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ABSTRACT

Poster Abstract

1: PHARMACOLOGY AND BIOCHEMISTRY

P001 | Novel orexin receptor-2 agonists developed using structure-based drug design: Prototype compounds promote wakefulness and reduce cataplexy in orexin/ataxin-3 and wt mice

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Objectives/Introduction: Narcolepsy Type 1 (NT1) is caused by the profound loss of orexin-producing neurons, resulting in dysregulation of sleep/wake and energy homeostasis. The orexin/ataxin-3 (Atax) mouse recapitulates the orexin neurodegeneration of NT1, exhibiting cataplexy episodes and decreased wakefulness. Here we present the profile of ORX-849, an early prototype oral orexin receptor 2 (OX2R) agonist, and other novel selective OX2R agonists developed using structure-based drug design with an OX2R stabilized receptor (StaR®) protein and high-resolution protein crystallography.

Methods: *In vitro* calcium mobilization (FLIPR), β-arrestin and inositol-phosphate accumulation assays are performed in Chinese hamster ovary cells stably expressing human recombinant OX2R or orexin receptor 1 (OX1R). Electrophysiological recordings are performed on brain slices from the ventral tuberomammillary nucleus (TMN) in mouse hypothalamus. *In vivo* efficacy in enhancing wakefulness is evaluated in wild type (WT) and Atax mice during their rest phase using Piezo Sleep, a rapid non-invasive method for classifying sleep and wakefulness by unsupervised machine learning based on physiologically relevant readouts. Electroencephalogram (EEG), electromyogram (EMG), and video recordings are used in Atax mice during their active phase to evaluate effects on arousal states and cataplexy.

Results: ORX-849 and related compounds behaved as a potent, full agonists at OX2R relative to the native ligand orexin-A (OXA) in the FLIPR assay. These compounds have been profiled further, and show >5000-fold selectivity over OX1R. In whole cell current-clamp recordings in the mouse TMN, ORX-849 depolarized membrane potentials (+TTX EC50 = 19 nM, max DmV = 13.5) and produced action potentials (-TTX, frequency, Hz = 0.42 +/− 0.13 at 300 nM) similar to OXA. In the Piezo Sleep assay, oral administration of ORX-849 increased time awake in WT mice (n = 16) at 10 mg/kg (F(2.82,41.4) = 18.7, p < 0.0001). In Atax mice (n = 10), oral administration of ORX-849 increased time awake at 1 mg/kg (F(2.24,20.1) = 64.6, p < 0.0001) and decreased cataplexy episodes at 3 mg/kg (F(1.70,15.3) = 26.8, p < 0.0001) as measured in the EEG/EMG/video assay.

Conclusions: High-resolution protein crystallography using the OX2R StaR® protein and computational modeling have been used to develop early prototype OX2R agonists with the potential to treat the primary symptoms of NT1 and other sleep/wake disorders.

Disclosure: Yes

Conflict of Interest statement: Disclosures/Acknowledgements: Sponsored by Orexia Therapeutics, a Centessa Pharmaceuticals company. We thank Drs. Emmanuel Mignot and Emiliangelo Ratti for scientific input.

P002 | Sex differences in an opioid withdrawal-induced sleep phenotype

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Objectives/introduction: Sex differences have been described in the various stages of substance use disorders, from progression to addiction, to withdrawal (WD) experience and ultimately relapse. Women display a faster escalation to addiction, experience more pronounced aversive withdrawal (WD) symptoms, and, finally, a higher propensity to relapse than men. Sleep disturbance is an important risk factor contributing to relapse to substance use. We describe here a preclinical model of opioid WD exhibiting sex differences in WD-associated sleep phenotype.

Methods: Male (N = 7) and female (N = 7) C57BL/6 mice were instrumented with telemeters that record EEG, EMG, activity, and body temperature (F20-EET; DSI, St-Paul, MN). All mice received 2 treatments separated by a 16-day washout period. Mice received vehicle (0.9% NaCl; volume:10 ml/kg) or ascending doses of morphine (5, 10, 20, 40, and 80 mpk; volume:10 ml/kg) for 5 days at ZT1 and 13. Recordings for the first 59 h after treatment discontinuation, and 24 h on day 5, were scored for sleep state using automated methods (Somnivore V 1.0.72) and sleep architecture was analyzed.

Results: Morphine was acutely wake-promoting for 6 h after the final dose in both sexes. Males and females then exhibit a 2–3 h NREM rebound prior to the transition to the light period. NREM and REM sleep increased during the first WD dark period in both sexes. While other sleep architecture measures weren't altered in males, NREM ($F_{(1,12)} = 15.04$, $p = 0.002$) and wake ($F_{(1,12)} = 9.25$, $p = 0.01$) bout number increased and NREM ($F_{(1,12)} = 7.39$, $p = 0.02$) and wake ($F_{(1,12)} = 6.38$, $p = 0.03$) bout duration decreased across the early WD period in females. Female mice also exhibit reduced body weight following morphine treatment (−2.45 ± 0.37 g; $p < 0.001$) compared to vehicle-treated females. There were no significant differences in sleep architecture on WD day 5.

Conclusions: Differences in sleep architecture were restricted largely to the first 36 h of WD. Morphine-treated female mice exhibited pronounced decreases in body weight during dosing and sleep fragmentation during WD, while males didn't. These data suggest higher sensitivity to morphine and a more distinct aversive sleep phenotype in female mice, results that mirror clinical data.

Research supported by the NIH HEAL Initiative (R01HL150836).

Disclosure: No

P300 | Effects of a bedtime pulsatile-release caffeine (160 mg) formula on the EEG and cardiac autonomic activity during sleep initiated 4.5 h after intake

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Background: The dose-effect relationships of caffeine on the sleep EEG and the effects of caffeine on cardiac autonomic activity during sleep are poorly understood. We tackled these questions by analyzing simultaneously collected caffeine levels, quantitative EEG, heart rate and heart rate variability (HRV) data during a sleep opportunity following intake of a delayed, pulsatile-release caffeine formula to counteract sleep inertia (Dornbierer et al., 2021; doi.org/10.1038/s41598–021–98376-z).

Methods: Twenty-two healthy young men ingested in randomized, double-blind, cross-over fashion at their habitual bedtime (10:30 p.m.), 160 mg delayed-release caffeine or placebo. We kept them awake under controlled conditions until 3:00 a.m., before giving them a 4-h sleep opportunity. Without disturbing their sleep, we collected hly blood samples during standard polysomnography (Artisan®, Micromed, Mogliano Veneto, Italy), and quantified the evolution of caffeine in plasma with ultra-high-performance liquid chromatography. Complete data sets of 21 participants were available. We analyzed the data with mixed-model ANOVAs and two-tailed, paired t-tests adjusted for multiple comparisons.

Results: Mean caffeine concentrations during sleep opportunities exhibited high individual variability ranging between 0.2 and 18.4 μmol/l. Slow wave-activity (0.75–4.5 Hz; C3–A2) decreased from the 1st to the 2nd NREM sleep episode ($F1,81 = 9.4$, $p < 0.003$) and was reduced by caffeine compared to placebo ($F1,81 = 4.1$, $p < 0.05$). In the first two NREM sleep episodes, the decrease was restricted to the 0.75–2.75 Hz range and showed a large effect size (Cohen's $d > 0.8$). Throughout the sleep opportunity, heart rate was modulated by sleep-wake states ($F4,199 = 10.2$, $p < 0.0001$) and reduced during caffeine exposure compared to placebo ($F1,199 = 13.7$, $p < 0.0003$; mean reduction: 2.7 ± 3.1 bpm). Caffeine also affected multiple measures of HRV, such that in N2 sleep high-frequency (0.15–0.4 Hz) HRV was increased, median differences of successive RR intervals were prolonged, and the proportion of successive RR intervals over 50mswas enhanced (pall < 0.01).

Conclusions: Caffeine potently reduced EEG 0.75–2.75 Hz power density in NREM sleep without changing sleep architecture. Ongoing correlation analyses indicate that plasma caffeine levels of ~10 μmol/l must be present to exert this effect. The caffeine induced changes in heart rate and HRV suggest elevated parasympathetic activity compared to placebo.

Disclosure: Yes

Conflict of Interest statement: The work was supported by Swiss National Science Foundation (# 320030_163439) and institutional funds.

P301 | Long term effect of a single dose of caffeine on sleep, the sleep EEG and neuronal activity in the lateral hypothalamus under constant darkness

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Introduction: Caffeine is a central nervous system stimulant that influences both sleep and the circadian clock. Light is a strong zeitgeber and it is known to interact with the effect of caffeine on the sleep. Thus, we performed caffeine administration under constant dark conditions and studied the effect on sleep and the circadian rhythm.

Methods: We performed long-term (2 days) electroencephalogram (EEG)/electromyogram recordings combined with multi-unit neuronal activity recordings in the peduncular part of the lateral hypothalamus (PLH) under constant darkness in Brown Norway rats and investigated the effect of a single caffeine treatment (15 mg/kg) or saline control at CT 1.

Results: After an initial reduction in sleep, and an increase in waking and activity in the first h after administration, also on the second recording day after caffeine administration, rapid eye movement (REM) sleep was still reduced (n caffeine = 13, *n* saline = 10, factor "treatment", $p = 0{,}0259$, two way ANOVA). Analysis of the EEG showed that power density in the theta range during waking and REM sleep was increased for at least two days ($n = 9$ animals; waking: first day, factor "treatment", $p < 0{,}0001$, second day, factor "treatment", $p < 0{,}0001$; REM sleep: first day, factor "treatment", $p < 0{,}0001$, second day, factor "treatment", $p < 0{,}0001$; two way ANOVA). Neuronal activity in PLH was also increased for two days after the treatment, particularly during non-rapid eye movement sleep ($n = 5$ animals,

factor "treatment", $p < 0{,}0001$ for both the first and second day, two way ANOVA).

Conclusion: The data reveal long term effects of a single dose of caffeine on vigilance states, EEG and neuronal activity in PLH. The absence of a light-dark cycle may have enabled the expression of these long term changes. It therefore may be that caffeine, or its metabolites, has a stronger and longer lasting influence, particularly on the expression of REM sleep, then acknowledged until now.

Disclosure: No

2: CELL AND MOLECULAR BIOLOGY AND GENETICS

P004 | Epigenetic regulation of orexin neurons by miRNAs

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Narcolepsy type 1 is a sleep disorder characterized by excessive daytime sleepiness and cataplexy (sudden loss of muscle tone triggered by positive emotions). Genetic studies showed that narcolepsy is associated with the human leukocyte antigen (HLA) locus. Postmortem brain analysis showed a large reduction of orexin-producing neurons in the lateral hypothalamus of narcolepsy patients. Narcolepsy patients show a deficiency of orexin-A neuropeptide in the cerebrospinal fluid (CSF). This deficiency is supposed to be due to an autoimmune attack targeting hypothalamic orexin neurons. An alternative possibility is a decreased or absence of orexin gene expression. Transcriptional control of orexin is not well-known. In this study the role of miRNAs as epigenetic regulators of orexin gene expression were tested. MicroRNAs (miRNAs) are small, non-coding, highly conserved RNAs which can block mRNA translation into protein. Dicer is an essential protein in the production of mature and functional miRNAs that can regulate or silence expression of target genes. Thus, we inactivated miRNAs in orexin neurons by deleting the floxed-Dicer alleles in orexin-Cre-ki mice (Orexin-Dicer-ko). We found that orexin expression is completely lost in Orexin-Dicer-ko mice, both at mRNA and protein levels, resulting in the typical narcolepsy symptoms such as cataplexy, sleepiness, difficulties to maintain long wakefulness and shorter Rapid-Eyes-Movements (REM) sleep latency. Interestingly, conditional deletion of miRNAs maturation in adult mice by using a tet-off system (Orexin-Dicer-cko) did not lead to the loss of orexin neurons 4 weeks after shutting down of miRNA maturation but a decrease of orexin neurons is observed 8 weeks after Dicer deletion. These results suggest that orexin neurons could survive without mature miRNAs during 4 weeks but not 8 weeks. Our findings suggest a major role for miRNAs in the development and maintenance of orexin neurons and add Orexin-Dicer-ko and Orexin-Dicer-cko as news mouse models of narcolepsy.

Keywords: microRNA, Gene expression, Dicer, Cataplexy

Disclosure: No

P302 | Characterization of *t* cell receptors reactive to $HCRT_{NH2}$, $PHA_{273-287}$ and NP_{17-31} in control and narcolepsy patients

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Introduction: Type 1 narcolepsy (T1N), a disorder caused by hypocretin/orexin (HCRT) cell loss, is associated with HLA-DQ0602 (98%) and *T* cell receptor (TCR) polymorphisms. Increased CD4+ *T* cell reactivity to HCRT, especially DQ0602 presented amidated C-terminal HCRT ($HCRT_{NH2}$), has been reported and homology with $pHA_{273-287}$ flu antigens from pandemic 2009 H1N1, an established trigger of the disease, suggest molecular mimicry.

Methods: We extended DQ0602 tetramer and dextramer data to 77 cases and 44 controls cultured with $HCRT_{NH2}$, $pHA_{273-287}$ and NP_{17-31}. Antigen restricted single cell sequencing of TCR and gene expression was performed in both plates and 10X workflow. A total of 709 TCRs from these three antigens were transfected into Jurkat 76 cells for functional activation.

Results: We confirmed Differential CD4+ *T* cell reactivity in T1N and found that fewer TCRs isolated with $HCRT_{NH2}$ (~11%) versus $pHA_{273-287}$ or NP_{17-31} antigens (~50%)were activated by their ligand. We also found preferential usage of TR genes and activated TRAJ24/TRBV4–2 TCRs by each epitope. TCRs activated by flu antigens are primarily clustered into clades, whilst HCRT TCRs are sporadically distributed and distantly related to flu. Lastly, distinct clusters were identified according to antigen restricted single cell gene profiling and activated TCRs were mainly found in cytotoxic CD4+ *T* cells.

Conclusions: Single cell characterization did not reveal phenotype differences in influenza versus $HCRT_{NH2}$ reactive *T* cells and analysis of TCR sequences shows motifs predicting of activation, but no cross-peptide reactivity. Our results therefore suggest that molecular mimicry between HCRT and $pHA_{273-287}$ or NP_{17-31} is unlikely.

Disclosure: No

P303 | The heritability of upper airway dimensions using MRI scans in twins

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Introduction: Obstructive sleep apnea (OSA) is a common illness which is characterized by the repetitive collapse of the upper airways during sleep, most likely in the oropharyngeal region. Heritable factors significantly contribute to the disease development; however, the heritability of the upper airway dimensions determining the collapsibility of the upper airways is less known. In the current study we aimed to quantify the impact of heritable and environmental factors of the upper airway dimensions in twins using magnetic resonance imaging (MRI).

Methods: We completed head and neck MRI imaging on 110 (66 monozygotic and 44 dizygotic, age median and Q1–Q3: 53 (44–63.75) years) adult twins from the Hungarian Twin Registry. We completed cephalometric, soft tissue and fatty tissue space measurements on T1- and T2-weighted images in sagittal, coronal and axial planes. The analysis of the genetic and environmental determination of the measured parameters was performed with an ACE twin statistical model.

Results: We found a strong genetic determination in the anteroposterior diameter of the tongue and the thickness of the submental fatty tissue of the neck. Other parameters of the tongue, soft palate and uvula has shown moderate heritability, while we found strong environmental determination in the thickness of the parapharyngeal fatty tissue, the thickness of the pharyngeal wall, and the smallest diameter of the posterior upper airways.

Conclusion: Our twin study can help better understand the genetic and environmental background of anatomical structures involved in the onset of sleep apnea.

Disclosure: No

P304 | Genetic variants associated with craniofacial features are related to obstructive sleep apnea risk and severity in two multinational cohorts

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Introduction: Obstructive sleep apnea (OSA) is a genetically complex disease, involving many genes that interact with various environmental and intermediate pathogenic traits. Specific pathways related to OSA include those involved with obesity, craniofacial features, and ventilatory control. In this study, we examined whether variants within candidate genes previously associated with variability in craniofacial features influenced OSA risk and severity within two multinational cohorts.

Methods: A total of 2,099 individuals with genetic data, in-laboratory or home-based polysomnography, and photography-based craniofacial data from either the Korean Genomic Epidemiology Study (KoGES; $n = 1292$) or the Sleep Apnea Global Interdisciplinary Consortium (SAGIC; $n = 807$) were included. A total of 11,262 single nucleotide variants within 30 candidate genes associated with craniofacial features in prior publications and validated ($p < 0.05$) in genome-wide meta-analysis using craniofacial measurements from digital photographs in the current datasets were included in genetic association analyses. Primary outcomes included the apnea-hypopnea index (AHI) and OSA case/control status (case-definition: AHI ≥10). Genetic association analyses were performed by linear (AHI) or logistic (OSA status) regression, with adjustment for age, sex, 5 ancestry/population-informative principal components, and body mass index.

Results: Variants within *calcium voltage-gated channel auxiliary subunit alpha2delta 3* (*CACNA2D3*) and *parkin RBR E3 ubiquitin protein ligase* (*PRKN*) were associated with AHI (rs61446413 within *CACNA2D3*: G allele, β [SE] = 0.16 (0.04), $p = 1.14 \times 10^{-5}$; rs6934514 within *PRKN*: A allele, β [SE] = 0.10 (0.03), $p = 2.14 \times 10^{-3}$) and with OSA status (rs6786051 within *CACNA2D3*: C allele, odds ratio [OR] [SE] = 0.73 (0.10), $p = 1.93 \times 10^{-3}$; rs9458572 within *PRKN*: *T* allele, OR [SE] = 0.64 (0.14), $p = 1.17 \times 10–^{3}$) in meta-analysis. Moreover, rs1649166 within *fibroblast growth factor receptor 2* (*FGFR2*) was associated with OSA risk (T allele, OR [SE] = 1.42 (0.08), $p = 1.31 \times 10^{-5}$).

Conclusions: We showed that certain variants within genes previously reported to be related to craniofacial features and associated with craniofacial traits in the current datasets are also associated with OSA risk and severity in two multinational cohorts. This study provides more information about the important role of genetic pathways related to craniofacial features in the development of obstructive sleep apnea.

Disclosure: No

P604 | Investigating the effects of endoplasmic reticulum stress on mouse cortical local field potential activity and sleep pressure

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The restorative nature of sleep is supported by subjective experience as well as its homeostatic and local regulation in the mammalian cortex. It has been proposed that intense spiking and synaptic activity during waking periods results in challenges to cellular physiology that leads to cellular stress, which sleep then serves to restore. In particular, prolonged wakefulness is associated with a marked increase in endoplasmic reticulum (ER) stress response markers in mouse cortex. Yet, it remains to be determined whether ER stress underlies the accumulation of sleep pressure following wakefulness. To address this question, we performed continuous recordings of sleep and wake in freely-moving adult C57BL/6J mice ($n = 8$) following induction of ER stress in the cortex using intracortical Tunicamycin injection. During 72 h following Tunicamycin (TUN) or Vehicle (VEH) injections, we observed no differences in sleep-wake architecture. Tunicamycin injection increased LFP spectral power density across frequencies between 0.5–30 Hz compared to Vehicle (2-way ANOVA, treatment: $p = 2 \times 10^{-57}$, frequency: $p = 1.0$, interaction: $p = 1.0$; TUN $n = 8$, VEH $n = 4$). Spectral power in the delta frequency range (0.5–4 Hz) during NREM sleep, which is a marker of sleep intensity, was greater following Tunicamycin compared to Vehicle during 0–72 h post-injection (2-way ANOVA, treatment: $p = 2 \times 10^{-4}$, time: $p = 0.004$, interaction: $p = 1.0$), with the greatest difference at the 6–12 h time

point (TUN: 118.2 ± 5.2%, VEH: 99.4 ± 11.8%; *T*-Test, $p = 0.134$). Likewise, spectral power in the low theta frequency range (4.5–6 Hz) during wake, which is a marker of sleep pressure, was also greater during 72 h following Tunicamycin (2-way ANOVA, treatment: $p = 2 \times 10^{-5}$, time: $p = 0.569$, interaction: $p = 0.987$). We observed these differences in NREM delta locally at the injection site, but not in the opposite hemisphere (2-way ANOVA, treatment: $p = 0.070$, time: $p = 6 \times 10^{-7}$, interaction: $p = 0.998$). Whereas, the differences in wake low theta frequency power was present at the injection site and the opposite hemisphere (2-way ANOVA, treatment: $p = 3 \times 10^{-7}$, time: $p = 0.039$, interaction: $p = 0.911$). Together, preliminary findings from this study suggest that Tunicamycin-induced ER stress in mouse cortex may be having broad effects on brain activity, and especially resulting in an increase in markers of sleep intensity and homeostatic sleep pressure.

Disclosure: No

P605 | Human leukocyte antigen-typing in patients with excessive daytime sleepiness

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Objectives: Narcolepsy is a disorder recognized by excessive daytime sleepiness (EDS). Several studies demonstrated its association with human leukocyte antigen (HLA) DQB1*0602, DQA1*0102, and DRB1*15. Our study aimed to perform HLA-typing on patients with EDS. Moreover, we performed HLA-typing for family members of the patients.

Methods: We studied 83 patients with EDS and 77 of their first-degree relatives. Patients filled out a questionnaire including Epworth Sleepiness Scale (ESS), and underwent polysomnography (PSG) and multiple sleep latency test (MSLT). The whole blood samples were drawn from the patients and their families for HLA typing (class II). International classification of sleep disorders-2 (ICSD-2) criteria was used as the gold standard for diagnosing narcolepsy.

Results: HLA DQB1*0602 was present in 20 (45.5%) of narcoleptic patients and 2 (5.1%) of patients with other causes of EDS. Prevalence of DQB1*0602 in family members of narcoleptic patients were higher than family members of patients with other causes of EDS (38% vs. 11.1%, $p = 0.06$). DQB1*0602, DQA1*0102, and DRB1*15 were more prevalent in narcoleptic patients with cataplexy than narcoleptic patients without cataplexy and patients with other causes of EDS. The sensitivities of the DQB1*0602 for diagnosing narcolepsy, narcolepsy with cataplexy, and narcolepsy without cataplexy were 40%, 60%, and 20%, respectively; while specificities were 93.9%, 87.9%, and 70.6%, respectively.

Conclusion: HLA typing can be helpful in patients with atypical cataplexy and inconclusive MSLT results. More studies of Iranian narcoleptic patients are required for analyzing their HLA sequences.

Disclosure: No

P606 | Genetic determinants of chronic fatigue syndrome

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Introduction: Chronic fatigue syndrome (CFS) is a severe chronic disease with an unknown disease mechanism. A core characteristic of the disease is debilitating fatigue that worsens after physical or mental exercise and is not resolved by rest. Another key factor includes symptoms of dysautonomia. While mechanisms ranging from metabolic, immune, and psychiatric symptoms have been suggested, the causal mechanisms behind CFS and dysautonomia are largely unknown. Therefore, it is crucial to identify mechanisms that contribute to the risk and prognosis of CFS as this may provide tools to understand disease mechanisms and provide treatment options.

Methods: Our goal was to identify genetic risk factors that contribute to CFS in order to better understand biological mechanisms and causal factors behind the risk of developing CFS by using population cohorts and genetic tools. Furthermore, we explored immune markers in CFS in order to understand the potential role of immunity in disease risk and manifestation.

Results: To capture the symptoms of dysautonomia and fatigue and to estimate their population prevalence we defined a phenotype of fatigue and dysautonomia using 14 ICD codes of diseases that contained dysautonomia and fatigue. A total of 15 628 individuals in the UK biobank had ICD-code based fatigue and dysautonomia diagnosis. GWAS analysis identified a genetic variant with a statistically significant association with fatigue and dysautonomia at the rs7084501 in gene *ADRA2A* ($p = 2.1e\text{-}11$), which codes for the Alpha-2-adrenergic receptor. We then explored the effect on expression in GTEx. The same variant was an eQTL in arterial tissue for*ADRA2A* ($p = 3.0e\text{-}15$).

Conclusions: Our findings indicate that *ADRA2A* may be involved in the etiology of fatigue and dysautonomia. This finding points to the possible biological mechanisms for dysfunction of the autonomic nervous system in CFS, fatigue, and dysautonomia.

Disclosure: No

4: NEUROBIOLOGY

P008 | Orexin/hypocretin action on the dopaminergic system modulates theta during REM sleep and wakefulness

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Introduction: The dopaminergic (DA) and hypocretinergic (HCRT) systems both critically modulate the circuits that regulate moment-to-moment arousal level, brain state, and behaviour. The interplay between the two systems however is not elucidated. To unravel their interactions, we inactivated HCRT-to-DA neuronal connectivity by selective disruption of *HcrtR1/OxR1*, or*HcrtR2/OxR2*, or both HCRT receptors, in DA neurons.

Methods: Conditional alleles of the *HcrtR1*and*HcrtR2*genes were created (*HcrtR1*^{flox} and *HcrtR2*^{flox}), and mice with DA cell-specific gene disruption were generated using a *dopamine transporter* (*Dat*) Cre driver. The resulting *HcrtR1*$^{Dat\text{-}CKO}$, *HcrtR2*$^{Dat\text{-}CKO}$, *HcrtR1+2*$^{Dat\text{-}CKO}$ mice, and their respective controls were recorded by EEG/EMG/video polysomnography during a 9-day experimental timeline under exposure to a sequence of behavioral paradigms. Parameters were analyzed in CKO-CTR pairwise comparisons.

Results: Chronic loss of HCRTR2 in DA neurons profoundly increased theta power in wakefulness and REM sleep (wake: 6.75–9.75 Hz, REMS: 6.0–8.25 Hz; 2-way ANOVA, Bonferroni post-hoc test, $p < 0.05$, $n = 9$ for each genotype). Episode duration and total time spent in theta-dominated-wakefulness (TDW) and REMS were lengthened (e.g., mean TDW bout during enforced wake, CKO2: 18.6 ± 1.7 s vs CTR2: 9.6 ± 1 s, $p < 0.05$, unpaired *t*-test, $n = 9$ each), and theta/fast-gamma coupling was increased in both states (modulation index in dark phase TDW: CKO2 > CTR2, $p = 0.0464$; light phase REMS: CKO2>CTR2, $p = 0.0351$; $n = 9$ each). Enhanced waking theta in *HcrtR2*$^{Dat\text{-}CKO}$ mice was found to be uncoupled from locomotor activity, while it was accompanied by reduced infra-theta, but increased fast-gamma activity, indicative of constitutive electrocortical hyperarousal. These effects were not seen in *HcrtR1*-ablated dopaminergic mutants, which tended to show EEG phenotypes opposite of*HcrtR2*-ablated mice, resembling those resulting from the loss of both receptors.

Conclusions: Our results suggest a clear genetically-defined link between monosynaptic hypocretin-to-dopaminergic connectivity and the power of theta oscillations, with a differential role of HCRTR2 in cross-frequency coupling and attentional processes.

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Disclosure: No

P009 | Sleep fingerprinting: Individual identification using sleep macro- and micro-architecture

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Brain fingerprinting is an emerging technique that has significant potential in leveraging individual differences for the improved prediction of behaviour (e.g., memory) and clinical (e.g., neuropsychiatric) outcomes. There is evidence suggesting that certain phenotypes of sleep might be markedly trait-like, however the uniqueness of sleep architecture and microarchitecture (neurophysiological activity) during the sleep state has yet to be assessed in a comprehensive manner.

We studied 52 good sleepers (mean age = 33.1 ± 18.8 y.o, 31F), who slept three nights in a laboratory (1 adaption night, 2 experimental nights). PSG recordings included EEG sampled at 512 Hz, EOG and EMG (Somnomedics, Germany), scored according to AASM guidelines to extract parameters of sleep macroarchitecture (SA; e.g., total sleep time, sleep efficiency, %stages). Features of sleep microarchitecture (MA) were also extracted, including the density, amplitude and duration of automatically detected events (slow oscillations and spindles), as well as the slope, offset and sigma peaks in power spectral activity. The trait-index of each variable was defined as the ratio of inter-individual variability to the intra-individual variability (across 2 experimental nights). A support vector machine (SVM) classifier was trained on the data from one experimental night, and the data from the other experimental night was used to predict the individual that each set of features belonged to. Three models were created that included: (1) both SA and MA; (2) only SA; (3) only MA. All features were also used to predict the age of participants in a leave-one-out cross validation linear regression.

The trait index was >1 for every variable, however the index for MA was significantly higher than those for SA (5.9 vs. 2.1, $t = 5.5$, $p < 0.001$). The SVM classifier was able to predict the correct individual with 86.5% accuracy using SA + MA, however accuracy was much higher using MA (89%) than using SA (19%). Finally, we were able to significantly predict the age of participants ($r = 0.78$, $p < 0.001$).

Features of sleep appear to be highly trait-like, however sleep microarchitecture is much more unique to individuals than features of sleep macroarchitecture. Sleep fingerprinting may have significant potential in predicting other demographic or behavioural features (e.g., memory consolidation).

Disclosure: No

P010 | The short-lasting hybrid state of wakefulness induced by psychedelic compound 5-MeO-DMT

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Introduction: The traditional view that the serotonergic system plays an important role in subcortical control of global sleep-wake states is supported by observations that administration of serotonergic psychedelics suppresses rapid eye movement (REM) sleep and results in increased sleep fragmentation. However, the possibility that potentiating the serotonergic system through psychedelics results in an occurrence of altered states of vigilance has received less attention. We hypothesise that the serotonergic system plays a role in controlling the quality rather than the quantity of specific sleep-wake states, as reflected in the EEG. The aim of this study is to characterise the effects of a short-lasting psychedelic compound, 5-methoxy-N, N-dimethyltryptamine (5-MeO-DMT), on brain activity and sleep-wake states in laboratory mice.

Methods: 11 adult male C57BL6 mice were implanted with frontal and occipital EEG and nuchal muscle EMG. Each animal received an IP injection of 5-MeO-DMT (5 mg/kg, in 1 mg/ml saline) and vehicle solution at either light onset ($n = 7$) or dark onset ($n = 4$).

Results: In the first h following the injection of 5-MeO-DMT at light onset, the first episode of REM sleep was delayed by on average 44.12 min ($t = 4.27$, $p = 0.005$, $d = 1.61$). During the initial wakefulness, EEG theta-frequency activity (6–10 Hz) was suppressed by 42.92 % ($t = -4.46$, $p = 0.004$, $d = -1.69$), while EEG slow wave activity (0.5–4 Hz) was increased by 52.21 % ($t = 5.20$, $p = 0.002$, $d = 1.97$). These changes returned to baseline levels within 60 min, and no further changes in the total amount of vigilance states were observed beyond this point.

Conclusions: Our data support the notion that the effects of 5-MeO-DMT are short-lasting, as the changes in vigilance states and the EEG were primarily apparent within 1 h from the injection. Importantly, the observed effect on state-specific brain activity patterns during waking after administration of 5-MeO-DMT reflect an occurrence of qualitatively different, "hybrid" or "dissociated" state, having features of both waking and sleep. Subsequent analysis of the animals injected at dark-onset will help to understand whether the features of this hybrid state are sleep-pressure dependent or circadian dependant.

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Disclosure: No

P011 | Blue light modulates task-dependent thalamo-cortical connectivity during an auditory attentional task

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Introduction: Exposure to blue light stimulates alertness and performance by affecting a widespread set of task-dependent brain regions. Light information is considered to first reach subcortical regions which in turn affects non-visual regional cortical activity. Here, we aim to provide an empirical demonstration of this putative scenario in humans.

Methods: Twenty healthy young subjects (24.4 y ± 2.6; 12 women) completed an attentional auditory oddball task, which consisted in detecting rare (20%) deviant tones (100 Hz) among more frequent (80%) standard (500 Hz) ones, during fMRI acquisition in an ultra-high-field (7T) scanner. While performing the task, participants were exposed to 30 s-blocks of blue enriched (61 $\mu W/cm^2$) or orange monochromatic light (5.28×10^{12} photons/cm^2/s) interleaved by ~15 s darkness periods. ANTs, FSL, and SPM12 were used for data preprocessing, while standard univariate analysis was completed with SPM12. Effective connectivity was computed using Dynamic Causal Modeling (DCM), as embedded in SPM12. For DCM, we employed parametric empirical Bayes (PEB) to estimate connections strength and Bayesian model reduction (BMR) to prune any driving effects not contributing to the model evidence.

Results: Univariate analysis showed that the intraparietal sulcus (IPS), involved in attention, and the pulvinar (PUL), an alertness-related subcortical structure, were significantly recruited by deviant tone detection ($p < 0.05$ FDR-corrected). We first specified and estimated across all subjects a model where both lights modulated the reciprocal connections between IPS and PUL and then performed a PEB second-level analysis. BMR on the PEB analysis revealed that blue enriched light, but not orange light, significantly modulated PUL-to-IPS connectivity by switching the influence of PUL on IPS from inhibition to excitation (posterior probability>.95). In contrast, IPS-to-PUL connectivity was not significantly affected by lights.

Conclusions: The pulvinar is a subcortical structure most consistently modulated by blue light exposures during a cognitive task in human neuroimaging studies. It is involved in the interaction between alertness and cognition in humans and is critical in the relay of information to the cortex. Our results provide empirical data suggesting that blue light affects cognitive activity by modulating task-dependent information flow from subcortical to cortical areas.

Disclosure: No

P012 | Establishment of an assay to measure orexin 2 receptor (OX2R) Protein distribution in rodent brain sections by ***in vitro*** autoradiography using radiolabeled OX2T-selective antagonist [^{3}h]-empa

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Objectives/Introduction: Orexin performs various physiological functions via activation of two types of G-protein coupled receptors: orexin 1 receptor (OX1R) and orexin 2 receptor (OX2R). Owing to pivotal function of OX2R in wakefulness and other biological functions,

OX2R-selective agonists are being developed. A detailed understanding of OX2R protein distribution is essential for mechanism of action analysis of OX2R-selective agonists, however, this has been hindered by the lack of OX2R-selective antibodies. *In vitro* autoradiography is useful for evaluating receptor distribution when a highly selective radioligand is available. In this study, the selectivity of [^{3}H]-EMPA, a radiolabeled OX2R-selective antagonist, for OX2R protein was assessed using *in vitro* autoradiography in brain sections from OX2R knockout (KO) mice and their wild-type (WT) littermates. Specific binding of [^{3}H]-EMPA to OX2R in brain sections from mice and rats was also determined using non-specific binding (NSB) under excess JNJ-10397049, another OX2R selective antagonist.

Methods: Immediately following euthanasia, the brains of OX2R KO mice and their littermate WT mice or Sprague–Dawley rats ($n = 4$ per group) were rapidly dissected and promptly frozen in pre-cooled 2-methylbutane in dry ice. Coronal sections were dissected at six brain levels corresponding to the regions of interest with reference to stereotaxic coordinates and were mounted on glass slides. Tissue sections were incubated at room temperature in assay buffer containing 3 nM [^{3}H]-EMPA with or without JNJ-10397049. After washing and air-drying, the sections were exposed to BAS-TR2025 Fuji imaging plates.

Results: A high density of [^{3}H]-EMPA binding was observed in brain sections from WT mice, which disappeared in those from OX2R KO mice, suggesting OX2R-selective binding of [^{3}H]-EMPA. The binding pattern of [^{3}H]-EMPA in mouse brain sections determined by NSB with JNJ-10397049 or OX2R KO mice were very similar. Thus, combination of [^{3}H]-EMPA and JNJ-10397049 can detect OX2R selective binding of [^{3}H]-EMPA in mice. A high density of [^{3}H]-EMPA binding observed in rat brain sections was also eliminated by excess JNJ-10397049.

Conclusions: *In vitro* autoradiography using [^{3}H]-EMPA with JNJ-10397049 is useful for evaluating OX2R protein distribution in mouse and rat brain sections.

Disclosure: This work was conducted by Takeda Pharmaceutical Company Limited.

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P013 | Dependence of antimicrobial activity of the inhibitors of monoamine reuptake on their antidepressant efficacy on sleep disturbances in rats exposed postnatally to antimuscarinic drug

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Introduction: Unlimited uses of antibiotics, frequently applied arbitrarily, contributed to the development of "antibiotic resistance". Therefore searching for non-antibiotic agents with antimicrobial activity, antidepressants among them, is very topical. We investigated whether the antimicrobial activity of antidepressants can be dependent on their effectiveness in restoring sleep disturbances in animal models of depression. Problem is important because antidepressants are supposed to recover disturbances characteristic of depression, sleep disorders among them, and they mustn't additionally worsen sleep and general condition of patients.

Methods: Wild white rat pups ($n = 10$) received a subcutaneous injection of Scopolamine, 30 mg/kg, two times daily, from postnatal day 7–28. Control rat pups received saline. Sleep EEG registration have been started 8–12 weeks after the drug discontinuation. Sleep EEG registration in control rats was made for three consecutive days, 10:00 a.m.–8:00 p.m. In experimental groups, EEG registration, with the same duration as in controls, was started after intraperitoneal injection of non-SSRI Melipramin (Group I) and/or SSRI Fluoxetine (Group II) (10 mg/kg and/or 15 mg/kg).

Escherichia coli, Bacillus subtilis, Staphylococcus aureus and Mycobacterium phlei were used as test cultures. Melipramin, (0.01; 0.1 and 1 g/L) and Fluoxetine (0.01; 0.1 and 1 g/L) were used for the studying of antibacterial spectrum. Statistical treatment was made by Student's *t* test.

Results: In adult rats, with early postnatal exposure to the Scopolamine, sleep was disturbed significantly. Single-dose Melipramin worse more the sleep quality and wholly inhibited REM sleep during 4–5 h after injection. In the recovery period (24 h after drug injection) sleep quality became deteriorated; sleep interruptions increased, REM latency diminished, but its incidence raised. The effects of single-dose Fluoxetine were relatively weaker and short-term indicating to higher anti-depressive efficacy of the drug.

Antimicrobial activity of Melipramin and/or Fluoxetine on growth-development of Escherichia coli, Bacillus subtilis, Staphylococcus aureus and Mycobacterium phlei was dependent on their anti-depressive efficacy on sleep and has been only revealed by the selective inhibitor of serotonin reuptake, Fluoxetine.

Conclusion: Antimicrobial activity of antidepressants depends on their recovery efficacy on sleep disorders in adult rats with early postnatal exposure to the antagonist of MChS.

Disclosure: No

P014 | Novel methods for measuring diurnal fluctuation of Orexin-A and -B in monkey cerebrospinal fluid

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Objectives/Introduction: Orexins (hypocretins) are a family of neuropeptides with multiple physiological functions that have key roles in the regulation of waking and sleep states. Orexin concentrations in the cerebrospinal fluid (CSF) are decreased in patients with

narcolepsy; however, standard measurement techniques have poor specificity and reliability. We recently developed a novel analytical method for the detection of Orexin-A (OXA) and -B (OXB) in CSF. In this study, we used this method to evaluate diurnal fluctuations of OXA and OXB in monkey CSF.

Methods: CSF samples were collected at different timepoints on different days from cynomolgus monkeys via cisterna magna puncture or lumbar puncture under anesthesia. Anti-adsorptive additives (citric acid and Tween 80) were used to avoid non-specific binding of orexins. OXA and OXB levels in the CSF samples were measured using highly specific and sensitive nanoflow liquid chromatography-high resolution mass spectrometry (nanoLC-HRMS).

Results: Evaluation of the diurnal fluctuations of OXA and OXB in cisternal and lumbar CSF from cynomolgus monkeys revealed a sharp increase in the early light period, followed by a gradual increase to the maximum levels at the end of the light period, and then a sharp drop to the minimum levels during the early dark period. OXA levels were higher than OXB levels in both cisternal and lumbar CSF: the mean molar ratio of OXA to OXB was 5.3 ± 3.9 in cisternal CSF and 9.3 ± 3.4 in lumbar CSF (mean ± SD). Both OXA and OXB levels were higher in cisternal CSF than in lumbar CSF. Although basal OXA levels in individual monkeys showed substantial variations, the ratios between the maximum and minimum OXA levels of each monkey were similar. Each monkey showed consistent OXA and OXB levels after 10 months interval.

Conclusion: Diurnal fluctuation of OXA and OXB were detected in monkey CSF using nanoLC-HRMS. These data will help improve our knowledge of orexin biology.

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P308 | Balancing between sleep and wakefulness - the global effect of vibro-tactile stimulation on cortical activity during NREM sleep

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Objectives: Our study investigated the effect of repetitive vibro-tactile stimulations (VTS) on sleeping participants' cortical activity, searching for potential laterality effects regarding ipsilateral versus, contralateral hemispheres. A previous study showed that lateralized rhythmic auditory stimulation during NREM sleep results in a global increase in slow waves, regardless of the side of stimulation. In this study, VTS was used on index fingers, and the effects of stimulation were addressed by change in EEG spectrum and evoked potentials along temporo-spatial dimensions.

Methods: Stimulations applied by VTS in 8 s trial blocks at 1 Hz through NREM sleep ($N = 14$, age = 24.38 years) and resting wakefulness ($N = 15$, age = 24.93 years). Stimulations arrived in randomized blocks and targeted the left/right index finger or were absent (sham). EEG were recorded by 19 Ag/AgCl electrodes following the 10–20 system. EEG time-frequency changes locked to the stimuli were averaged across participants and conditions, including an additional 4-second-long baseline period. Cluster-based permutation tests (CBPT) were used to assess the effect of stimulus versus, sham and targeted vs. untargeted side.

Results: The average number of trial blocks /condition were 31.7 and 41.6, regarding NREM and Wakefulness. During NREM, a non-lateralized increase in EEG power appeared during stimulus versus, sham comparison in two clusters: first cluster (Tsum = 6218.9; cluster $p = 0.002$, 1–13 Hz) with fronto-central dominance, peaking between 1–4 Hz. Second cluster (Tsum = 2743.1; cluster $p = 0.01$, 14–22 Hz) covered central and posterior areas. During Wakefulness, only one cluster (Tsum = 2260.4; cluster $p = 0.005$, 11–20.5 Hz) emerged. No significant CBPT cluster appeared during the comparison of targeted versus, untargeted side stimulations (NREM: Tsum = 349.04; cluster $p > 0.5$ and Wakefulness: Tsum = 168.44; cluster $p > 0.5$).

Conclusions: Our study indicates that rhythmic VTS influences cortical activity during NREM sleep, forming an antero-posterior gradient of slow frequency activity increase at fronto-central areas, where this change may signify a sleep-protective effect. In addition, the widespread increase in fast frequency power observed over central sites during both sleep and resting wakefulness probably shows temporary increased environmental processing. The lack of laterality effect may be due to low statistical power or the absence of associated meaning to the VTS stimuli, giving the direction for further studies.

Disclosure: No

P309 | Brain temperature as a read-out of neuronal activity

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Background: Brain temperature is a fundamental physiological variable that affects numerous neural processes. We previously

demonstrated that in the mouse the daily dynamics in brain temperature are strongly influenced by sleep-wake states and that circadian and locomotor activity play subordinate roles (Hoekstra et al., 2019; Sela et al., 2021). Here, we further investigated the information contained in the temperature signal in gauging brain activity by assessing its ability to predict sleep-wake state transitions and by quantifying its dynamics at discrete EEG events during wakefulness and sleep.

Methods: We equipped 12 C57BL6/J mice with EEG and EMG electrodes and a thermistor to record cortical activity and temperature continuously for 4 days. EEG/EMG were manually scored at 4 s resolution for the sleep–wake states wakefulness, rapid eye movement (REM) sleep, and non-REM (NREM) sleep. Temperature was recorded at 10 Hz and EEG signals were recorded at 200 Hz and the EEG was analyzed for the occurrence of theta events during wakefulness and spindles during NREM sleep.

Results: We first show that changes in brain temperature can be used to reliably predict the 3 sleep-wake states. Encouraged by this strong correlation between brain state and brain temperature, we then assessed whether discrete EEG activities during sleep-wake states such as theta (6–10 Hz) and sigma (10–15 Hz) were accompanied by consistent changes in cortical temperature. We found that episodes of high spindle density coincided with an increase in temperature of ~0.02°C. While in single spindle event temperature raises by ~0.002°C. Moreover, we noted that temperature during episodes of NREM sleep fluctuated with a period of ~50 s, phase-locked with EEG sigma power consistent with the infra-slow oscillation generated by the locus coeruleus affecting spindle activity (Osorio-Forero et al., 2021). Also, theta activity, characteristic of goal-driven and exploratory wake behaviours, was associated with increases in brain temperature.

Conclusion: Brain temperature is a highly sensitive measure of neuronal activity and besides global brain states also informs on specific EEG events such as theta activity during wakefulness and NREM sleep spindles.

Disclosure: No

P310 | Unilateral monocular flash stimulation leads to local signatures of sleep pressure in the contralateral primary visual cortex in freely moving mice

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Objectives/Introduction: It is established that extended wakefulness leads to a global increase in electroencephalogram (EEG) slow-wave activity (SWA: power density between 0.5–4 Hz) during subsequent sleep. SWA is regulated at the local level, which led to the hypothesis that sleep is a use dependent process. While many models have been proposed to account for the global and local sleep regulation there is a scarcity of experimental models that afford the manipulation of sleep locally and physiologically in the neocortex of freely behaving animals. Here we present a new model for investigating the neurobiological mechanisms of local sleep based on selective local activation during waking.

Methods: We adopted a paradigm previously established in rats for investigating mechanisms of neuroplastic changes in the visual cortex (Manning et al.,2007). To induce sustained synaptic activity in the unilateral visual cortex, we built removable devices that enabled us to position light-emitting diodes (LEDs) in front of one eye of a freely behaving mouse. EEG and/or 16-channel laminar electrodes were used to record cortical activity. Animals were kept awake for 4 h starting at light onset under monocular light stimulation (8 Hz, train duration 2 s every 30 s, pulse duration 10 ms). Animals were allowed to sleep undisturbed during 24 h after the experiment. In all animals the visual stimulation reliably evoked responses in the contralateral visual cortex. No discernible responses were detected in the ipsilateral frontal or occipital EEG.

Results: Having established the experimental paradigm, we asked if it leads to signatures of high sleep pressure in the EEGs. During the first h after sleep deprivation combined with stimulation the occipital EEG spectral power density in part of the SWA frequency range (0.25–2 Hz) was consistently higher in the stimulated visual cortex (SEM: 50 ± 5.2% vs. 33 ± 5.2%, $n = 8$). A second stimulation generated a bigger difference between occipital derivations (SEM: 63 ± 7% vs. 42 ± 5%, $n = 8$).

Conclusions: These preliminary results establish a new model for local manipulations of neural activity in freely behaving mice, using peripheral sensory stimulation delivered at physiologically relevant (theta) frequency. This paradigm will be useful for investigating the neurobiological mechanisms of homeostatic sleep need.

Disclosure: No

P311 | Orexin 2 receptor (Ox2R) Protein distribution measured by ***in vitro*** autoradiography using radiolabeled Ox2R-selective antagonist [^{3}h]-EMPA in rodent brain and peripheral tissues

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Objectives/Introduction: Orexin performs various physiological functions via activation of two types of G-protein coupled receptors: orexin 1 receptor (OX1R) and orexin 2 receptor (OX2R). Owing to pivotal function of OX2R in wakefulness and other biological functions, OX2R-selective agonists are being developed. A detailed understanding of OX2R protein distribution is essential for determining the mechanism of action of OX2R-selective agonists;

however, this has been hindered by the lack of OX2R-selective antibodies. We have established experimental conditions to assess OX2R protein distribution in rodent brain sections by *in vitro* autoradiography with [^{3}H]-EMPA and JNJ-10397049. In this study, OX2R protein distribution in rats was comprehensively assessed in 51 brain regions and 10 peripheral tissues using *in vitro* autoradiography with [^{3}H]-EMPA.

Methods: Immediately following euthanasia, the brains of Sprague–Dawley rats ($n = 4$ per group) were rapidly dissected and promptly frozen in pre-cooled 2-methylbutane in dry ice. Brains and peripheral tissues were dissected at different levels corresponding to the regions of interest and were mounted on glass slides. Tissue sections were incubated at room temperature in assay buffer containing 3 nM [^{3}H]-EMPA with or without JNJ-10397049. After washing and air-drying, the sections were exposed to BAS-TR2025 Fuji imaging plates. During necropsy, tissues were preserved in 10% neutral buffered formalin. They were stained with hematoxylin-eosin for microscopic examination.

Results: An extensive distribution of [^{3}H]-EMPA binding was observed in the rat brain sections with a very high density in the hippocampal dentate gyrus, nucleus accumbens (shell), and cortical amygdala. OX2R distribution was also identified in previously unrecognized regions including the retrosplenial cortex. In contrast, negligible or very low OX2R protein expression was observed in peripheral tissues.

Conclusions: Widespread distribution of OX2R protein expression, including previously unrecognized regional OX2R expression, was observed in the rat brain. In contrast, peripheral tissues contained undetectable or very low levels of OX2R protein. These data support orexin exerting OX2R-dependent physiological functions primarily through activation of the central nervous system. Our data showing OX2R protein distribution will help evaluation of the mechanisms of action of OX2R-selective agonists.

Disclosure: This work was conducted by Takeda Pharmaceutical Company Limited.

Disclosure: Yes

Conflict of Interest statement: All authors are employees of Takeda and stockholders of Takeda Pharmaceuticals Company Limited.

P312 | Orexin-A ameliorates lasting effects of early postnatal dysfunction of muscarinic cholinergic system on sleep-wakefulness

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Introduction: Orexin/Hypocretin-producing neurons are involved in the consolidation of arousal/wakefulness that becomes unstable if the brain's Orexinergic system is deficient. Otherwise, suppression of wakefulness is one of the main reasons for the development of sleep disorders and depression. It is believed that Orexins may also be involved in the pathophysiology of depression. The aim of the present investigation was to study the effects of ICV Orexin-A on lasting disturbances of sleep in adult rats exposed in the early postnatal period to the dysfunction of the brain Muscarinic cholinergic system (MChS).

Methods: MChS dysfunction was produced by subcutaneous injection of scopolamine (30 mg/kg) in rat pups ($n = 10$), twice daily, from postnatal days 7–28. Control rat pups ($n = 10$) received the same volume of saline. Experiments were started 2–3 months after discontinuation of the drug injection that is in adult age. Implantations of stainless steel screws, for epidural EEG registration, and microinjection cannulas (plastics ones) were made under general anesthesia. Two doses (10 μg/μl and/or 25 μg/μl) of Orexin-A (Phoenix Pharmaceuticals Inc.) were injected into the lateral ventricle. Experiments with EEG registration of the sleep-wakefulness cycle have been started immediately after ICV microinjection of Orexin-A and/or saline, after the post-surgery recovery period and lasted continuously for 6 h daily (10:00 a.m.–16:00 p.m.) for three consecutive days on each animal. Statistical treatment was made by the Students' test.

Results: It was found that animals exposed to the early postnatal dysfunction of MChS were characterized in adult age by significant sleep disturbances that were similar to sleep disorders, characteristic of major depressive disorder. ICV microinjection of Orexin-A dose-dependently ameliorated sleep disturbances, which was manifested in the enhancement and stabilization of wakefulness, in an increase of the latency of REM sleep, which was reduced in these animals, and a decrease in the incidence of REM sleep that has the tendency to develop more frequently as during major depressive disorder.

Conclusion: Elevation of the level of Orexin-A in CSF significantly ameliorates sleep disturbances in adult animals subjected in early ontogenesis to the dysfunction of MChS.

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Disclosure: No

P313 | Lasting effects of early postnatal antagonism of M1-M5 muscarinic cholinoreceptors on their density, sleep and adult hippocampal neurogenesis in mature age rats

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Objectives: The involvement of the muscarinic cholinergic system in mood disorders, the major depressive disorder, in particular, was studied with different methodical approaches. However, the lasting effects of early postnatal antagonism of M1-M5 choline receptors (LEEPAM1-M5) were not studied at all. Before we have studied for the first time the effects of LEEPAM1-M5 on forced swim test,

sucrose preference, and the rate of M2/M4 muscarinic choline receptors in the hippocampus. Here we present the effects of this procedure on the main indices of sleep, the density of M1-M5 choline receptors, and hippocampal neurogenesis in mature age rats.

Methods: Rat pups received subcutaneously Scopolamine ($n = 10$) 30 mg/kg two times daily, from postnatal day 7 (P7) until P28; Afterwards, pups were under special care. Control pups ($n = 10$) received distilled water with the same volume and procedure. Surgery and implantation of stainless screws were made under general anesthesia, 8–12 weeks after drugs discontinuation. Sleep EEG registration started 5–7 days after surgery and continued for 10 h daily for seven consecutive days. The density of M1-M5 choline receptors was measured by Western blotting with specific antibodies. Adult hippocampal neurogenesis was assessed by the number of granular cells in CA1 and CA3 fields in Nissl stained hippocampal slices. Statistical processing was made by Students'-test.

Results: LEEPAM1-M5 produced significant sleep disturbances in experimental animals. Light and deep slow-wave sleep became fragmented and superficial, evident by frequent awakenings from slow-wave sleep and decreased incidence of delta waves in the frequencies of 0.5–1.5 c/sec. REM sleep latency was shorter and REM incidence was three times more frequent than in saline controls. REM total time was increased two times due to increased REM sleep incidence.

The rate of M1/M5 choline receptors became significantly higher in hippocampal plasma membranes. Adult hippocampal neurogenesis was diminished, evidenced by the decreased number of granular cells in CA1 and CA3 fields.

Conclusion: Early postnatal antagonism of M1-M5 choline receptors leads to sleep disturbances like those that are characteristic of major depressive disorder, significant up-regulation of M1/M5 choline receptors, and a decrease in the hippocampal neurogenesis in adult age rats.

Disclosure: No

P611 | Auditory stimulation during sleep boosts slow-wave-spindles coupling in children with attention-deficit hyperactivity disorder (ADHD)

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Objectives/Introduction: Cross-frequency coupling between the neocortical slow waves (SW, 0.5–2 Hz) and spindles (9–12 Hz) is thought to facilitate sleep-dependent memory formation. Previous studies have shown that SW-activity in children with ADHD can be decreased as compared to their healthy peers (Furrer et al., 2019). In this study, we tested

(1) whether the SW-spindles coupling is impaired in children with ADHD and

(2) whether phase-targeted auditory stimulation (PTAS) might boost coupling in children with ADHD.

Methods: We collected sleep hd-EEG data of 18 children (9 children diagnosed with ADHD and 9 control children, both groups 11 ± 1.5 years). Two conditions separated by 1 week were carried out:

(1) non-stimulation (SHAM) and

(2) up-PTAS (STIM) of the slow waves detected over the right prefrontal area. During the stimulation, pink (1/f) noise pulses were delivered in 6-s blocks (ON-windows), followed by a 6-s pause (OFF-windows). Coupling strength between the SW and spindles was assessed with the normalized modulation index (Tort et al., 2010), for STIM-ON, STIM-OFF, SHAM-ON and SHAM-OFF.

Results: Contrasting coupling strength of the two experimental groups during SHAM nights revealed decreased coupling in fronto-temporal regions in children with ADHD compared to controls ($p(clust) = 0.01$). PTAS resulted in a boost of coupling in fronto-central regions during ON windows, but not during OFF windows for both groups of children (STIM-ON vs. SHAM-ON,$p(clust) < 0.02$). Notably, the difference in coupling strength between the two groups was alleviated during STIM-ON but was still present in STIM-OFF windows.

Conclusions: Here we provide initial evidence, that in addition to the decrease in SW-activity, children diagnosed with ADHD also show impaired coupling between SW and spindles. Supporting previous findings in adults (Krugliakova et al., 2020), our results suggest that PTAS is an efficient tool to boost SW-spindle coupling also in children. Furthermore, PTAS can compensate for the coupling deficit in children with ADHD up to the level of their healthy peers. In the next step, it will be important to test whether PTAS-evoked coupling changes can improve sleep-dependent memory consolidation in children with ADHD.

Disclosure: No

P612 | Effects of hypocretins within the medial preoptic area of lactating rats on sleep, maternal behavior, temperature and neuronal activity

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During the postpartum period (PP) there is a wide variety of physiological changes that made the mother different from non-lactating animals. The medial preoptic area (mPOA) is crucial for the regulation of maternal behavior, sleep and thermoregulation. Hypocretins (HCRT)

are two hypothalamic neuropeptides (HCRT-1 and HCRT-2), involved in the maintenance of wakefulness and motivational behaviors. However, the role of HCRTs in the mPOA during the PP remains unknown.

The aim of the study was:

(1) determine the role of HCRT-1 within the mPOA on sleep, maternal behavior and body temperature in lactating rats; and

(2) study the effect of HCRT-1 on the activity of mPOA neurons.

In polysomnographic implanted mother rats, we assessed the sleep-wake states, maternal behavior and body temperature following microinjections of 0.2 μl of either HCRT-1 (100 and 200 μM, $n = 9$), a dual orexin receptor antagonist (DORA, 5 mM, $n = 8$) or their vehicles into mPOA. In addition, in urethane anesthetized lactating rats ($n = 21$), extracellular neural recordings within the mPOA were made, and the effect of juxta-cellular administration of HCRT-1 (100 μM) on neural activity was evaluated.

Our data shown that the high dose of HCRT-1 increased wakefulness (105.2 ± 8.0 to 120.7 ± 6.2 min, $p = 0.001$) while decreased slow wave sleep (SWS) (83.2 ± 4.8 to 73.0 ± 4.7 min, $p = 0.049$) and REM sleep (14.1 ± 2.1 to 7.5 ± 1.5 min, $p = 0.001$, with a slight increase in body temperature (37.0 ± 0.3 to 37.3 ± 0.4°C, $p = 0.030$), without affecting maternal behavior. DORA increased SWS (67.7 ± 4.6 to 78.3 ± 3.2 min, $p = 0.008$) and REM sleep (8.1 ± 1.2 to 11.9 ± 1.2 min, $p = 0.037$), along with nursing (121.4 ± 12.7 to 154.2 ± 6.9 min, $p = 0.007$), without affecting body temperature. Moreover, HCRT-1 decreased the firing rate in 32.5% of neurons (from 3.6 ± 1.1 to 1.9 ± 0.8 Hz, $p = 0.001$), increased it in 32.5% neurons (from 3.3 ± 0.9 to 5.5 ± 1.5 Hz, $p = 0.001$), and had no effect in 35% neurons.

Overall, HCRT within the MPOA promoted wakefulness with subtle effects on temperature, while the reduction of the endogenous HCRT promoted sleep and nursing behavior. In addition, the effects of HCRT in neuronal activity vary in different groups of mPOA neurons.

Disclosure: No

P613 | Dynamic auditory remapping across the sleep-wake cycle

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Sleep is essential for survival. However, to survive during sleep, the sleeping brain needs to be able to accurately detect important information, such as a roaring lion, or a fire. Indeed, despite the decreased responsiveness to external stimuli, some level of sensory processing persists during sleep. Yet it is unclear precisely how sleep transforms sensory processing. While during wakefulness endogenous changes lead to sensory remapping, this reorganisation has not been charted throughout the sleep-wake cycle. To test whether sleep induces sensory functional reorganisation, we recorded neural activity during a full night's sleep in response to a range of pure tones using high-density electroencephalography and computed the similarity between auditory responses in wakefulness, non-rapid (NREM), and rapid eye movement (REM) sleep ($n = 36$). We found that NREM and REM sleep elicits a decrease in auditory neural similarity in an early processing stage compared to wakefulness (all F's > 5.78, all p's < 0.016, all h^2's > 0.002), while NREM sleep elicits an increase in auditory neural similarity in a late processing stage, relative to both wakefulness and REM (all F's > 46.6, all p's < 0.0001, all h^2's > 0.02). Notably, these sleep-induced changes in auditory neural similarities vary with tone frequency and show greater attenuation for low versus high frequencies, implying sensory reorganisation. These findings of state-, time-, and stimulus-dependent auditory neural similarities indicate that sleep modifies the relationship between auditory responses and demonstrates a functional reorganization of auditory processing across the sleep-wake cycle.

Disclosure: No

P614 | Repetitive stimulations in lateral and perifornical hypothalamus elevate orexin-A content in CSF, shorten barbiturate coma time; accelerate wakefulness recovery and normal sleep EEG in rats

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Introduction: The established function of Orexins (ORX) is manifested in the regulation of wakefulness. ORX deficiency, and/or a lack of ORX Type-I receptors lead to narcolepsy, a pathological state characterized by the suppression of wakefulness. We hypothesized that if repetitive electrical stimulations (RESs) of Lateral (LH) and Perifornical hypothalamic (PfH) ORX-producing neuronal regions can elevate ORXA content in CSF then it might affect coma duration/time; accelerate the reappearance of wakefulness episodes, and recovery of normal sleep EEG.

Methods: For modeling of the comatose state, in control (non-stimulated) white wild rats Sodium Ethaminal was used (90 mg/kg; 100 mg/kg, and 110 mg/kg; $n = 5$ for each dose). Spontaneous recovery was significantly complicated at the dose 110 mg/kg. Therefore, in experimental (stimulated) rats comatose state was produced by systemic injection of Sodium Ethaminal 110 mg/kg. EEG registration was started immediately and lasted continuously for 72 h. 30 min after comatose state RESs (8-12v, 200c/sec, 0.1 msec) of LH ($n = 5$) and/or PfH ($n = 5$) were started. RESs were applied for 1 h, with 5 min intervals between subsequent stimulation, applied by turn to the left and right LH and PfH. The content of CSF ORXA was measured by the method of ELISA. Statistical processing was made by the Students'-test.

Results: The reappearance of wakefulness episodes from the experimental coma required 8.0–8.5 h in non-stimulated control rats. In

stimulated experimental rats, RESs of LH and/or PfH significantly reduced the coma time and accelerated the reappearance of the first episode of wakefulness that took 3.5–4 h after RESs were stopped. Wakefulness fragments were soon (20–30 min) followed by the slow-wave sleep episodes with EEG strongly different from normal slow-wave sleep. The difference disappeared 10 h after RESs were stopped. An especially strong influence was manifested in the REM sleep latency–23–24 h during spontaneous recovery and more than two times shorter under the impact of RESs of LH and/or PfH. RESs produced a significant elevation of ORXA in CSF.

Conclusions: RESs of LH and PfH Orexin-producing neuronal regions elevate CSF OrexinA content; accelerate reappearance of wakefulness episodes and recovery of normal sleep EEG from barbiturate comatose state.

Disclosure: No

P615 | Ketamine affects homeostatic sleep regulation in the absence of the circadian sleep-regulating component in freely moving rats

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Introduction: Ketamine is a surgical anesthetic agent with profound analgesic but lacking sedative effect. Pharmacological effects of ketamine may affect homeostatic sleep regulation via the mechanisms related to slow waves. As circadian factors may mask drug effects, a lighting regime using short light-dark cycles was applied which enables the direct sleep-inducing effect of the light but also the build-up of the homeostatic sleep need.

Methods: Effect of ketamine applied in anesthetic dose (80 mg/kg) was tested on neocortical electric for 24 h in freely moving rats ($n = 6$). Ketamine effects were compared to changes seen during control (saline) injections and after 6-h gentle handling sleep deprivation (SD) and effects on slow waves were analyzed using current-source density (CSD) analysis. Statistical significance was checked by two-way ANOVA.

Results: Ketamine application induced a short (10–40 min) hypnotic stage with characteristic slow waves followed by a long-lasting (4–5 h) waking-like stage with hyperactivity resulting pharmacological sleep deprivation. Contrary to natural waking, coherence analysis indicated the association of the waking-like stage with increased local synchronization in broad local field potential frequency ranges. Termination of the ketamine effect was followed by replacement of both slow wave sleep (SWS) and rapid eye movement sleep. Delta power (< 4 Hz) increased tremendously during the hypnotic stage and lost delta power was recovered after the termination of the ketamine effect but both delta power and SWS replacement was less intensive compared to that seen after SD. Layer 5 multiple unit activity was higher during ketamine-incuced waking-like stages compared to control but showed a decreasing trend parallelly with the decreasing drug effect. However, this decreasing trend was not present during SD where cortical firing became more intense as a function of time spent in SD. CSD analysis of the slow waves showed that cortical transmembrane currents were stronger during ketamine-induced hypnotic stage compared to that seen both during sleep replacement after SD and after the termination of the ketamine-induced waking-like stage.

Conclusions: These results indicate that ketamine-induced pharmacological changes affect homeostatic sleep regulation. Ketamine-induced waking-like stage strongly differs from natural waking but able to induce sleep replacement after its termination.

Disclosure: No

P616 | Novel analytical method for Orexin-A and -B using anti-adsorptive additive treatment followed by nanoflow liquid chromatography-high resolution mass spectrometry

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Objectives/Introduction: Orexin-A (OXA) and -B (OXB) are members of a family of neuropeptides with roles in multiple physiological functions, including the regulation of waking and sleep states. Measurement of orexin concentrations in the cerebrospinal fluid (CSF) is used for the diagnosis of narcolepsy; unfortunately, the widely used radioimmunoassay has insufficient specificity for OXA. Although liquid chromatography tandem mass spectrometry (LC-MS/MS) has higher specificity for OXA, reported OXA levels in human cerebrospinal fluid (CSF) measured using this technique are still inconsistent. Moreover, OXB has not been detected in the CSF. To address these problems, we established a novel analytical method for accurate OXA and OXB measurement.

Methods: Nanoflow liquid chromatography-high resolution mass spectrometry (nanoLC-HRMS) was employed for highly specific and sensitive detection of OXA and OXB in 50 µl aliquots of CSF samples from cynomolgus monkeys. To avoid nonspecific binding of OXA and OXB, the recovery of OXA and OXB during sample collection and sample preparation was evaluated with and without anti-adsorptive agents (citric acid and Tween 80).

Results: The novel nanoLC-HRMS method had sufficient specificity and sensitivity for measuring OXA and OXB in monkey CSF. This is the first report detecting OXB in CSF samples. The calibration curves were linear over the range of 2.5 to 250 pg/ml for OXA and OXB. The accuracy (relative error) and precision (coefficient of variation) in intra- and inter-day assays were within -9.3%–2.0% and 14.0%, respectively. The recovery of spiked OXA and OXB in monkey CSF was 41.6% and 40.2%, respectively. Treatment with the anti-adsorptive agents improved the recoveries to 100.6% for OXA and 91.2% for OXB. CSF samples collected without the anti-adsorptive agents demonstrated low recoveries of 10.3%–49.8% for OXA and 18.0%–24.0% for OXB.

Conclusion: We established a novel method to measure OXA and OXB levels precisely in monkey CSF. Evaluation of OXA and OXB levels using this method will provide valuable information for the role of orexin neuropeptides in human normal and abnormal states.

Disclosure: This work was conducted by Takeda Pharmaceutical Company Limited.

Disclosure: Yes

Conflict of Interest statement: All authors are employees of Takeda and stockholders of Takeda Pharmaceuticals Company Limited.

5: PHYSIOLOGY

P015 | The role of the melanin-concentrating hormone (MCH) Neurons in increased REM sleep propensity and cataplexy in narcolepsy

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Introduction: The melanin/concentrating hormone (MCH) neurons play a regulatory role in REM sleep and they dynamically modulate its expression during thermoneutral ambient temperature (Ta) warming (Komagata et al., 2019). Given the reciprocal inhibition between the hypocretin (Hcrt) and MCH systems, we hypothesize that loss of Hcrt may disinhibit MCH activity resulting in the increased REM sleep propensity characteristic of narcolepsy, whereas MCH hypoactivity may exacerbate boundary state instability and favor cataplexy.

Methods: First, we monitored the sleep-wake cycle in narcoleptic Hcrt-KO mice during the dark phase to investigate the occurrence of cataplexy, both as spontaneous events ($n = 11$) and during a food-elicited cataplexy test (FECT) ($n = 9$), and REM sleep as a function of ambient temperature. Then, we examined the MCH dynamics across vigilance states using fiber photometry in MCH:cre ($n = 3$) mice and interrogate the role of the MCH system in REM sleep and cataplexy in MCH:cre/Hcrt-KO mice by using fiber photometry ($n = 5$) and optogenetic approaches ($n = 10$).

Results: We found that both the FECT and spontaneous condition revealed a dynamic dissociation of REM sleep expression and cataplexy as a function of Ta. Specifically, during the warming phase we observed an increase in REM sleep and a significant decrease in cataplexy, whereas an opposite dynamic modulation occurred during the cooling phase (data analyzed using two-way ANOVA and post-hoc Sidak's comparison test).

Fiber photometry revealed that MCH-dependent signal increased in anticipation of REM sleep both in MCH:cre and MCH:cre/Hcrt-KO mice. Surprisingly, MCH activity in MCH:cre/HcrtKO mice also increased during cataplexy and decreased at the transition to wakefulness. Moreover, optogenetic inhibition of MCH neurons increased cataplexy, but Ta warming reversed this effect. In contrast, narcoleptic mice increased REM sleep during the Ta warming condition, but this ability was blunted by optoslencing MCH neurons (data analyzed using RM one-way ANOVA and post-hoc Tukey's test).

Discussion: Taken together, these results show that optogenetic inhibition of MCH neurons increases cataplexy, even though these neurons are also active during cataplexy. Moreover, although the MCH system may drive REM sleep propensity in narcolepsy, the Ta warming effect on cataplexy reduction appears to be independent of the MCH system.

Disclosure: No

P016 | Effects of auditory slow wave modulation on overnight change in cardiovascular and haemodynamic parameters

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Introduction: Non-rapid eye movement (NREM) sleep is reflecting a period of rest and recovery for the body. Because blood pressure (BP) and sympathetic activity were reported to be lowest during deep NREM sleep, slow waves, the high-amplitude, low-frequency oscillations, might likely be involved in overnight BP regulation. Yet, linking slow waves to overnight changes in BP and advanced haemodynamic parameters derived from the BP waveform should be further investigated.

Methods: To investigate the functional role of slow waves, we applied auditory stimulation conditions (45 dB rhythmic stimulation ($ISI1_{High}$), 42.5 dB rhythmic stimulation ($ISI1_{Low}$), and a SHAM control) each presented in a windowed 10 s ON followed by 10 s OFF approach. 18 healthy male participants (age 30–57) underwent three nights of 7.5 h of sleep in our laboratory with one of three conditions applied during NREM sleep. Additional to the sleep polysomnographic recordings, we measured BP, 10 min resting ECG, and advanced haemodynamic measurements classified by BP waveform (e.g., cardiac output, cardiac index, or total peripheral resistance) before and after the sleep period.

Results: We found a significant slow wave activity enhancement for the $ISI1_{High}$ and $ISI1_{Low}$conditions (electrode Fz, $F(2, 33.095) = 11.397$, $p < 0.001$) within the first five seconds of the stimulation compared to SHAM, using a linear mixed model approach. We did not observe a significant change in overnight resting heart rate difference

for any of the conditions ($p = 0.24$). Furthermore, overnight diastolic BP decline was significantly reduced for both $ISI1_{High}$ and $ISI1_{Low}$,compared to SHAM ($F(2, 34) = 4.00$, $p_{ISI1Low} = 0.04$, $p_{ISI1-High} = 0.02$). However, there were no significant differences in overnight systolic BP difference ($p = 0.103$) and any other advanced haemodynamic parameters (all $p > 0.1$).

Conclusions: We unexpectedly observed a reduced diastolic BP decline for both applied auditory stimulation volumes, reflecting increased diastolic BP in the mornings. However, the functional relationship between physiological parameters of sleep, such as slow wave activity, and the overnight BP change remains unclear. As a next step, changes in BP and hemodynamic parameters during sleep and the stimulation period should be analysed.

Disclosure: Yes

Conflict of Interest statement: This work was conducted as part of the SleepLoop Flagship of Hochschulmedizin Zürich and funded by the Swiss National Science Foundation (PZ00P3_179795 to CL). CL is a member of the Scientific Advisory Board of Emma Sleep GmbH and RH is a founder and shareholder of tosoo AG, which are both not related to this work.

P017 | Investigating the effect of fear of sleep on self-reported sleep measures in residents of a low socioeconomic setting

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Objectives/Introduction: South Africans living in low socioeconomic areas have reported unusually long sleep durations (±10.3h). The reason(s) for this have not been explored, but we propose one reason may be compensation for poor sleep quality owing to environmental factors typical of low-income communities such as high crime rates and associated fears around safety. The aim of this study was to investigate the relationships between self-reported sleep characteristics and fear of sleep in South Africans living in a low-income community.

Methods: South African adults (25–45 y) of African origin living in an urban informal settlement characterised by high crime and poverty rates, were recruited. Self-reported demographic and sleep information were collected via questionnaires.

Results: In this cohort ($n = 411$), self-reported sleep duration was 8.69 ± 1.55 h, Insomnia Severity Index (ISI), Pittsburgh Sleep Quality Inventory (PSQI) and Epworth Sleepiness Scale (ESS) scores were 2 (1–5), 4(3–6) and 7(4–11) respectively and 21% of participants reported not feeling safe during sleep. Logistic regression models adjusted for age, gender, employment status, household density and alcohol units per week indicated that participants who feared being unsafe while sleeping were more likely to report insomnia symptoms of moderate and severe severity (ISI > 14, odds ratio (OR) with 95% confidence interval (CI):5.48 (1.95–12.21), $p = 0.001$), poor sleep quality (PSQI > 5, OR (95%CI):4.78 (2.81–8.13), $p < 0.001$), excessive daytime sleepiness (ESS > 10, OR (95%CI): 2.62 (1.59–4.33), $p < 0.001$) and self-reported sleep < 7 h (OR (95%CI):2.81 (1.34–5.91), $p = 0.006$) than participants who did not fear being unsafe during sleep. Gender-stratified analyses showed the relationships between fear of sleep and both poor sleep quality and insomnia were stronger among the men.

Conclusion: This is one of only a few studies investigating how perceptions of personal safety at night may impact sleep outside of American or European populations. Fear of not being safe during sleep was clearly associated with measures of poorer sleep quality and shorter sleep duration in these low-income adults of African-origin. Future research in which habitual sleep characteristics are measured objectively and psychiatric symptoms, such as past trauma, depression and anxiety are assessed in more detail, especially as they relate to nocturnal safety or fear, are warranted.

Disclosure: No

P018 | The cerulean gate: a role of the locus coeruleus in the ultradian sleep cycle

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Introduction: The noradrenergic locus coeruleus (LC) is recognized for its role in the regulation of attention and stress during wakefulness. In previous studies, we found that during non-rapid-eye-movement (NREM) sleep, levels of noradrenaline (NA) in the sensory thalamus fluctuate on an infraslow timescale. Sleep spindles cluster following these fluctuations, and they generate NREM sleep fragility moments where transitions to wakefulness become more likely. Here, we asked whether these moments are also involved in regulating NREM-to-REM sleep transitions.

Methods: We recorded undisturbed sleep-wake behavior in 6–8 week-old dopamine-β-hydroxylase-Cre mice that were virally transfected to express optogenetic actuators to permit closed-loop and temporally precise optogenetic stimulation or inhibition of the LC. Additionally, an automated system has been used to achieve REM sleep deprivation.

Results: First, we noted that NREM-to-REM sleep transitions were tightly phase-locked to the infraslow activity of the LC ($n = 7$). Next, we found that we could prevent or precipitate NREM-to-REM sleep transitions when we optogenetically activated or inhibited the noradrenergic LC neurons during NREM sleep, respectively ($n = 14$, $n = 10$, $p_1 = 1.2 \times 10^{-4}$, $p_2 = 4.5 \times 10^{-3}$, Wilcoxon signed-ranked-test and paired t-test). Furthermore, activation or inhibition of the LC at specific moments of low spindle activity strengthened these effects, suggesting that the LC activity provides windows of opportunity where NREM-to-REM sleep transitions are facilitated ($p_1 = 3.91 \times 10^{-3}$,

$p_2 = 7.42 \times 10^{-4}$, Wilcoxon signed-ranked-test and paired *t*-test). The suppression of transitions to REM sleep upon LC stimulation was observed even at moments of high REM pressure after REM sleep deprivation ($n = 6$ mice, $p = 0.0001$, two-factor ANOVA).

Conclusions: These results indicate that the LC is both necessary and sufficient to regulate transitions to REM sleep at moments of low and high propensity to enter REM sleep. The probability of transitioning to REM sleep after a long REM event has been hypothesized to be characterized by a refractory period, where transitions to REM sleep are unlikely. We currently investigate the role of LC in regulating REM sleep based on its recent history. These findings will inform future mechanistic models on the regulatory processes of the ultradian sleep cycle.

Disclosure: No

P019 | Spectral slope between 30–45 hz during NREM and REM sleep differentiates between insomnia patients and healthy controls

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Objectives: NREM sleep is characterised by synchronised oscillations in electroencephalography (EEG). Recent research indicates that insomnia patients sleep might be characterised by a heightened arousal, specifically during NREM sleep periods. We use the 1/f spectral slope of the electrophysiological power spectrum between 30–45 Hz, which reflects the non-oscillatory, scale-free component of neural activity as a marker of arousal during NREM, REM and wake periods and by that compare healthy good sleeping control with insomnia patients

Methods: Data were derived from one sleep laboratory night with a five channel eeg polysomnographic monitoring in 19 healthy participants and 19 insomnia patients. The differences of the 1/f spectral slope between 30–45 Hz in log-log space during NREM and REM in healthy good sleepers and insomnia patients were investigated using multivariate ordinal regression models.

Results: First, Multivariate model analyses in healthy good sleeping controls sleep showed a significant difference between of NREM and REM sleep ($F_{(1,37)} = 18.13$, $p < 0.001$). Second Multivariate model analyses indicated a significant difference between of NREM and REM sleep in healthy good sleeping controls and insomnia patients ($F_{(1,36)} = 4.78$, $p = 0.002$).

Conclusions: We demonstrate- to our knowledge the first time- that spectral slope between 30–45 Hz is altered in insomnia patients as compared to heathy good sleeping controls. Results are constant with the hyper- arousal model of insomnia pathophysiology.

Disclosure: No

P020 | Histamine deficiency does not entail tibialis anterior electromyographic bursts during sleep in mice

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Objective: Antihistamine medications have been suggested to elicit clinical features of restless legs syndrome (RLS). The available data are limited, particularly concerning periodic leg movements during sleep, which are common in RLS and involve bursts of tibialis anterior electromyogram (TA-EMG). We evaluated whether the occurrence of TA-EMG bursts during non-rapid eye movement sleep (NREMS) is altered in histidine decarboxylase knockout (HDC-KO) mice with congenital histamine deficiency.

Methods: We implanted 6 HDC-KO mice and 9 wild-type (WT) female mice to record neck muscle electromyogram, bilateral TA-EMG bursts, and electroencephalogram during the rest (light) period. The TA-EMG bursts were scored according to previously published criteria (PMID: 26118726). The time structure of TA-EMG events was evaluated by computing the intervals between the onset of consecutive events (inter-event intervals, IEIs). The number of IEIs scored per h of NREMS was grouped in 5-s intervals up to 60 s to analyze the IEI distribution. The TA-EMG events were categorized as short-interval (IEI of 0.5–10 s) or long-interval (IEI of 10–60 s) according to previous work on mice (PMID: 26118726; 30618828). Differences in TA-EMG events per h of NREMS and in sleep architecture were analyzed by independent-sample *t*-tests and confirmed with an analysis of covariance, with mouse age as covariate. The IEI distribution was analyzed with mixed design analysis of variance (ANOVA) with age as covariate and Huynh−Feldt correction. Data are shown as means ± SEM.

Results: The experimental groups did not differ significantly in terms of sleep architecture. In both HDC-KO and WT mice, the distribution of intervals between TA-EMG bursts had a single peak for intervals < 10 s. The occurrence rate of total TA-EMG events during NREMS and of short-intervals (IEI < 10 s) TA-EMG events per h of NREMS were significantly lower in HDC-KO than in WT mice.

Conclusions: These data do not support the hypothesis that preventing brain histamine signaling may promote RLS. Rather, the data suggest that limb movements during sleep are a manifestation of subcortical arousal requiring the integrity of brain histamine signaling.

Disclosure: No

P315 | A role for interoceptive VGLUT2-expressing neurons in the nodose ganglion of the left vagus nerve in the regulation of sleep architecture and spectral composition

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When awake, we consciously perceive stimuli from the world that surrounds us. When asleep, our brain disconnects from the sensory environment. In contrast to these exteroceptive stimuli, little is known about how interoceptive stimuli are processed by the sleeping brain. The vagus nerve is a mixed sensory-motor nerve that interfaces between the autonomic periphery and the central nervous system. We asked whether stimulating specifically vagal sensory afferents modulates sleep.

All experiments are based on viral transfection techniques to enable chemo- or optogenetic activation of vGluT2-expressing neurons in the nodose ganglion of the left vagus nerve, in combination with polysomnographic, local field potential (LFP), fiber photometry in freely moving conditions after low (1.5 mg/kg i.p.) or high (2.5 mg/kg i.p.) CNO injections or NaCl at ZT0.

Whole-cell patch-clamp recordings confirmed that optogenetic activation of vagal afferents formed functional glutamatergic synaptic contacts in the brainstem nucleus tractus solitarius. In a next step, we found that chemogenetic activation of the vagal sensory afferents suppresses rapid-eye-movement sleep (REMS) in its major spectral and autonomic correlates. The REMS onset latency was increased from 13 ± 2 min after NaCl injection to 82 ± 16 min after low-dose (Wilcoxon-sign-rank-test, $p = 4.8e\text{-}4$, $n = 11$) to 185 ± 27 min after high-dose CNO injection (Wilcoxon-sign-rank-test, $p = 2.4e\text{-}4$, $n = 11$). Moreover, heart rate remained decelerated throughout the period during which REMS was not detectable. In contrast to the suppression of REMS, the spectral properties of non-REMS were moderately affected, with evidence for a minor increase in low-frequency power (delta (1.5–4 Hz) ($n = 11$, $p = 1.8e\text{-}4$, Student's-*t*-test) and slow oscillations (0.5–1.5 Hz) ($n = 11$, $p = 6.6e\text{-}4$, Student's-*t*-test)) and a decrease in spindle power (10–15 Hz) ($n = 11$, $p = 1.5e\text{-}4$, Student's-*t*-test) after a low dose of CNO. To characterize more comprehensively the physiological correlates of sleep during elevated vagal activity, we are currently analyzing breathing rates and the brain temperature. The mechanisms underlying these alterations are addressed using fiber photometry techniques in combination with LFP recordings.

Our findings point to a major role for vagal afferent activity in body-brain physiology that regulates the balanced expression of non-REMS and REMS. Moreover, they indicate that vagus nerve stimulation could offer non-invasive strategies to improve sleep architecture in pathological conditions.

Disclosure: No

P316 | Torpor disrupts sleep-wake architecture in fasted laboratory mice: Implications for basic research and the 3Rs

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Objectives/Introduction: Neuroscience research using animals is prone to a high degree of variability. Many of these studies use food restriction paradigms which readily induce torpor, a controlled state of hypometabolism, in laboratory mice. Work on other rodent species has suggested that torpor is a sleep depriving state, although this has not been well characterised in mice. We hypothesised that torpor induction may be disrupting sleep dynamics in food restricted mice, therefore altering subsequent physiology and behaviour, and confounding data generation. The aim of this study was to further investigate how torpor and euthermic sleep processes interact.

Methods: Chronic EEG/EMG implants were performed in adult male C57Bl/6J mice ($n = 3$). Mice were food restricted to approximately 85% of their baseline bodyweight to induce torpor. A 6-h sleep deprivation was conducted during ad libitum and food restricted conditions which was followed by feeding. Sleep deprivation was compared to undisturbed torpor, followed by feeding as in other conditions.

Results: Food restriction significantly altered sleep-wake architecture, with food restricted mice spending most of the dark period asleep which is reversed compared to ad libitum conditions. Moreover, food restricted mice spent a significantly greater percentage of time in NREM sleep, at the expense of wake (56% vs. 38%, $p < 0.05$). Greater consolidation of sleep episodes was observed in food restricted conditions, with the mean length of NREM episodes increasing from 4.6 ± 0.7 to 6.2 ± 0.3 mins ($p = 0.003$). In all conditions, sleep following sleep deprivation or torpor was characterised by increased slow wave activity (SWA) above baseline. However, peak SWA in the food restricted and post-torpor condition was delayed and lower than during ad libitum conditions (Ad lib peak: 153 ± 1.3%; FR peak: 118 ± 2.1%; Torpor peak: 98 ± 4.6%; $p = 0.027$).

Conclusions: Our preliminary results indicate that food restriction significantly alters sleep-wake architecture, likely due to the induction of torpor. Although there is limited evidence that torpor is a sleep depriving state, the restructuring of sleep-wake patterns suggests that timing of behavioural experiments for optimal alertness and motivation should be an important consideration when mice are undergoing food restriction to stimulate performance in tasks.

Disclosure: No

P317 | Cortical hemodynamic changes associated with sleep slow waves in school-age children

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Introduction: Studies using high-density EEG showed that the peak of slow-wave activity (SWA, 0.5–4 Hz) shifts from posterior to anterior brain regions from childhood to adulthood, paralleling brain structural modifications and the acquisition of behavioral and cognitive skills. Using simultaneous EEG-fMRI, we recently demonstrated in adults that slow waves are associated with negative hemodynamic changes in the somatomotor cortex and positive signal changes in the thalamus (Betta et al., 2021). Here we sought to determine whether slow waves of school-age children are associated with similar or distinct hemodynamic changes relative to adults.

Methods: We analyzed data collected from fourteen children (12 males, age 6–11 yrs) with a diagnosis of idiopathic focal epilepsy who fell asleep during simultaneous EEG (32 electrodes) and fMRI (3T) recordings. Sleep scoring was performed according to standard criteria. Automated algorithms were used to detect slow waves and spindles, while epileptic spikes were manually scored. Brain regions associated with slow wave occurrence were identified through a voxel-wise regression, including spikes and spindles as regressors of no interest. A within-run permutation procedure ($N = 1000$) was applied to estimate the strength of BOLD-signal changes (z-score), and a mixed-effect linear model was used for group-level analysis ($p < 0.05$, cluster-size correction).

Results: Slow waves were associated with significant BOLD-signal decreases in bilateral somatomotor and parietal areas. Such hemodynamic changes extended more posteriorly relative to those found in adults. No significant BOLD-signal changes were found in the thalamus. However, while the thalamic activity of younger children showed no clear modulation during slow waves, a positive BOLD deflection, similar to that of the adults, was observed in three older epileptic subjects (age 16–22 yrs, 1 male).

Conclusions: Present findings are in line with EEG evidence indicating that slow wave cortical distribution changes with maturation but also indicate a central role of the somatomotor cortex in slow wave expression throughout the lifespan. The absence of a positive thalamic modulation in younger children and its presence in post-pubertal individuals is consistent with the occurrence of maturation-dependent changes in the thalamic contribution to slow-wave expression.

Disclosure: No

P318 | Investigation of sleep-wake architecture in 'layer 6B silenced' mice

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Introduction: Sleep is critical for survival yet needs to be tightly regulated as other vital behaviours cannot occur simultaneously. The control of vigilance states is governed through the release of neuromodulators by subcortical sleep and wake active nuclei, and through state-specific oscillations in thalamocortical networks. Here we investigate the role of cortical layer 6b in sleep wake regulation. Layer 6b is derived from the subplate, which plays an essential role during development. Whereas its conservation to adulthood is seen across numerous species, its function in the adult brain is not known. Layer 6b is the only cortical layer activated by orexin, a major neurotransmitter of arousal. Moreover, it projects selectively to higher order thalamic nuclei, which are critical for brain state regulation, and receives predominantly long-range input, allowing integration of local activity across multiple brain areas. These characteristics could enable layer 6b to link subcortical with thalamocortical regulation of sleep.

Methods: We investigated the role of layer 6b in sleep wake regulation in a mouse model that has a truncation in the gene for Synaptosomal Associated Protein of 25 kDa (Snap25) in a subset of layer 6b neurons (Drd1a-Cre:Snap25$^{fl/fl}$), which makes this subset of layer 6b unable to release neurotransmitter and thus synaptically silenced.Vigilance state control was studied by continuous electro-encephalography/electro-myography (EEG/EMG) recording over 24 h.

Results: In a preliminary analysis, we find that control animals ($n = 4$) spent 10.54 ± 0.22 h in NREM, 2.065 ± 0.16 h in REM, and 10.29 ± 0.49 h in wakefulness, and layer 6b silenced animals ($n = 4$) spent 11.16 ± 0.69 h in NREM, 1.76 ± 0.11 h in REM, and 11.52 ± 0.97 in wakefulness (mean ± SEM).The number of brief awakenings per h of NREM sleep, as an indicator of sleep stability, was 53.53 ± 2.83 in control animals and 49.32 ± 3.30 in layer 6b silenced animals.

Conclusion: This is the first study where the effect of layer 6b silencing on sleep is being investigated and while the current data set does not allow to reach strong conclusions, data collection is ongoing.

Disclosure: No

P319 | Association between the sleeping brain's connectivity and behavioral development in the first year of life

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Introduction: The temporal coupling of neural oscillations during sleep is believed to support learning. Nevertheless, the link between sleeping brain's connectivity and behavioral development in infancy remains unexplored. Here, we examined whether sleep EEG coherence, a measure of connectivity, at age 6 months is associated with behavioral outcome at 12 months of age.

Methods: Thirty-one healthy infants aged 5.5–7.4 months (mean age = 5.9 ± 0.5 months; 15 females) participated in at-home 124-channel sleep EEG recordings. Coherence was calculated for the first eighty 20-s epochs of NREM sleep in delta (0.75–4.25 Hz) and sigma (9.75–14.75 Hz) bands, frequencies implicated in sleep-dependent learning. By means of a data-driven clustering approach, we identified three regions over the frontal lobe (left, central, right) as regions demonstrating the strongest coherence. For these regions and frequency bands, we averaged coherence values and applied linear regression models to quantify the association between coherence and scores from the Ages and Stages Questionnaire (ASQ) at 12 months of age (i.e., total score and scores from the two subdomains Gross Motor and Personal Social), while controlling for age at EEG assessment and sex.

Results: We found that higher ASQ total scores were significantly associated with greater delta coherence over left frontal regions ($p = 0.04$) and, at trend-level, with lower delta coherence over right frontal regions ($p = 0.07$). Similarly, higher Gross Motor scores were associated with lower delta coherence over right frontal regions ($p = 0.007$). After correcting the p-values corresponding to the number of performed tests (6 statistical models, FDR-corrected), only the association with Gross Motor scores remained significant with a p-value of 0.04. We observed no significant associations between ASQ scores and sigma coherence.

Conclusions: Lower sleep EEG delta coherence over right frontal regions at the age of 6 months is linked to more mature behavioral outcome at the age of 12 months suggesting that sleep EEG delta coherence may be an early marker of gross motor development. The direction of this effect and the asymmetry of our findings support previous observations of early brain laterality.

Disclosure: No

P320 | Associations of actigraphy-derived sleep characteristics with cardiometabolic disease risk in corporate executives

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Objectives/Introduction: Poor sleep health, including weekday-to-weekend variation, is associated with cardiometabolic disease (CMD) in the general population, yet this relationship remains unclear in corporate executives, who are subject to performance-related work pressures in highly competitive environments. This study aimed to describe occupational and psychological correlates of sleep quality and insomnia severity, the associations between actigraphy-derived sleep and CMD risk factors, and the extent to which weekday and weekend sleep impacts CMD risk.

Methods: Health risk assessment anthropometrical, blood pressure and fasted blood marker variables; self-reported sleep quality, insomnia severity, and 7-day actigraphy-derived data were obtained from 61 corporate executives. Age and sex-adjusted regression analyses investigated the relationships between occupational and psychological variables with sleep quality and insomnia severity, and actigraphy-derived sleep characteristics with CMD risk factors during weekday and weekend sleep.

Results: Participants' (mean age 46 years, 68% male) CMD risks included obesity (44%), elevated glucose (27%), blood pressure (25%) and high triglycerides (27%). Poor sleep quality and elevated insomnia severity scores were reported by 52% and 42% of the cohort, and mean actigraphy-derived total sleep time (TST) was 6.7 ± 0.8 h. Correlates of poor sleep quality and high insomnia severity included longer work commute, lower work ability and stress (all $p < 0.05$). Later bedtimes and shorter time in bed (TIB) were associated with low HDL cholesterol (all $p < 0.05$). Additionally, weekdays showed that shorter TIB and TST were associated with obesity, and that poorer sleep efficiency was associated with high triglycerides and glucose (all $p < 0.05$). Shorter weekday TST and poorer sleep efficiency were associated with an increase in the CMD score with no associations during weekend sleep.

Conclusion: Actigraphy-derived sleep characteristics were associated with CMD risk in corporate employees with weekday sleep showing greater risk compared to weekend sleep. Long daily commute to work, elevated stress, low work ability and high need for recovery were correlates of poor sleep quality and elevated insomnia severity. These findings emphasise the need to restore healthier weekday sleep patterns to mitigate the increased risk for CMD.

Disclosure: No

P623 | A simple sleep EEG marker in infants as predictor of developmental outcome?

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The topographical distribution of slow-wave activity (SWA; 0.75–4.25 Hz) during NREM sleep precedes the maturation of brain myelin and gray matter, following the same posterior-anterior gradient. Further, SWA-markers mirror the development of cortical functions. While a frontal/occipital-SWA ratio serves as an index of brain development across the school years, a central/occipital (c/o) ratio of theta activity (4.5–7.5 Hz) was proposed as a marker in infancy, which yet still remains to be confirmed in its effective prediction of behavior.

We hypothesized that the c/o-ratio of SWA (c/o-SWA) and theta (c/o-theta) in infants age 6 months positively predict behavioral outcomes at ages 12 and 24 months, such that higher central compared to occipital theta power and SWA reflect more advanced developmental status.

Thirty-two healthy, term-born 6-month-old infants (15 female) underwent at-home high-density EEG (128 channels) recordings during nighttime sleep, which was preprocessed with in-lab standards (0.1 Hz highpass and 0.5–50 Hz band-pass filter, downsampling to 128 Hz, semi-automated artefact rejection, visual sleep-stage scoring in 20-s epochs by two raters, re-referencing against the average across all channels). A cluster of 8 central and 6 occipital electrodes (locations as defined in previously published work), were averaged in the SWA and theta power range. Behavior was assessed with parent-reports (Age & Stages Questionnaire: Collective Score, and subscores Gross Motor and Personal Social) at ages 6, 12, and 24 months.

We ran linear models, corrected for ages and sex. First, we assessed EEG and behavior at age 6 months: the c/o-SWA was neither associated with collective (all $p > 0.31$), nor gross-motor nor personal-social behavior. Similarly, no link was found between the c/o-theta with collective, gross-motor, or personal-social behavior at 6 months. Then, we tested the longitudinal predictions of EEG at age 6 months, which unraveled no significant link to behavior at 12 or 24 months (collective score, c/o-SWA and c/o-theta).

Thus, in 6-months old healthy infants, neither c/o-SWA nor c/o-theta are markers for predicting behavioral development assessed with parent-ratings. Future investigations will focus on longitudinal sleep EEG at ages below 6 months and illuminate their predictive value for individual differences in motor and social behaviors.

Disclosure: No

P624 | Effect of pramipexole and exercise on sleep and genes and proteins associated with restless legs syndrome in the animal model spontaneously hypertensive rat

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Introduction: Restless legs syndrome (RLS) is a common sensorimotor disorder in which reduced brain iron and dopaminergic dysfunction may be associated with its pathophysiology. The treatment for RLS can be pharmacological, including the use of pramipexole (PPX), and among the nonpharmacological ones, exercise has shown significant results.

Objectives: To evaluate the effect of pramipexole and exercise on sleep and on the expression of genes and proteins associated with RLS in an animal model of RLS (spontaneously hypertensive rats/SHR).

Methods: The animals were divided into four groups: control (CTRL) $n = 8$; exercise (EX) $n = 7$; pramipexole (PPX) $n = 8$; exercise and pramipexole (EX + PPX) $n = 7$. Treatment with PPX (0.125 mg/kg daily, i.p.) and exercise (treadmill, moderate intensity) lasted 4 weeks. Sleep recording (24 h) was performed before and after the interventions. Gene and protein analyses (in the striatum) were performed by qPCR, Western Blotting (WB), and ELISA (Protein Tyrosine Phosphatase Receptor Type D- PTPRD; Tyrosine-Hydroxylase-TH; Dopamine Transporter- DAT; and Dopaminergic Receptor type 2- D2). Data were analyzed by SPSS Statistics software and analysed by the linear mixed model with Bonferroni post hoc when appropriate, and the level of significance was $p < 0.05$.

Results: After the interventions, PPX showed an increase in total sleep time and sleep efficiency (light cycle); however, in the dark cycle, PPX showed a reduction in REM sleep and an increase in wakefulness in relation to CTRL. EX+PPX showed a reduction in arousals and an increase in sleep efficiency in relation to CTRL (light cycle). In the molecular analyses, EX showed higher expression of the PTPRD gene in relation to PPX (qPCR), and EX+PPX showed higher protein content of PTPRD in relation to CTRL and PPX (WB) and reduction of TH in relation to the control (WB).

Conclusions: In this context, the results suggest that the reduction of RLS symptoms was mainly observed in the light cycle and by interventions with PPX and with the association of EX with PPX. On the other hand, the worsening in some sleep parameters in the dark cycle and in PTPRD levels after the PPX intervention may be associated with the augmentation symptom.

Disclosure: No

P625 | SKOR2 expressing gabaergic neurons in the periaqueductal gray and mesencephalic reticular formation may be involved in the regulation of REM sleep

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Introduction: REM-on neurons in the brainstem are inhibited by the GABAergic REM-of neurons in the ventrolateral periaqueductal gray (vlPAG) and the adjacent dorsomedial mesencephalic reticular formation (dMRF). In the above mentioned brain regions, a subpopulation of GABA-ergic cells with similar locations to those of the REM-of neurons express Skor2. Skor2 is a transcription factor which is involved in the differentiation of GABAergic neurons. We wanted to clarify whether the GABAergic REM-of neurons in the dMRF/vlPAG belong, at least in part, to the Skor2 expressing cells.

Methods: Male Han-Wistar rats ($n = 6$) were deprived of REM sleep (REMS) on small platforms surrounded by water for 72 h using the water tank (inverted flowerpot) method. Animals on large platforms ($n = 6$) or in dry cage ($n = 5$) served as controls. At the end of the REM sleep deprivation/sham deprivation, the animals were sacrificed by intraperitoneal administration of 400 mg/kg chloral hydrate, perfused with phosphate buffered saline and 4% paraformaldehyde and the brains were removed. Sections covering the dMRF/vlPAG area were collected and stained for the expression of c-Fos and Skor2. The co-expression of c-Fos and Skor2 in the dMRF/vlPAG was analysed in the REMS deprived rats compared to that in the nondeprived control animals.

Results: In the dMRF/vlPAG, the proportions of the c-Fos positive neurons from the Skor2 expressing cells were significantly higher in the REMS deprived rats than in the in the control animals (control rats in dry cage: 14.5%, control rats on large platforms: 23.3%, REMS deprived rats: 40.8%; Kruskal-Wallis and Wilcox tests).

Discussion: The enhancement of c-Fos expression by REMS deprivation indicates that Skor2 expressing GABAergic neurons in the dMRF/vlPAG may be involved in the regulation of REMS.

Disclosure: No

P626 | How do preadolescents and older adults fall asleep? Spatiotemporal electrophysiological patterns of the sleep onset process during lifespan

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Introduction/Objectives: Sleep and wakefulness do not reflect mutually-exclusive states, but instead represent local phenomena. Despite the massive age-related modifications occurring during lifespan, the electrophysiological (EEG) Sleep Onset (SO) features in preadolescence and healthy aging have not been exhaustively investigated. Thus, we aimed to describe spatiotemporal EEG dynamics of SO in preadolescents and older adults.

Methods: The pre- vs- post-SO changes in the topography of EEG power (1-Hz-frequency-resolution) and the time course of the EEG frequency bands during SO were assessed in a group of 23 preadolescents (9–14 years, Experiment 1) and in a group of 36 older participants (59–81 years, Experiment 2). Additionally, we compared delta/beta ratio and delta activity during SO between these groups (Experiment 1: preadolescents, Experiment 2: elderly) and a group of 40 young adults (18–29 years).

Results: Experiment 1. Preadolescents showed a postSO increase (A) of power spectra in the low frequencies (0.5–6 Hz), with a central predominance (0.5–2 Hz), (B) at 12–13 and 14–15 Hz localized over frontal and central areas, respectively, and (C) of the lowest beta over central areas. Preadolescents showed higher delta/beta ratio in posterior areas (pre and postSO), higher delta power over posterior (preSO) and centro-posterior areas (postSO) and reduced delta/beta ratio and delta power in frontal areas (postSO).

Experiment 2. Elderly exhibited a power increase postSO of lower frequencies; the alpha band showed a particular pattern of postSO modifications; sigma power slightly increased postSO and its highest bins showed a decrease in frontotemporal areas. Compared to young adults, elderly displayed a reduced delta power and delta/beta ratio both before and after SO.

Conclusions: Preadolescents showed not entirely mature spindles and a more posterior delta activity, expression of strong homeostatic need from the "developing" areas; the decreased delta activity in elderly might reflect a reduced homeostatic regulation during SO. Taken together, these findings depict the scenario known for adults but with peculiarities pointing to different homeostatic regulation likely accountable for the observed age-related SO dynamics.

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Disclosure: No

P627 | Sleep, cardiovascular disease risk and nocturnal blood pressure dipping in adults of african descent

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Introduction: Individuals of African descent have been shown to have a high cardiovascular disease (CVD) burden and poor-quality sleep. To build on the relationship between sleep duration and CVD risk, we describe associations between CVD risk and sleep quality and timing in individuals of African descent. We also provide preliminary data on the relationship between nocturnal blood pressure (BP) dipping

(an important CVD risk factor) and objectively measured sleep characteristics.

Methods: Self-reported sleep (Pittsburgh Sleep Quality Index, PSQI; Epworth Sleepiness Scale, ESS), demographic and clinical data were collected. CVD risk was determined using the Framingham 10-year CVD risk formula. Nocturnal BP dipping and habitual actigraphy-derived sleep were measured in a subset of women ($n = 24$), since they presented with more predictors of CVD risk than men.

Results: In 412 adults (56% women, 35.0 ± 7.6 y, 40% employed), 58.5% reported ≥9 h of sleep per night. Gender-stratified logistic regressions adjusted for age, employment status, alcohol use, smoking and physical activity indicated that women were more likely to belong to a higher CVD risk score quintile if they reported an earlier bedtime (0.43, 0.22–0.89)and wake-up time quintile(0.34, 016–0.74); had a sleep-onset latency (SOL) of >30 min (2.36, 1.27–4.36) and higher PSQI global scores (2.74, 1.17–6.40) (all $p < 0.05$). Men were more likely to belong to a higher CVD risk score quintile if they belonged to an earlier bedtime quintile (0.22, 0.09–0.50, $p < 0.001$). Preliminary data (n = 19 women) show 91.3% overweight and 47.8% obese, 73.7% were SBP non-dippers, 31.6% were DBP non-dippers and 43.5% were classified as having nocturnal hypertension. Nocturnal actigraphy-derived time-in-bed was 9.19 ± 1.40 h, total sleep time was 7.06 ± 1.20 h and sleep efficiency was 77.0 ± 8.5%. Women with higher PSQI scores had higher nocturnal DBP ($r = 0.45$, $p < 0.05$) while those with less SBP dipping had longer nocturnal SOL ($r = -0.47$, $p < 0.05$) and higher waist circumferences ($r = -0.48$, $p < 0.05$).

Conclusions: Multiple markers of sleep timing and quality appear to be additional risk factors for CVD in adults of African descent. Preliminary data observe high levels of BP non-dipping among women who are also overweight/obese. Further studies are needed in this population to improve our understanding of their unique CVD risk as it relates to sleep.

Disclosure: No

6: CHRONOBIOLOGY

P021 | Sleep structure modifications of people living in a cave for 40 days – deep time mission

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Introduction: It is now well known that sleep is organized by stages and cycle. The aims of this study were to determine

(1) whether sleep duration will change when people are living out of time without any constraints and

(2) if this is the case, how will sleep structure evolved across days and according to the length of the night sleep?

Methods: Through the Human Adaptation Institute, 14 individuals (7 ♀ and 7 ♂) isolated themselves from any time giver in a cave (Lombrives, France) for a period of 40 days between March and April 2021. Participants were asked to record their sleep every four cycles for 40 days using polysomnography (Somté PSG, Compumedics). Sleep duration, sleep efficiency and each sleep stages percentage were measured.

Results: Out of 112 recordings we could analyzed 68 nights (due to problems with the device, too many artefacts, etc.). The mean sleep duration was 9.80h ± 3.25, with no sex difference to depict ($p = 0.637$). The overall mean repartition of each sleep stages is slightly different to what is already known (stage 1: 3.16% ± 1.55, Stage 2: 37.92% ± 10.16, Stage 3: 30.29% ± 10.72, Stage REM: 16.84% ± 7.95, Wake: 11.84% ± 12.60). We found a positive correlation between the length of time awake during their subjective day and the percentage of stage 3 the following night ($p = 0.038$), as well as a positive correlation between the percentage of stage 3 and the length of time awake the following day ($p = 0.03$). The analysis of the nights after they exit the cave are still in progress.

Conclusion: Consistently to what is known, the percentage of stage 3 is well correlated to the elapsed time awake of each subject. In the same vein, can we correlate the slight decrease of the percentage of stage REM with the lack of cognitive solicitation inside the cave? We will soon be able to clarify this hypothesis by corroborating our data with the results of another team which showed a decrease of the grey matter in the learning areas in these same participants.

Disclosure: No

P022 | Efficient but variable response to the afternoon-evening sleep following nightshift in nurses with rapid rotating three shifts

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Objectives: The aim of the study is to investigate the feasibility and the efficacy of changing sleep timing to afternoon-evening sleep following nightshifts in hospital nurses with rapid rotating three shifts.

Methods: Hospital nurses with three rotating shift schedules were enrolled for a 1-month pre-intervention and a 1-month intervention study. During the Intervention, sleep timing following nightshifts was directed to afternoon-evening for 8 h time-in-bed (TIB) after 1 p.m., and ad-lib sleep schedule for other shifts. Sleep was assessed by sleep diary and actigraphy. Epworth sleepiness scale(ESS), insomnia severity index (ISI) for each shift were measured as well as the depression scale. The participants were

asked to give feedback and a willingness to continue this intervention.

Results: A total of 41 subjects (30.2 ± 8.9 years, 22-53, 1 male) finished the study among 46 nurses who participated in the study. The shift work duration was 48.6 ± 62.4 months. The participants included registered nurses and nurse assistants. Chronotype was mostly evening and intermediate type. The number of compliant subjects to nights to the intervention protocol was 31(83%). TIB following nightshift were 424.5 ± 88.6 and 487.5 ± 487.5 min ($p = 0.003$), and total sleep time (TST) was 351.6 ± 81.4 versus, 372.0 ± 73.5 min ($p = 0.187$, for pre-intervention and intervention, respectively. ESS, ISI, and BDI were significantly improved after the intervention ($p < 0.05$). 61.9%, 58%, and 46% of participants showed an increase in TST, reduction of ESS, and reduction of ISI at night shifts, respectively. Approximately 50% of participants reported improved work efficiency and sleep quality

after the night shift. However, 26.8% (11/41) of participants were willing to continue the afternoon-evening sleep schedule following night shifts afterward.

Conclusion: Afternoon-evening sleep schedule following nightshift modestly increased TST but improved subjective sleepiness, sleep quality, insomnia severity, and mood significantly. This suggests the benefit of afternoon-evening sleep to nightshift workers. However, a relatively small number of subjects are willing to continue this schedule. The individual difference should be considered for applying afternoon-evening sleep for rapid rotating shift schedules.

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Disclosure: No

P023 | Determination of biological rhythms in marine wild fish *xyrichthys novacula*

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The study of personality in animals has shown a growing interest in the last decade. The determination of personality is carried out through the concept of repeatability and, in the case of fish, when talking about personality, two clearly marked traits are attributed: proactive subjects who are those who create new routes and are in a constant state of exploration of the environment; and reactive fish that are more passive and do not face exploration and fighting episodes.

Among the patterns that define personality, the chronotype stands out, and, therefore, an attempt was made to define different chronotypes in 76 specimens (♂ = 38) of the marine wild fish *Xyrichthys novacula* (raor), a species of high commercial value in the western Mediterranean. Non-parametric and parametric values (onset, offset, and center of gravity) were determined, as well as the main circadian parameters of motor activity recorded in this species in the marine reserve of the bay of Palma (Mallorca, Spain), during the pre-reproductive (May) and reproductive period (July). Of the total number of specimens, 19% presented an advance in activity (≈ 25,7 min) with respect to the mean, while 22% of the specimens presented a delayed delay (≈ 87.98 min) at the start of the activity. The reproductive period showed significant differences in terms of onset, offset, and center of gravity ($p < 0,001$) compared to the pre-reproductive period, showing a delay in activity. In addition, within the non-parametric variables, it was seen that in the reproductive period there was a more synchronized and fragmented rhythm, and between sexes, males present a more synchronized and less fragmented rhythm. Regarding the circadian variables, females presented higher values of mesor and amplitude with respect to males ($p < 0,001$) both in the pre-reproductive period and in the reproductive period.

With these results, is possible to differentiate for the first time chronotypes in marine wild fish, with the repercussions that this may have not only in the study of their physiology but also in the field of exploitation of fishery resources.

Disclosure: No

P024 | The relationship of sleep duration and chronotype with psychiatric symptoms and how they vary across the day

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Introduction: Sleep and chronotype are both linked to mental health. However, symptoms are not static but change throughout the day. In the current study we aimed to characterise whether sleep duration and chronotype predict psychiatric symptoms and how they vary across the day.

Methods: We recruited an online sample of 500 individuals for a two-day study. During day 1, information on last night's sleep and chronotype (rMEQ) was collected. Of those, 441 individuals continued the next day with ratings of 22 psychiatric symptoms and activities repeatedly across the day (~08:00 a.m.–1:00 p.m. h). Factor analysis was performed to obtain the underlying latent constructs of psychiatric symptoms. Generalised additive mixed-effects models were used to assess the extent and shape of any interaction of sleep duration or chronotype with time of day.

Results: The psychiatric symptoms and activities loaded onto four factors: emotional symptoms; fatigue; ADHD-type symptoms; activity. Key findings include diurnal variation in all psychiatric symptoms, with

differences in strength. Chronotype predicted time-of-day effects in emotional symptoms, fatigue, and activity. Compared to morning types, evening types were less physically active (especially in the morning), experienced more fatigued in the morning and also more emotional symptoms in the evening. Besides being more active, morning types were more fatigued in the evening. Regarding sleep duration, short sleepers reported more emotional symptoms, more fatigue, and more ADHD-type symptoms than long sleepers, but sleep duration did not predict time-of-day effects of symptoms.

Conclusions: Short sleep duration predicts worse psychiatric symptoms, but not diurnal variation in symptoms. Chronotype, on the other hand, predicts diurnal aspects of symptoms, where evening types are not only more vulnerable for morning fatigue but also experience more emotional symptoms in the evening. Better knowledge of how sleep and chronotype influence variation in psychiatric symptoms has the potential to guide precision medicine to better support health and functioning across the entire day.

Disclosure: No

P025 | Ultra high field 7 tesla fMRI potential in revealing hypothalamus responses to blue-enriched light exposure

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Introduction: In addition to vision, light serves many non-visual effects including the stimulation of alertness and cognition. These non-visual effects are mainly mediated through photoreceptors known as intrinsically photosensitive Retinal Ganglion Cells (ipRGCs) and expressing the melanopsin photopigment. While the hypothalamus is known as a primary target of ipRGCs, the precise working of its numerous nuclei receive direct and indirect ipRGCs inputs are not established. Here, we investigated the potential of high-resolution ultra-high-field (UHF) 7 Tesla (7 T) MRI to provide insight on the roles of the nuclei of the hypothalamus in mediating the non-visual impact of light on alertness and cognition.

Methods: We recorded 19 healthy young participants (22–30 y; 10 women; ongoing data acquisition) with 7 *T* functional MRI while there were asked to perform an auditory working memory task (N-back) and alternatively maintained in darkness or exposed to 30-s light block which were composed of either blue-enriched light (100, 200 and 400 microWatt/cm2 for which melanopic lux were 63, 155, 310, respectively) and monochromatic orange light (1013 photons/cm/s; mostly undetected by ipRGCs, or which melanopic lux was 0.2). MRI data processing included data-driven/machine learning segmentation of the hypothalamus into several sub compartments gathering a few nuclei only.

Results: Preliminary results suggest a blue-enriched-light impact in the so-called inferior tubular part of the hypothalamus (uncorrected $p < 0.005$) which includes the lateral hypothalamus (LH), key to sleep-wake regulation, and the tuberomammillary nucleus (TMN), one of the alertness centers in the brain which controls arousal. Also our preliminary results show a blue-enriched-light modulatory impact bilateral in superior tubular part of the hypothalamus (uncorrected $p < 0.008$) which includes the lateral hypothalamus (LH), and dorsomedial nucleus (DMN), essential relay of the suprachiasmatic nucleus which is the site of the master circadian clock.

Conclusion: These results show that UHF 7T MRI is promising in unraveling the subcortical wiring of the non-visual impact of light, including at the level of the hypothalamus. Future analyses on a larger sample size will test whether other hypothalamus compartments are affected by light and will assess cross-talk between nuclei.

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Disclosure: No

P026 | Ramadan fasting as an ecological intervention model of circadian rhythm disruption and recovery

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Objectives/Introduction: The temporal organization of rest-activity cycle is intimately intertwined with one's feeding routine. A unique opportunity to study the effects of mistimed meals on the human sleep can be found in the Islamic Holy month of Ramadan, during which eating and drinking are allowed only in nighttime. We hypothesized that this extreme inversion of meal timings drives adaptive changes in sleep-related variables.

Methods: We developed of a novel digital Circadian Ramadan (CIRAM) questionnaire for multiple within-subject assessments of changes in sleep and fasting timings with respect to 5 phases: *Baseline*- one week pre-Ramadan fast, *Ramadan-I* - the end of the first week and *Ramadan-II* -end of the fourth week of Ramadan, *Recovery-I and II* - end of the first week and of the fourth week after Ramadan, respectively. 198 healthy young adult volunteers were recruited through advertisements in the Nazareth Muslim community; 102 responders (48 females, mean age 28.5 ± 6.2 y) completed all five assessments using Qualtrics on-line survey.

Results: During Ramadan, the nocturnal sleep duration was shorted by ~1 h and did not reach full recovery even at *Recovery-II*. The mid-sleep (MST) and mid-fasting (MFT) times were delayed by 29 and 566 min respectively, and the MST-MFT difference (ΔMFMS)

increased from 0 to 558 min. The median MST became increasingly later during Ramadan until *Recovery-I*. The MFT was the latest during *Ramadan-I* (1:00 p.m., local time) but was partially recovered at *Ramadan-II* (11:49 a.m., local time). At *Recovery-I*, both the MST and the MFT were still far from their *Baseline* (~70 and 30 min, respectively), while the ΔMFMS was already close to the *Baseline*. At *Recovery-II*, the medians of the MST, MFT, and ΔMFMS returned to their baselines; however, on the individual level, at least 15% of the sample still exhibited a misalignment between MST and MFT compared to *Baseline*. Late chronotypes were more prone to this long-term disturbance.

Conclusions: Ramadan is a suitable model for studying how changes in meal timing may lead to the uncoupling of peripheral clocks from, or their re-coupling to, the central pacemaker that regulates sleep–wake in humans, *in situ*.

Disclosure: No

P027 | Rest-activity circadian rhythm using wrist actigraphy in ICU patients

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Objective: to investigate the status of rest-activity circadian rhythm using wrist actigraphy in ICU patients before their discharge.

Methods: Actigraphy data of four nonparametric variables: M10, L5, RA, IS were measured to 13 recently extubated non mechanically ventilated until discharged ICU patients (6 males) admitted for medical (7 patients) reasons or for post-operative care (6 patients). Rest–activity circadian rhythm of the patients was monitored for 24–72 consecutive h and analysed separately for daytime (set from 8:00 a.m. to 8:00 p.m.) and nighttime (set from 8:00 p.m. to 8:00 a.m.) using the MotionWatch 8©.

Results: Mean age was 65.9 ± 4.3 years, with APACHE II and SOFA score, 19.5 ± 2.9 and 7.4 ± 0.7 respectively. Mean length of stay was 23.6 ± = 7.1 days. Mean actigraphy use was 46.2 ± 6.9 h.M-10 and L-5 values were higher and RA values (0.6, normal values >0 and < 1) was lower compared to healthy population. IS values was 0.8 (normal values 0–1). A significant correlation was found between L5 and M10 ($r = 0.681$, $p < 0.01$) and between L5 and RA ($r = -0.621$, $p < 0.01$).

Conclusions: M-10 and L-5 values were high which is compatible to a hyperkinetic state, a high gross motor activity indicating a loss of rest-activity circadian rhythm prior ICU discharge. Low RA values also support this finding of the loss of day-night orientation. On the other hand, IS values indicate "good" synchronization to environmental cues, for example light exposure, in the ICU. Thus, wrist actigraphy may be useful to diagnose rest-activity circadian rhythm dysregulation in ICU patients.

Disclosure: No

P322 | Social jetlag and correlates related to health and life satisfaction: a large-scale study of a representative sample of norwegian students

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Social jetlag refers to a misalignment between one's biological cycle and social time and have been associated with several unfavorable health outcomes. The aim of this study was to examine whether social jetlag is related to mental and somatic health problems, life satisfaction, and body mass index (BMI). We used data from the cross-sectional survey Student's Health and Wellbeing Study (SHoT2018), which include responses from 50,054 students (female 69%, 23.2 years ± SD 3.3 years). Social jetlag was split into seven categories at half-h intervals, from 30 min or less and up to 3 h or more. Regression analyses were conducted in order to examine the association between social jetlag (≤30 min as reference category) and psychological distress (the Hopkins Symptom Checklist-25), somatic symptom burden (the Somatic Symptom Scale-8), life satisfaction (the Satisfaction With Life Scale) and BMI. Both crude and adjusted models were conducted, the latter controlling for background variables (sex, age, relationship status, care for children, financial difficulties), chronotype, and average weekly sleep duration. For the analysis of BMI, physical exercise was also adjusted for. Results generally demonstrated a pattern in which having a higher social jetlag – as compared to having a social jetlag of 30 min or less–was associated with beneficial outcomes on life satisfaction, psychological distress, and somatic symptom burden. Social jetlag was also positively associated with higher BMI. It was also possible to detect a favorable amount of social jetlag, in which a social jetlag of between 2.5–3.0 h were associated with the highest scores on life satisfaction, and social jetlag of 2.0–2.5 h was associated with the lowest scores on psychological distress and somatic symptom burden.

Disclosure: No

P323 | Daytime rest, circadian timing and cognitive performance in healthy older adults

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Introduction: Ageing goes along with an increased occurrence of daytime rest and epidemiological evidence points towards an association between rest-activity fragmentation and cognition. However, the biological correlates of daytime rest remain mostly elusive. Here, we assessed whether daytime rest characteristics are associated with concurrent changes in 24-h rest probability profiles, neurobehavioral outcomes and circadian timing in healthy older adults.

Methods: Sixty-three individuals (68.4 ± 5.6 years (mean ± SD), 23 women) underwent field actigraphy monitoring, in-lab dim light melatonin onset (DLMOn) assessment and a cognitive test battery, encompassing episodic memory, executive functions and attentional performance. Daytime rest frequency (mean number of rest bouts per day), duration (overall mean duration of rest bouts) and timing (median delay between rest bouts start time and DLMOn) were computed using actigraphy. Regression analyses were performed to investigate the link between these daytime rest characteristics and concurrent 24-h rest probability profile, cognitive performance and circadian rhythm outcomes (DLMOn and phase angle between DLMOn and actigraphy-derived activity offset times). Concurrent 24-h rest probability profiles were analysed using 1D statistical parametric mapping.

Results: As expected, increasing daytime rest frequency was associated with higher rest probabilities during the day ($p_{cluster} < 0.01$), but also with lower rest probabilities during the night, suggesting more altered night-time rest ($p_{cluster} < 0.001$). Higher daytime rest frequency was also predictive for lower episodic memory performance ($\beta = -0.38$, $p < 0.01$). Moreover, late-timed daytime rest was associated with an advanced circadian phase ($\beta = -0.67$, $p < 0.001$) and with an increased phase angle of entrainment between the activity offset time and circadian phase ($\beta = 0.57$, $p < 0.001$).

Conclusion: Our data show that increased intrusion of rest into the active wake period is linked to reduced night-time rest consolidation and reduced episodic memory performance in healthy older adults. Concomitantly, resting later in the day is associated with an advanced circadian phase and with misalignment between circadian timing and the rest-activity cycle. Our results point towards a cross-talk between daytime rest characteristics, the circadian timing system, and memory decline in older adults. Understanding the mechanisms underlying wake fragmentation is timely, considering that napping habits are increasingly used as health indicator in the context of ageing and associated neurodegeneration.

Disclosure: Yes

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P324 | Sleep-wake pattern in patients with depression without primary sleep disorders

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Background: Insomnia and daytime sleepiness are frequently reported by patients with depression; however, comprehensive objective sleep tests are rarely performed in this group of patients. This is further complicated by the fact that primary sleep disorders are also common in these patients. However, less data is available on the sleep-wake pattern of patients with depression in whom primary sleep disorders are excluded. Our aim was to analyse actigraphy data in this group.

Methods: We investigated two-week actigraphy data in patients who were referred to our Sleep Laboratory due to daytime sleepiness or insomnia. Patients who were diagnosed with autism spectrum disorder, attention deficit hyperactivity disorder, sleep disordered breathing, sleep-related movement disease, narcolepsy, circadian rhythm disorder and parasomnia were excluded. Actigraphy data of 16 patients with depression were compared to 17 patients without depression.

Results: There was no difference in age (32 ± 12 vs. 37 ± 14 years), gender (50% vs. 47% male), Epworth Sleepiness Scale (12 ± 6 vs. 14 ± 5), body mass index (27 ± 7 vs. 29 ± 7 kg/m^2), average number of daytime naps (0.5 ± 0.8 vs. 0.3 ± 0.5), time spent in bed (559 ± 156 vs. 510 ± 70 min), time spent with sleep (435 ± 80 vs. 427 ± 60 min), or sleep efficiency (78 ± 12 vs. 82 ± 5%) between patients with versus, without depression, respectively (all $p > 0.10$). However, sleep latency tended to be longer in patients with depression (44 ± 80 vs. 13 ± 10, $p = 0.09$).

Conclusion: We did not identify major differences in measures of sleep-wake pattern between patients with and without depression in whom primary sleep disorders were excluded.

Disclosure: No

P325 | Season matters. Winter hypersomnia caught in a cross-sectional actigraphic study

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Even if the modern urban lifestyle masks their effects, the seasons are still important for human physiology and behaviour. The differences in daily light exposure between seasons of the year may affect the sleep-wake rhythm and general level of energy or daytime sleepiness.

Are those phenomena reflected in actigraphy recordings gathered in various times of the year?

One-week registrations obtained with MotionWatch8 devices (Camntech Ltd), worn on a non-dominant hand, 24 h/7days, were roughly divided into "warm-season" and "cold-season" data, according to spring and autumn equinox. The difference between average length of natural light exposure in the latitude in which the data was collected (Krakow, Poland) amounts 4 h 58 min.

There were 127 participants in the study (74 females), 18–35 years old (mean 24.6 ± 4.0 yrs). The following sleep parameters were taken into account: fell asleep and woke-up times, time in bed, actual sleep time, actual wake time, sleep efficiency, sleep latency, and fragmentation index. Additionally, daytime drowsiness was assessed with Epworth Sleepiness Scale.

Sleep analyses did not show differences in bed- and wake-times, but means of actual sleep length and time in bed differed significantly ($p < 0.04$) between the seasons – sleep was longer in "cold" months by 22 min. The longer photoperiod in time of actigraphy registration was associated with earlier waking time, shorter time-in-bed and shorter actual sleep (correlations significant at $p < 0.05$). An important ($p < 0.05$) gender effect was observed - women used to fall asleep earlier and to sleep longer; their sleep was less fragmented than men's sleep. The circadian rhythm characteristics (as assessed with NPCRA, i.e., relative amplitude, intra-daily variability and inter-daily stability) seem to be similar all year long.

It may be concluded that actigraphy recordings reflect the cold-season-related tendency to hypersomnia, especially in women.

Disclosure: No

P326 | Circadian rhythm of temperature and visuospatial working memory in aging

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Introduction & Methods: Circadian rhythms (CR) can modulate human cognition, and aging goes along with reduced CR amplitude and advanced CR phase. We investigated here the combined impact of CR and aging on visuospatial working memory (WM) in healthy young ($n = 20$, 18–35 years) and old ($n = 16$, >65 years) individuals. CR was quantified by the 24 h modulation of the distal-proximal body temperature gradient (DPG), recorded during 5 days using iButtons. Visuospatial WM was assessed in the morning and evening on separate days using an object-location visuospatial binding task, allowing to distinguish between identification and localisation performance at low versus, high WM load levels and short versus, long retention delays. We hypothesised that WM performance is modulated by age and testing time-of-day and is further associated with 24-h DPG amplitude. Repeated measures ANOVAs explored WM performance, time-of-day differences, DPG modulation, and their interactions. Harmonic regressions were used to assess DPG amplitude and phase.

Results: Results show that DPG significantly changed across the 24 h cycle ($F(23,744) = 11.745$, $p < 0.001$) and that 24-h DPG modulation differed in old participants compared to the young ones ($F(1,744) = 7.529$, $p = 0.006$), inferring a reduced amplitude ($t = 2.754$, $p = 0.006$). WM localisation (binding) performance was decreased in old versus, young ($F(1,144) = 29.286$, $p < 0.001$), but not WM identification ($F(1,185) = 0.923$, $p = 0.337$). Performance in older participants was more affected by delay ($F(3,144) = 13.056$, $p < 0.001$) and item load than in young ones ($F(1,185) = 23.097$, $p < 0.001$). Testing time-of-day and 24-h DPG amplitude were not associated with WM parameters (ps > 0.1).

Conclusion: Our findings confirm reduced CR amplitude and WM performance in aging. However, no relation was found between WM and testing time-of-day nor CR amplitude variations as measured using DPG. More in-depth analysis using DPG time courses need to be conducted to further probe potential associations between CR and daily performance modulation across aging.

Disclosure: No

P327 | Association of daily eating duration and day-to-day variability in the timing of eating with fatal cancer risk in older men

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Introduction: Meal timing has significant effects on health. However, whether meal timing is associated with the risk of developing and dying of cancer is not well-researched in humans.

Methods: In the present study, we used data from 941 community-dwelling men aged 71 years who participated in the Uppsala Longitudinal Study of Adult Men to examine the association of meal timing with cancer morbidity and fatal cancer. The following meal timing variables were derived from seven-day food diaries:

(i) daily eating duration, that is, the time between the first and last eating episode of an arbitrary day;

(ii) the calorically weighted midpoint of the daily eating interval, a proxy of when the eating window typically occurs during an arbitrary day; and

(iii) the day-to-day variability in the timing of eating.

We also assessed the reported daily energy intake reliability using the Goldberg method.

Results: During a mean observational period of 13.4 years, 277 men (29.4%) were diagnosed with cancer. Furthermore, 191 30 men (20%) died from cancer during 14.7 years of follow-up. As shown by Cox regression adjusted for potential confounders (e.g., smoking status

and daily energy intake), men with reliable dietary 32 reports whose daily eating intervals were on average 13 h long had a 2.3-fold greater fatal cancer 33 risk than men whose daily eating windows were on average about 11 h long. We also found that men with an average day-to-day variability in the timing of eating of 48–74 min had a 2- to 2.2-fold higher fatal cancer risk than those with the lowest average day-to-day variability in the 36 timing of eating (i.e., 23 min). No clear associations were found in men with inadequate dietary reports, emphasizing the need to consider the reliability of dietary records in nutritional epidemiology.

Conclusion: To fully unlock its potential, studies are needed to test whether recommendations to time-restrict the 24-h eating interval and reduce day-to-day variability in the timing of eating can meaningfully alter the risk of death due to cancer.

Disclosure: No

P328 | Somnus libertas: Association between remote work opportunities and sleep quality in a representative sample of finnish adults

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Introduction: Social obligations have a potential to clash with circadian rhythm of an individual and this is especially likely for persons with evening chrontype. Recent research has suggested that during COVID-19 restrictions some people, especially evening types, slept better than before the pandemic. We hypothesize that this is due to increased remote work that decreases conflicts between sleep timing and working h for some people.

In the current study we test a hypothesis that amount of remote work is associated with improved sleep length and quality as well as decreased social jet lag among Finnish adult population. We also expect that this association is strongest among people with evening chronotype.

Methods: The sample will consist of 3500 Finnish adults representative of general population in Finland. Data collection will take place April 2022 and will be carried out by market research company Kantar. Participants will fill in a survey investigating among other things number of workdays per week they work remotely. Questions related to sleep include self-estimated sleep length, sleep quality, MEQ chronotype questionnaire and sleep and wake times during free- and workdays. Various questions about sociodemographic background variables will also be inquired.

Regression models will be used to investigate associations between amount of remote work and sleep length, sleep quality, social jet lag and chronotype.

Results: Our hypothesis is that there is a positive association between amount of remote work and sleep length and sleep quality with remote work having negative association with social jet lag. Data collection will complete in April and preliminary results will be available by autumn 2022.

Conclusions: Social jet lag is very prevalent among adults, and this suggest that conflicts between optimal timing and duration of sleep with social obligations such as working h are common. Increased remote work opportunities might be one way to lessen these conflicts, especially for people with evening chronotypes. This study will investigate this hypothesis in a representative sample of Finnish adults.

Disclosure: No

P632 | Is eating regularity associated with sleep-wake-patterns in infants and mediated by the gut-microbiota?

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Introduction: While arrhythmic food intake modifies the gene expression rhythm at the cellular level, its influence on the sleep-wake rhythm is less known. Growing evidence supports a bidirectional link between the gut microbiome and sleep-wake rhythm, suggesting that gut microbiota could mediate the link between rhythmic food intake and sleep. As both the gut microbiota and sleep-wake rhythm develop across infancy, their linkage might be particularly apparent during this period. We hypothesized that sleep-wake patterns of infants and the regularity of food intake are related, and that this relation is mediated by changes in the gut microbiota.

Methods: We assessed sleep for 10 days (actigraphy and sleep diaries) at age 3, 6 and 12 months in 152 healthy infants, and thereof created five standard sleep composites (Sleep Activity, Sleep Timing, Sleep Night, Sleep Day, Sleep Variability) that capture infants' sleep-wake rhythm. Regularity in food intake was measured through an Eating Regularity Index (ERI) computed from the similarity of food intake clock time across all assessment days. Stool samples were collected at the three ages, processed (amplicon sequencing, 16s rRNA, V3), and three markers of gut microbiota maturation were computed (Alpha Diversity, Enterotype, Maturation Index). As general principles of parenting behavior can influence sleep and timing of meals, we included a "Structure" score (Baby Care Questionnaire) representing parents' subjective importance to introduce a regular schedule.

Results: Increased ERI was significantly associated with earlier bedtimes (Sleep Timing, multilevel models, $p = 0.003$), less time spent awake during the night (Sleep Activity, $p < 0.001$) and more regular sleep patterns (Sleep Variability, $p < 0.001$). Yet, the ERI was not significantly linked to the sleep duration during either night (Sleep Night) or day (Sleep Day). This relation between ERI and sleep was not mediated through the gut microbiota markers (4-step Causal Analysis, $p > 0.05$).

Discussion: Thus, the regularity of food intake is associated with sleep-wake patterns in infants: Infants with more regular eating have

more mature sleep-wake rhythms. Maturational markers of gut microbiota are not a main driver of this linkage. These associations indicate that effects of rhythmic food intake go beyond the cellular level and may influence infants' sleep.

Disclosure: No

P633 | Cross-sectional interrelationships between chronotype, obstructive sleep apnea and blood pressure in a middle-aged community cohort

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Introduction: Chronotype is increasingly linked to adverse health measures and may have important associations with obstructive sleep apnea (OSA) and blood pressure (BP), but data are limited. This study aimed to determine the separate and combined associations of chronotype with OSA and BP/hypertension in a middle-aged community population.

Methods: Adults(n = 812)from the Raine Study (male = 40.8%; age mean[range] = 56.6[42.1–76.6] years) were categorised by chronotype using the Morning-Eveningness Questionnaire. A total of 10 BP readings within a 24 h period (afternoon, evening and morning) was used to calculate the average systolic BP, diastolic BP, and mean arterial pressure (MAP). Prevalent hypertension was defined as "doctor diagnosed" and/or elevated systolic (≥140 mmHg) or diastolic (≥90 mmHg) BP. OSA severity was determined using the apnea hypopnea index (AHI) from in-laboratory polysomnography. The effect of increasing severity of OSA was assessed by applying different AHI cut-offs (5, 10, 15 events/h). Multivariable linear and logistic regression models (adjusted for age, sex, body mass index, alcohol, smoking, physical activity, sleep duration, insomnia, and depression) were used to assess cross-sectional relationships between chronotype and the presence and severity BP/hypertension and OSA.

Results: Most members of this community sample were categorised as morning (40%) or intermediate (43%) chronotypes with only 17% being evening chronotypes. The MAP in morning chronotypes was 2.29 mmHg and 4.21 mmHg higher than the intermediate (p = 0.05) and evening (p = 0.04) chronotypes, respectively in participants with an AHI ≥15events/h. There were otherwise no differences between chronotypes in BP when AHI thresholds of ≥5 or ≥10events/h were used or in the odds of prevalent hypertension and OSA.

Conclusions: Increasing severity of OSA in individuals who are morning chronotypes is associated with an increased risk for high BP compared to those who are evening or intermediate chronotypes. These findings suggest that chronotype could influence the well-established relationship between OSA and hypertension. Consideration of chronotype in the clinical setting may aid in hypertension risk stratification of OSA patients.

Disclosure: Yes

Conflict of Interest statement: N. McArdle has received research funding support within the last year from Nyxoah Pty Ltd (Mont-Saint Guibert, Belgium).

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P634 | Light sensitivity as a physiological factor that promotes irregular sleep/wake patterns: a model-based investigation

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Introduction: Irregular sleep is a health risk factor. However, we currently have a poor understanding of physiological factors that contribute to individuals having irregular sleep/wake patterns. We used a validated mathematical model of sleep-wake and circadian physiology to systematically examine the influence of circadian, sleep homeostatic, and light sensitivity parameters on sleep regularity.

Materials and Methods: Sleep-wake patterns were generated by a computational model, assuming a 5-day work schedule with enforced wakefulness from 7:00 a.m. to 7:00 p.m. We introduced daily random variation σ in the model's sleep-onset threshold to mimic observed intra-individual variability in sleep/wake patterns. The Sleep Regularity Index (SRI) was calculated, ranging from 0 (random pattern) to 100 (perfectly regular pattern). Eight model parameters were varied to determine their effects on SRI: circadian period (τ); circadian amplitude (ν_{vc}); sleep homeostatic time constant (χ); and five light sensitivity parameters: delay bias of the phase response curve (b), sensitivity of the dose response curve (p), retinal output strength (G), photoreceptor recovery rate (β), and photoreceptor activation rate ($\alpha 0$).

Results: Sleep regularity was meaningfully affected by six of the eight parameters. Responses occurred in three clusters: (1) light sensitivity parameters G and β had no effect on SRI; (2) circadian amplitude ν_{vc} modulated the effect of σ, such that weaker amplitude resulted in lower SRI (less regular patterns) for the same σ; and (3) the remaining five parameters τ, χ, b, p, and $\alpha 0$ all generated maximal SRI scores (most regular patterns) for default parameter values, with lower SRI scores when parameters deviated from default values.

Conclusions: This is the first study to systematically investigate potential mechanisms of irregular sleep using mathematical modeling. Our findings suggest that irregular sleep can result from individual differences in the sensitivity to the timing and intensity of light exposure, as well as differences in circadian and sleep homeostatic parameters.

Disclosure: No

P635 | Chronotype and resting-state connectivity networks in Chilean young adults

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Objective/introduction: Late chronotype has been related to mood disorders, and sleep and behavioral alterations. However, the underpinning neural mechanisms remain unclear. We aimed to assess whether resting-state connectivity networks differ between chronotypes in healthy young adults.

Methods: Participants were part of a cohort follow-up study since infancy. Using actigraphy for a week, nighttime sleep-wake parameters were assessed to identify early and late chronotypes (mid-sleep time on weekdays corrected by oversleep on weekends) based on the median of their distribution (5.6 h). Resting state functional magnetic resonance imaging (rsfMRI) was acquired using a Siemens 3T Skyra MRI scanner (Siemens Healthcare, Erlangen, Germany). Data was preprocessed and analyzed using the CONN functional toolbox. Seed-based connectivity analysis was performed to explore different networks that could relate to sleep. For between-group comparisons, matrices were entered into a second-level general linear model and adjusted by sex. The results shown are those that survived a false discovery rate (FDR)-corrected threshold of $p < 0.05$ at the seed level.

Results: Sixty-six participants (56.0% male and 21.3 ± 0.2 y) were assessed. Compared to late chronotype and regarding resting-state connectivity, the early chronotype presented higher (1) default mode network (DMN) connectivity regions: the middle temporal gyrus (to-R), postcentral gyrus (R and L), superior parietal lobule (L), precentral gyrus (R and L); and (2) sensorimotor network connectivity regions: lateral occipital cortex (sd-L and sd-R) and angular gyrus (R).

Conclusions: Even though participants were healthy young adults, early and late chronotypes showed different patterns of resting-state connectivity networks. In particular, the late chronotype was characterized by decreased default mode networkand sensorimotor network connectivity regions.

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Disclosure: No

P636 | Meta-analysis of human jet-lag paradigms to determine factors driving phase shift variability

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Objectives: Phase shift manipulations, used to emulate jet-lag, vary greatly between studies, both when it comes to subject inclusion criteria (e.g., age, prior sleep-wake schedules), lighting conditions or the direction and number of h shifted. Such differences in study setup may lead to varying results. This meta-analysis aims to enhance awareness of these factors that drive variability in jet-lag paradigms to improve future study designs.

Methods: We systematically searched databases such as MEDLINE and EMBASE for phase shift studies published between 1970 and 2020. Inclusion criteria include: the availability of total phase shift and its within-group variability (based on end points), report of the recovery period duration (time between first phase shift and endpoint). All data was manually curated and extracted.

Results: A total of 1,149 records of phase shift studies were found, which varied in terms of inclusion criteria, methods (length of phase shift advance/delay, endpoint measurements and parameters controlled) and interventions (pharmacological agents, light, physical activity). We currently identified 36 studies, conducted in 21 laboratories and with 892 participants. Identified studies employ a single phase shift and include either a constant routine or dim light melatonin onset protocol for circadian phase assessments via core body temperature, melatonin and/or cortisol. While analyses are ongoing, power assessments suggest that with $n = 36$ (studies), assuming an allocation ratio of 1, we expect to have meta-analytic power of at least 80% (at an alpha of 0.05) to detect variance ratios of approximately 3.5 fold or greater. By contrast, assuming an effective $n =$ '892 (participants), we expect at least 80% power to detect variance ratios of 1.26 fold or greater.

Conclusions: Jet-lag paradigms are frequently used, highly diverse and applied in multiple labs, making it possible to explore whether methodological differences modulate variability. Based on power analyses, the results of our meta-analysis will provide adequate statistical power to detect small effects with fixed-effects analysis, but are likely inadequate to detect effects based on study-level analysis.

Disclosure: No

P637 | Circadian rest-activity rhythm of the raor (***xyrichtys novacula***) In its natural habitat, before and during its reproduction period

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The cyclic periodicity inherent in the physical environment has functioned throughout evolution as a driving force for the selection of living organisms. The different organisms adapted to this changing environment have developed physiological processes that vary cyclically, the so-called biological rhythms. Although they persist independently of the environment, these cyclical environmental variations are able to synchronize them. Among the most important biological rhythms of animals, we find the circadian rhythms, whose period is approximately 24 h, and in which the oscillators or circadian clocks, structures capable of inducing and regulating innately these cyclical physiological responses, are of great importance. In teleost fish, we find a multitude of these oscillators, but the pineal organ is the most important, as it has the capacity to detect by itself the environmental variation of light-darkness, and to regulate endogenously the synthesis of melatonin and the circadian rhythm of activity-rest of the fish. In the present work, we define the circadian activity-rest rhythm of the Raor *(Xyrichtys novacula)*, a small teleost fish of great importance in the Balearic Islands, in its own habitat, before and during the breeding period. Part of the data collected during the CLOCKS research project is used, where acoustic telemetry is used to detect the activity of the fish, understood as its movement, in one-minute intervals. With these data, the circadian rhythm of activity-rest of these fish is defined by its non-parametric values (IV, IS, RA, M10 and L5) and a well-marked rhythm is observed, little fragmented and well synchronized with the environmental light-dark cycle, independently of the sex and the time of year studied. However, during reproduction the rhythm is slightly more desynchronized and fragmented, caused by variations in the photoperiod. Moreover, in both periods the activity of males is much higher than that of females, possibly due to the peculiar behavior of males when defending the harems they lead.

Disclosure: No

8: BEHAVIOUR

P028 | Orexin neuromodulation of the dopaminergic system: relevance for attentional and impulse control outcomes

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Objectives/Introduction: Orexin neurons are located in the Lateral Hypothalamus (LH) and they have been established as critical modulators of sleep, wakefulness, and other motivated behaviors. There are two orexin peptides, A and B, that act at two different receptor subtypes, orexin receptor-1 (OX1R) and orexin receptor-2 (OX2R). Hypothalamic orexin neurons project to multiple brain areas including mesolimbic dopamine (DA) pathway regions, such as the ventral tegmental area (VTA) and the nucleus accumbens. In fact, the projection from the LH to the VTA is a major monosynaptic pathway among the basal forebrain and hypothalamic areas. Nevertheless, the functional consequences of DA neuron modulation by orexin inputs are not well understood.

Methods: Using the Cre/lox technology and a*dopamine transporter* (*Dat*) Cre driver line, we generated mice harboring cell type-specific inactivation of the*Ox1R*gene in DA neurons. Moreover, we characterized the mice in a task equivalent to the Continuous Performance Task in humans, namely the 3-Choice Serial Reaction Time task (3-CSRTT), measuring their attentional performance, as well as compulsivity/impulsivity parameters.

Results: Assessing this mouse line, along with their respective control littermates, we could show that orexin receptors in DA neurons play an important role in several behavioral readouts in the 3-CSRTT. More specifically, we show that mice lacking*Ox1R*in DA neurons, differ in their learning pattern in this task compared to control mice and they also show increased compulsive behaviour as reflected in increased repetitive responses, as well as increased errors of commission.

Conclusions: Our results indicate important contributions of OX1R neuromodulation of the dopaminergic system to these attentional performance and impulse control domains.

Disclosure: No

P029 | Association of habitual sleep with fNIRS-measured functional connectivity during a nap in infants

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Objectives/Introduction: Functional connectivity patterns show large variability in infancy and these individual differences can predict later cognitive development. Similarly, habitual sleep patterns in infancy also relate to development. Studying individual differences in functional connectivity patterns during sleep could clarify the underlying mechanism connecting sleep and development. Our proof-of-concept study uses the first bespoke integrated fNIRS-EEG set-up to assess connectivity patterns during infant sleep while also collecting data on habitual sleep. Based on prior research we expect infants with poor habitual sleep quality to show more local rather than global connectivity patterns (Bruchhage et al., 2020).

Methods: $N = 26$ (11 asleep, 7 female) 5-to-8-months-old infants participated in the nap study phase 1 using a lab-based fNIRS-EEG set-up (NIRS: 39-channel NTS Gowerlabs; EEG: 13-channel ENOBIO) at Birkbeck Babylab, London, UK. Data collection for study phase 2 is ongoing aiming to increase the current $N = 11$ (10 asleep, 5 female) collected using a wearable fNIRS-EEG set-up (NIRS: 44-channel Artinis babyBrite; EEG: 20-channel ENOBIO). Habitual sleep was measured using the Brief Infant Sleep Questionnaire (BISQ; variables: sleep duration and fragmentation). fNIRS data was divided into 120 s epochs and channel-by-channel correlational analyses were performed to obtain connectivity matrices for each epoch. K-means cluster analysis was used on all concatenated sleep epochs of all

participants to identify recurring connectivity patterns in the NIRS data. Correlational analyses were performed for associations of clusters with habitual sleep data.

Results: Phase 1 analyses showed infants nap duration varied from 23–63 min (M: 39.64, SD: 13.96). Connectivity matrices of every epoch/ subject showed differences in connectivity across the sleep period in every infant. Overall occurrence of connectivity clusters differs across individual naps. And only WASO was associated with connectivity occurrence ($r = 0.66$, $p = 0.038$). We aim to reproduce these analyses in study phase 2.

Conclusions: Our results show the feasibility of using our bespoke fNIRS-EEG to study infant sleep and neurocognitive development. Furthermore, preliminary results suggest individual differences in connectivity pattern occurrence during a nap in infants could be related to some aspects of habitual sleep fragmentation. Though, a larger sample size is needed to confirm those results.

Disclosure: No

P030 | Workplace psychosocial resources and risk of sleep disturbances among employees: A multi-cohort study

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Aims: The aim of the study is to assess the association of workplace psychosocial resources with sleep disturbances among employees.

Methods We pooled data from three cohort studies including 114,971 participants (69% women, mean age 48) from Denmark, Finland and Sweden. Horizontal psychosocial resources (good culture of collaboration, support from colleagues) and vertical psychosocial resources (high leadership quality and procedural justice) were measured using standard questionnaire items. Clustering of resources was pre-assessed and categorized into "general low", "intermediate vertical & low horizontal", "low vertical & high horizontal", "intermediate vertical & high horizontal" and "general high" resource classes. Sleep disturbances were measured using Karolinska Sleep Questionnaire or Jenkins Sleep Problem Scale. Concurrent and longitudinal associations between resources and sleep disturbances were analyzed.

Results: Compared with "general low" resources (the reference), all other classes showed a lower prevalence of sleep disturbances, with the lowest in the "general high" resource class ($OR_{concurrent} = 0.38$, 95%CI = 0.37–0.40). Longitudinal associations with sleep disturbances were observed at two and six years of follow-up; the $OR_{six\text{-}year}$ for "general high" resource group being 0.52 (95%CI = 0.48–0.57). Workplace resources changed over time for 53% of participants. Improvements in vertical or horizontal resource dimension were associated with a lower risk of persistent sleep disturbances (e.g., $OR_{both\ dimensions} = 0.53$, 95%CI = 0.46–0.62). Decline in vertical or horizontal any resource dimension was associated with a higher risk of onset of sleep disturbance (e.g., $OR_{both\ dimensions} = 1.74$, 95% CI = 1.54–1.97).

Conclusions: Promotion of social workplace resources related to leadership quality, coworker support and culture of collaboration may support better sleep quality in employees.

Disclosure: No

P031 | What is the required rest between work shifts for sufficient sleep? A meta-analysison individual data from 15 field studie

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Sleep is fundamental for health and lab studies show that it is tightly regulated by biological processes, that is, sleep homeostasis and the circadian system. While we know less of factors influencing sleep in modern life, field studies show that irregular working h have a major impact on sleep duration. In order to determine the sufficiency of sleep duration during the rest time, and to define the association of rest time and the amount of sleep between the shifts, we merged data from 15 field studies for meta-analysis.

We analyzed actigraphy and diary data from 15 field studies/work sites in workers with irregular working h in Sweden, Finland and Australia, together rendering 532 subjects and 2970 sleep periods.

Recovery time between work shifts strongly predicted main sleep duration prior evening- and night shifts, each h of extra recovery rendered 13, 20 min of more sleep, respectively, and to some degree prior to morning shifts (only 7 min more sleep per extra h of recovery). One reason for the poor prediction of main sleep period before morning shifts was that the start time of morning shifts was a strong predictor of sleep duration, each h a shift started before 7 a.m. resulted in 34 min less sleep. The start times of evening and night shifts had no significant effects on prior sleep. There were large individual differences in sleep duration, and for 75% of subjects to obtain at least 6 h of sleep on average, recovery times had to be 14 h prior morning shifts, 13 h prior evening shifts and 18 h prior night shifts. With 11consecutiveh of recovery between work shifts (minimum daily rest period according to the European Working Time Directive; 2003/88/EC), only 56% of subjects obtained 6 h of sleep before morning shifts, 60% before evening shifts and 10% prior night shifts. Rest time is a strong predictor of sleep duration, and 11 h is too short for most individual to get sufficient sleep.

Disclosure: No

P032 | The phenomenology of parasomnias based on internet databases

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Introduction: Parasomnias deeply impact the quality of life of those affected and can cause injuries.There are distinct patterns of sleep-related behaviors characterizing different age- and sex- groups of parasomnia patients.

Methods: We analyzed video records on sleep-related movements and behaviors that likely represent parasomnias, looking for typical "phenotypes" in different groups. Public databases of internet videos were searched using the keywords "sleepwalking", "sleep eating" "sleep sex", "somnambulism", and "aggression in sleep" in six languages. We classified those persons in the videos into sex- and age-groups, scored the activity-types based on a self-made score list; and applied binary logistic regression for analyzing the association between sleep behaviors versus sex- and age- groups by STATA package providing 95% confidence interval.

Results: 224 videos (102 women) were collected. The odds of sleepwalking and related dangerous behaviors were lower in elderly people than in adults (p < '0.025). Females performed complex risky behaviors during sleepwalking more often than males (p < 0.012). Elderly people presented emotional behaviors less frequently than adults (p < 0.004), and females showed them twice often as males. Adults sleep talked full sentences more often than children and elderly people (p < 0.001). Elderly males had 40-fold odds compared to adults and children, to perform aggressive movements, and 70-fold odds to complex movements in the bed, compared to adults.

Conclusion: Elderly people hardly ever sleepwalk. Elderly males perform intense and violent movements in bed, unlike other groups. The existence of parasomnia-phenotypes allows preventing typical injury types and raises theoretical questions on the mechanism and brain-network backgrounds of parasomnias.

Disclosure: No

P034 | Evaluating the feasibility and acceptability of a school-based sleep education programme to improve adolescent sleep in Scottish schools

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Objectives/Introduction: Insufficient sleep is highly prevalent in adolescents and has been associated with poorer mental/physical health and academic performance. School-based sleep education programmes have been developed and studies have generally found that such programmes effectively improve sleep knowledge but have demonstrated only limited changes to sleep behaviour in adolescents. To our knowledge, no such research has been conducted within the Scottish educational context, however this provides an opportune moment and setting to encourage healthy sleep practices and prevent downstream effects of poor sleep. This study aimed to evaluate the feasibility and acceptability of delivering a school-based sleep education programme (SIESTA) to improve sleep in adolescents in Scottish secondary schools.

Methods: This study investigated a novel school-based programme (SIESTA) which comprised three, 45-min lessons delivered by trained researchers, combining sleep education and cognitive behavioural techniques. A mixed-methods approach was utilised. The participants (n = 171, 12–15 years) were recruited from secondary schools in Scotland. Outcome measures were assessed at baseline (1 week before lesson 1) and follow-up (1 week following lesson 3). Assessments comprised of self-report questionnaires to measure change in sleep quality (Sleep Condition Indicator), sleep hygiene (Adolescent Sleep Hygiene Scale), depression, anxiety, and stress (Depression, Anxiety and Stress Scale - 21). Two weeks following the final lesson, 19 pupils were recruited to participate in focus groups to provide a qualitative evaluation of the intervention.

Results: From baseline to follow-up, there were significant improvements in sleep quality (Z = −4.986, p = <.001, r=−.38)and stress (Z = −2.666, p = <.005, r = −.2), but no significant improvements were observed for sleep hygiene, depression, or anxiety. At baseline, 18.7% of participants were categorised as poor sleepers based on the recommended thresholds for the Sleep Condition Indicator (< 16 indicative of probable insomnia), and this was reduced to 14.7% at follow-up, but this change was not statistically significant (p = 0.118). Participants reported that SIESTA was acceptable and improved their sleep.

Conclusion: SIESTA effectively improved adolescent sleep and there were small improvements in stress. The findings support the preliminary effectiveness, feasibility, and acceptability of SIESTA. Future research should investigate the effectiveness of the intervention, employing a controlled design and long-term follow-up to investigate maintained effects.

Disclosure: Yes

Conflict of Interest statement: The work was supported by a grant from the Glasgow Children's Hospital Charity (https://www.glasgowchildrenshospitalcharity.org, **GCHC/SPG/2019/05**). Stephanie McCrory has no conflict of interest to disclose. Leanne Fleming has no conflict of interest to disclose. Megan Crawford has no conflict of interest to disclose. James Boyle has no conflict of interest to disclose

P035 | The quantified scientist: a longitudinal study to explore the interdependencies between sleep, stress, the gut and other bodily functions

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Objectives/Introduction: Polysomnography under laboratory conditions provides high-quality sleep data. However, it is costly and artificial. Wearable sleep EEG provides the opportunity to assess sleep longitudinally under naturalistic conditions with comparably low costs. Sleep wearables are also increasingly used within the 'Quantified Self' movement, which is the idea of measuring oneself continuously to gain self-knowledge through numbers. Here, we describe a dataset—the Quantified Scientist (QS) study—that resulted from a deeply phenotyped case of Quantified Self monitoring.

Methods: The QS study includes measurements of a single participant ($n = 1$) gathered over two years. These measurements include daily sleep recordings ($n > 500$) using wearable EEG, sleep recordings with full polysomnography ($n = 80$), structural and functional MRI scans ($n > 120$), and regularly collected microbiome samples ($n > 250$). It further includes measures of blood pressure, oxygen saturation, body temperature, resting heart rate, number of steps taken, psychomotor vigilance, and questionnaire data on behaviour, mood, stress, and dreams.

Results: In preliminary analyses of subsets of the data, we found positive correlations between N2 and nervousness ($r = 0.16$, $p = 0.04$), and negative correlations between sleep efficiency and nervousness ($r = -0.22$, $p = 0.003$), sleep efficiency and stress ($r = -0.19$, $p = 0.01$), and sleep efficiency and tiredness ($r = -0.23$, $p = 0.001$).

Conclusions: The QS study dataset has already proved useful in discovering several correlations between sleep variables. Further analyses of the polysomnography, MRI data, and microbiome samples will help us study the relationships between sleep and the brain, body and the gut.

Disclosure: Nothing to disclose.

Disclosure: No

P036 | Sleep and pleasure

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Pleasure and pain are closely related. Indeed, both share the same hedonic dimension. Positive stimuli (pleasing) contribute to the homeostatic maintenance and the organism responds with a wanting reaction. When the dimension is negative, it is related to anti-homeostatic responses and survival risk. Then, the organism shows avoidance or escape responses.

The main primary reinforcers are food, water, sex, and sleep. Indeed, sleep has a positive hedonic dimension and oppositely, the privation of sleep is recognized as one of the most excruciating tortures. Until recently, the hedonic dimension of sleep has remained unrecognized in the sleep literature, but there is no doubt that sleep is also an important primary reinforcer. The pleasure of recovering the lost sleep and the displeasure of insomnia is universal in humans and animals with capability for emotional feelings.

This report recognizes that the pleasure of sleeping is the main variable involved in the circadian and homeostatic regulation of sleep. Furthermore, we propose that sleep and palatable food show a comparable positive hedonic valence.

We aim at developing a sleep questionnaire for evaluating the hedonic dimension of sleep. For this purpose, we will develop a subjective scale evaluating the hedonic significance of sleep as indicative of the personal sleep propensity.

The hedonic value assigned by the respondents to sleep as behavior, to palatable foods and to sleep was evaluated according to the chronotype of the subjects. The hedonic dimension caused by a palatable food was also compared with that of sleep. Finally, the internal consistency of the survey was evaluated, quantifying the correlation that exists between the items of the questionary, so obtaining the Cronbach's coefficient that measures the consistency of the questionary.

The results showed a positive correlation between sleep and pleasure, indicating the positive hedonic value of sleep. They also showed that the pleasing dimension of sleep was higher than that of palatable food.

The obtained Cronbach's coefficient values show a good reliability of the proposed questionnaire, which can be used as a standardized instrument to measure the hedonic value assigned to sleep.

Disclosure: No

P344 | The impact of time spent outside on orp sleep quality and cognitive performance across 18-31 nights of in-home polysomnography

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Introduction: Limited research has related lifestyle factors with objective measures of sleep quality and next day performance. In the current study, we investigated the relationship between time spent outdoors, objective sleep quality, and reaction time performance in a real-world environment.

Methods: 18 participants (age 40.2 ± 10.5; 9 females) recorded sleep with in-home PSG using the Cerebra Sleep System for 18–31 nights. Sleep quality was measured using odds ratio product (ORP) derived from micro-analyzing frontal EEG channels during the sleep recording. Participants completed a nighttime questionnaire within one h of bedtime which assessed the amount of time they spent outside that day. Responses were coded between 1–30 min, 31–60 min, 61–120 min and greater than 120 min. Within one h of waking up, participants performed a 2-min psychomotor vigilance task (PVT). PVT Lapses were defined as any trial with a response time greater than 355 ms.

Results: Participants reported spending time outside on a total of 277 days (73.9% of the days), with time outside of 1–30 min being

the most frequently reported. Spending more time outside was associated with better sleep quality as evidenced by a lower ORP NREM, $F(3,259) = 4.76$, $p = 0.003$). Tukey post-hoc tests revealed that spending more than 120 min outside was significantly different than spending up to 30 min outside on ORP NREM ($p = 0.004$). More time outside was also associated with a lower ORP-9, $F(3,233) = 6.21$, $p < 0.001$) with more than 120 min significantly different than spending up to 30 min outside ($p < 0.001$). On the morning PVT, those who had spent more time spent outside on the previous day had fewer lapses than those who spent less time outside, $F(3,235) = 7.82$, $p < 0.001$).

Conclusions: Spending greater than 2 h outside was associated with deeper sleep during NREM, and a more rapid descent back to sleep after an arousal versus spending between 1–30 min outside. This improvement in sleep quality was also associated with fewer attentional lapses of attention the next morning on the PVT. Future research could focus on what specific factors related to being outside (e.g., light exposure, exercise) could have played a role at improving sleep quality.

Disclosure: Yes

Conflict of Interest statement: I am a full-time employee of Cerebra who developed the technology to record sleep in the home for this abstract.

P345 | The impact of video gaming habits on sleep, depression, anxiety and stress

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Introduction: According to surveys, videogames are probably the most common form of entertainment among younger people and their diffusion is constantly growing (IDEA, 2021; ESA; 2021). In line with this vast popularity, the interest of researchers in studying their effects on general health has also grown, but results are mixed and unclear, mostly reporting a negative impact on sleep. Here, we aim to assess the impact of video gaming on sleep schedules, subjective sleep quality and depression, anxiety and stress symptoms.

Methods: A sample of 403 participants aged 18 to 69 years (mean age = 26.2 ± 7.84; 227 F) completed an online survey from September 2021 to January 2022. The survey included the Pittsburgh Sleep Quality Index (PSQI), the reduced Morningness-Eveningness Questionnaire (rMEQ), the Depression Anxiety Stress Scale (DASS-21) and a set of specific*ad hoc* questions on the use of videogames.

Results: Out of the total sample, 42.2% of participants were habitual gamers (HG), 36.5% non-habitual gamers (NHG) and 21.3% non-gamers (NG). One-Way ANOVA showed no significant between-groups differences in PSQI global score or for any of the PSQI subscales. Instead, significant differences were found in DASS-21 ($p < 0.020$) and rMEQ scores ($p = 0.016$), with HG reporting higher depressive symptoms and higher eveningness and NHG reporting higher anxiety symptoms than NG ($p = 0.015$). No between-groups differences emerged for stress subscales. Correlation analysis revealed positive associations of the number of h/day spent playing videogames with bedtime for NHG ($p = .002$) and wake time for HG ($p = 0.001$), while a negative correlation with PSQI global score ($p = 0.009$) was found only for HG.

Conclusions: In contrast to what is generally reported in literature (Curcio *et al*., 2018), our data show that playing videogames does not necessarily compromise subjective sleep quality, paralleling what we observed on objective sleep quality (Cerasuolo *et al*., 2020). The effects on mental health appear to be less clear and require further investigation.

Disclosure: No

P346 | The impact of evening caffeine timing on evening alertness, odds ratio product, and subjective sleep across 18-31 nights of in-home polysomnography

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Introduction: There is a paucity of research on lifestyle factors affecting sleep quality using objective polysomnographic data under real-world conditions. In the present study, we assessed the relationships between caffeine timing and the impact on evening alertness, objective sleep quality, and morning self-reported sleep quality.

Methods: 18 participants (age 40.2 ± 10.5; 9 females) recorded their sleep with in-home PSG using the Cerebra Sleep System for 18–31 nights. Sleep quality was measured using odds ratio product (ORP) derived from micro-analyzing frontal EEG channels during wake, NREM and REM sleep. Participants completed a nighttime questionnaire within one h of bedtime which assessed the time since their last caffeinated drink and their levels of alertness. Caffeine timing was divided into 3 categories: 0–4 h, 4–8 h, and 8–12 h before bedtime. Alertness was measured using the Karolinska Sleepiness Scale (KSS). Within one h of waking up, participants completed a morning questionnaire rating their quality of last night's sleep.

Results: 15 out of 18 participants reported consuming caffeine within 12 h of bedtime across a total of 190 nights (50.6% of total nights), with an average of 3.2 caffeinated beverages daily. Alertness levels before bedtime were higher in individuals who consumed caffeine 0–4 h versus, 4–8 h or 8–12 h ($F(2,184) = 6.01, p = 0.003$). There was a significant effect of caffeine timing with higher ORP NREM ($F(2,177) = 6.64, p = 0.002$) and ORP REM ($F(2,160) = 18.06$, $p < 0.001$) indicating poorer sleep quality with caffeine use 0–4 h before bedtime. There was no significant effect of caffeine timing on ORP wake ($p = 0.085$). Morning self-reported sleep quality was also significantly

worse with caffeine timing within 0–4 h of bedtime on the previous night ($F(2,184) = 6.01, p = 0.003$).

Conclusions: These results highlight the utility of in-home PSG to assess the impact of lifestyle factors on sleep quality using ORP. Caffeine consumption within 0–4 h of bedtime increased alertness before bedtime, increased ORP indicating poorer PSG sleep quality, and participants reported their sleep quality from the last night's sleep as worse. Future research could focus on how quickly an individual metabolizes caffeine and the impact on alertness and sleep quality to create more personalized caffeine timing recommendations.

Disclosure: Yes

Conflict of Interest statement: Leslie Cervantes, Kari Lambing, Bisola Ariyibi, and Amy Bender are full-time employees of Cerebra who used this technology to record sleep for this abstract.

Magdy Younes receives royalties from Cerebra for developing the technology used to record sleep for this abstract.

P347 | Slow breathing and music listening as interventions for rapid eye movement sleep fragmentation in healthy adults

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Introduction: Rapid eye movement (REM) sleep plays an important part in emotional adaptation, and its fragmentation is associated with depressive symptoms. Interventions aimed at reducing REM fragmentation are sparse, though it seems likely that autonomous nervous system could act as a pathway for improving the continuation of REMS. Following this thought, we investigated whether a slow breathing exercise or music listening would have an effect on REM sleep structure.

Methods: 10 females and nine males slept for two nights, with the one night serving as a control and the other as an intervention. The order of the nights was randomized evenly so that either the intervention or control was first in an equal amount of nights The intervention night included either a structured slow breathing exercise (five breaths per minute ~frequency of 0.08 Hz for 30 min) or music listening (Max Richter: SLEEP for 30 min). The participants sleep was measured in own-home-settings with ambulatory polysomnograhy (SomnoMedics PSG plus), and REMS fragmentations were annotated manually from visual data using DOMINO 2.9.0 software, single-blinded regarding intervention. Both absolute number of macro fragmentations (3–15 s) and relative fragmentation proportion of REM duration were used as outcomes.

Results: Our sample included 19 healthy adults (mean age = 24.5 y, SD = 3.6 y, range = 20–37 y). The relative proportion of REMS macro fragmentations was smaller in those participants who underwent the slow breathing intervention ($p = 0.017$). Music listening was not associated with changes in REM sleep structure ($p = 0.195$). The intervention had no effect on the absolute number of REMS fragmentations in those who participated in the slow breathing exercise ($p = 0.125$), or in those who listened to music in the evening ($p = 0.439$).

Conclusions: We found that REM sleep was less fragmented after 30 min of slow breathing in the evening. Relaxing otherwise, that is, by listening to calming music, did not have any impact on REM sleep fragmentation. Our finding highlights the possibilities of altering and improving specific sleep structures via an easily administered and cost-efficient method.

Disclosure: No

P348 | Bedtime procrastination and chronotype differentially predicts adolescent sleep on school nights and non-school nights

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Objectives: Bedtime procrastination (BTP) refers to the tendency to delay sleep beyond an intended bedtime. BTP based on self-reports has been associated with delayed sleep timing, shorter sleep duration, poorer sleep quality. However, this relationship has not been evaluated with objective sleep measures. We examined how BTP predicts actigraphy-measured sleep over school and non-school nights in adolescents to clarify if it affects sleep timing differently on school nights compared to non-school nights. Additionally, we examined the separate influences of BTP and chronotype on sleep.

Methods: 121 adolescents aged 14–19 years completed a survey on sleep quality, chronotype, bedtime procrastination, and mental health. Subsequently, habitual sleep was objectively measured with actigraphy for up to 2 weeks. Associations between BTP, chronotype, and actigraphy-measured sleep were examined for school nights and non-school nights separately.

Results: Greater BTP was associated with poorer sleep quality, more symptoms of chronic sleep reduction, higher levels of daytime fatigue, as well as eveningness chronotype and higher anxiety/depression scores. On school nights, greater BTP predicted later bedtimes and shorter sleep duration, even when controlling for chronotype. In contrast, on non-school nights, eveningness chronotype, but not BTP, predicted later bedtimes and wake-up times but not sleep duration.

Conclusions: BTP and chronotype have differential effects on sleep for school nights and non-school nights. On school nights, later and shorter sleep is driven by BTP, whereas on non-school nights, chronotype is better predictor of sleep timings.

Disclosure: No

P349 | Daily sleep, social motivation and social activity

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Objectives/Introduction: Sleepiness has been suggested as a motivational drive towards sleep-preparatory behaviors. This includes a decrease in self-reported motivation towards social activities, such as hanging out with friends. Sleepiness, decreased sleep duration, and lower sleep quality have also been implicated in predicting less social activity. The current study investigated the role of daily sleep in predicting social motivation and, in turn, social activity.

Methods: For one week, 126 individuals (age range 27–57) wore actigraphs and filled out daily morning and evening diaries. In the morning, subjective sleep quality and subjective sleep sufficiency for the preceding night were assessed, as well as current sleepiness and social motivation. In the evening, social activity during the day was assessed. The data was analyzed using mixed multiple linear regressions, with within-person centered predictors and allowing for random intercepts within subjects.

Results: Better subjective sleep quality and less sleepiness in the morning predicted feeling more social in the morning (p's < 0.001), when controlling for the other sleep variables. However, subjective sleep sufficiency, and actigraphy-assessed sleep efficiency and duration had no predictive values (p's > 0.14). Only subjective sleep quality predicted social activity during the day ($p = 0.015$), and this effect was mediated by morning social motivation (67% mediated).

Conclusions: Although sleepiness upon waking and subjective sleep quality the previous night predicted social motivation in the morning, only subjective sleep quality predicted social activity during the day. As sleepiness usually fluctuates during the day, morning sleepiness may not be a good indicator of daytime sleepiness. However, the findings suggest that how you feel you slept the previous night may result in lasting social consequences for the upcoming day.

Disclosure: No

P350 | Relationships between extent of social contacts, sleep duration and amount of eating in infants during confinement

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Introduction: The surge of COVID-19 infections in 2020 led European countries to enforce confinement to reduce direct contact within populations. Isolation can have negative health consequences, and a fly model shows that chronic isolation reduces sleep duration and increases food intake. Similarly, social isolation in adults relates to reduced sleep quality. Yet, whether this model transfers to developing humans is unknown. Our study aimed to explore if social distancing during confinement relates to sleep and food intake in infants. We hypothesized that infants experiencing a higher extent of distancing have shorter sleep and increased food intake.

Methods: An online questionnaire (in Spanish, German, English, French, Italian) distributed in April/May 2020 quantified parent-reported sleep duration (Brief Infant Sleep Questionnaire) and the infant's direct contact with friends and extended family. A 5 point Likert scale captured whether meal size increased, decreased or remained unchanged since the beginning of the confinement. We collected data on 350 infants ≤3 years old (18.2 ± 10.0 months, 170 girls).

Results: Sleep duration did not differ between infants who had direct contact with their friends ($n = 22$) compared to those without direct contact ($n = 312$) when controlling for age ($p = 0.44$, multiple linear regression). There was also no difference in sleep duration between infants with direct contact with their family ($n = 81$) compared to those without direct contact ($n = 266$) when controlling for age ($p = .90$, multiple linear regression). Similarly, there was no group difference in the confinement-induced change of meal size dependent on contact with friends ($p = .39$, Chi-squared test), or with family ($p = .91$, Chi-squared test).

Discussion: Thus, the extent of distancing as part of the COVID-19 confinement in 2020 did not correlate with infants' sleep duration and their quantity of meals, which indicates that isolation has a different effect in developing humans than in adults or flies. As infants depend on close contact with their parents, effects of isolation on sleep and eating might only appear beyond infancy.

Disclosure: No

P351 | Factors related to body weight changes during the COVID-19 lockdown among portuguese higher education students

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Introduction: Lifestyle changed drastically due to the COVID-19 pandemic; people became less active and sleep and eating habits were altered, all of which can change body weight and its health consequences.

Objectives: To explore the factors linked to body weight changes during the COVID-19 pandemic.

Methods: An online survey was conducted during the COVID-19 lockdown in Portugal (February 15, 2021–March 15, 2021), including questions about age, gender, life quality, self-reported physical/psychological health, social isolation, physical activity, BMI, sleep patterns changes and night awakenings with eating, some questions of the Eating Attitudes Test-25,slight modified, and the Perceived Stress Scale. The sample comprised 494 higher education students aged between 18–26 years old (Mean ± SD = 20.86 ± 2.133 years, women = 77.3%; Portuguese = 92.7%).

Results: The sample comprised 494 higher education students, aged between 18–26 years old (Mean ± SD = 20.86 ± 2.13 years; women = 77.3%; Portuguese = 92.7%). 42.1% of our sample reported no weight changes (Group 1/G1); 22.1% reported weight loss (Group 2/G2), and 35.8% reported weight gain (Group3/G3). Weight changes

were associated with the female gender, perceived stress, poor physical/psychological health, changes in sleep patterns, disturbed eating attitudes/behaviours and lower quality of life. The subjects with weight gain also reported having a higher BMI, less/a tendency to less physical activity, and more/a tendency to have more night awakenings with eating than G1 and G2 subjects. Those with weight loss reported more social isolation than G1 and G3 subjects.

Conclusion: The COVID-19 lockdown had implications in body weight changes, increasing the risk of obesity and therefore the risk for severe COVID-19 disease and other comorbidities. Strategies focusing weight changes and related behaviours could be adopted to prevent these complications and improve life quality.

Disclosure: No

P639 | Cross-cultural comparison of sleep behaviours, attitudes and quality between 3rd year medical students in London and Singapore

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Introduction: A previous study from our institutions (Imperial College London and Lee Kong Chian School of Medicine) identified that medical students in Singapore had worse daytime sleepiness than those in London, despite equal knowledge of sleep. This study investigated the existence of a difference in sleep behaviours between medical students in London and Singapore, and the impact on sleep quality.

Methods: First clinical-year medical students from London ($n = 23$) and Singapore ($n = 26$) monitored their sleep for 30 nights using a sleep tracker. Each participant answered questionnaires: Adolescent Sleep Hygiene Scale (ASHS), Dysfunctional Beliefs and Attitudes about Sleep (DBAS), Pittsburgh Sleep Quality Index (PSQI), and supplementary questions.

Results: A significant difference of 51 min in the mean total sleep time between the London (381 ± 44 min) and Singapore cohorts (330 ± 43 min) occurred (*t*-test $p = 0.0002$). The ASHS revealed that the Singapore cohort had a significantly higher median substance score (6.0) compared to London (5.5) (Mann-Whitney U test $p = 0.001$). 43% of the London cohort reported sharing a bed at least once per week, compared to 13% of the Singapore cohort. The Singapore cohort was found to be 1.4 times more likely to miss sleep to study, compared to the London cohort. No significant differences were found in attitude towards sleep, as measured by the DBAS.

Conclusions: Medical students in Singapore sleep less than their London colleagues. There are likely a multitude of contributing factors, including different use of substances (i.e., caffeine, tobacco, alcohol) before bedtime and greater likelihood of missing sleep to study in the Singapore cohort. Differences in bed-sharing habits may also have an impact. This study found that both cohorts were under-sleeping, according to guidelines; there are likely behavioural components underpinning this. This data will inform the development of future tailored sleep-education materials.

Disclosure: Yes

Conflict of Interest statement: This project was funded by the Professor Jenny Higham Collaboration grant.

P640 | Shining light on sleep regularity – daytime light exposure and nighttime sleep patterns

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Introduction: Compelling evidence links irregular sleep and adverse health outcomes, yet these associations could be mediated not by sleep itself, but by co-occurring irregularity in other factors, including light exposure. We investigated the association between regularity of sleep and regularity of light exposure in the field, using continuous eye-level light recordings.

Materials and Methods: Sleep/wake patterns were assessed for 30 days in 23 day-workers (61% females, range 21–38 years), using sleep diaries and actimetry. Spectral light exposure was recorded continuously at eye level for five days (including one weekend) at three wavelengths: blue (465 nm), green (540 nm), and red (620 nm). Daily midsleep timing, timing of light exposure (acrophase), and intensity of light exposure (mean level) were extracted, and the Composite Phase Deviation (CPD) metric was used to calculate regularity scores for all three variables. The CPD uses vector lengths to measure how far away a given sleep/wake or light pattern is from a perfectly regular pattern. Hierarchical clustering was performed to identify groups of (ir)regular sleepers with (ir)regular light exposure.

Results: Cluster analyses identified two main groups: irregular sleep/wake patterns were associated with irregular light exposure, and regular sleep wake/patterns with regular light exposure. Individuals in the irregular cluster were on average later chronotypes and had shorter sleep durations. High mean levels of light intensity only occurred in the regular cluster. The high mean light intensities resulted from irregular exposure to bright outdoor light on weekends, but not weekdays, revealing two distinct light profiles: exposure to occasionally high light levels ("light showers") versus, exposure to consistently low light levels ("biological darkness"). Individuals with occasionally high light levels were on average earlier chronotypes, more regular sleepers, and slept longer, whereas the group with consistently low light levels included individuals with a wide range of sleep/wake behaviors (i.e., both regular and irregular sleepers).

Conclusions: Our findings suggest that living in biological darkness (i.e., consistently low light levels) may allow other (physiological) factors, such as individual sensitivity to light, to shape sleep/wake

behavior. Occasional exposure to bright light, such as spending weekends outdoors, may help improve sleep.

Disclosure: No

P641 | Sleep-related problems in highly sensitive individuals: testing the mediation effect of perceived stress

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Objectives/Introduction: Sensory-processing sensitivity (SPS) is defined as an underlying phenotypic trait that describes individual differences in sensitivity to internal and external stimuli. High sensitivity is characterized by greater awareness of environmental subtleties, a tendency for over-stimulation, greater depth of information processing, and increased emotional reactivity. Thus, highly sensitive individuals are more vulnerable to stress. A recent study found that subjects scoring high on SPS reported more nightmare frequency and lower mental well-being than subjects scoring low on SPS. On this basis, we hypothesized that SPS contributes to sleep disruption and poor sleep quality and that this effect could be mediated by increased perceived stress.

Methods: Two hundred eight volunteers (mean age 36.24 ± 11.18; 154 females) completed the following questionnaires: the Highly Sensitive Person (HSP) scale, the Perceived Stress Scale (PSS), the Pittsburgh Sleep Quality Index (PSQI), and the Insomnia Severity Index (ISI). We considered the total score for the HSP, PSS, and ISI, while for the PSQI, the global score and its seven components.

Results: Correlation analysis revealed a positive correlation between HSP and PSS, $r = 0.18$, $p < 0.01$. HSP was also positively correlated with ISI, $r = 0.26$, $p < 0.01$, and PSQI global score, $r = 0.19$, $p < 0.01$, as well as with PSQI components: Subjective sleep quality, $r = 0.17$, $p < 0.05$, Sleep latency, $r = 0.17$, $p < 0.05$, and Daytime dysfunction, $r = 0.26$, $p < 0.01$. PSS was also positively correlated with ISI, $r = 0.50$, $p < 0.01$, and all PSQI scores except for sleep duration, with r coefficients ranging from 0.14 to 0.37, $p < 0.05$. We then conducted mediation analysis with HSP as antecedent variable, PSS as mediator, and ISI and PSQI as outcomes. The analysis revealed that the effect of HSP on PSS completely mediated the effect of HSP on PSQI global score, 0.22, $p < 0.01$, and on its components Subjective sleep quality, 0.04, $p < 0.05$, and Sleep latency, 0.06, $p < 0.05$. Instead, only a partial mediation was observed for the effect of HSP on ISI, 0.48, $p < 0.01$, and on PSQI component Daytime dysfunction, 0.03, $p < 0.05$.

Conclusions: Results supported the hypothesis that SPS correlates to increased sleep-related problems through increased perceived stress. Therefore, it is important to evaluate and further study sleep difficulties in highly sensitive individuals.

Disclosure: No

P642 | The meaning of sleep in urban and rural areas during the COVID-19 pandemic. Preliminary report in the province of Quebec, Canada

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Objectives/Introduction: The social representations of sleep (SRS) are a set of cognitive elements related to sleep which are determinant in understanding an individual's sleep patterns. This research investigates the SRS in the adult population of Quebec, Canada. We assess the impact on SRS of living in a rural or urban setting and of migrating from one to the other during the COVID-19 pandemic.

Methods: A sample of 79 participants (mean age = 33.9; SD = 13; 77% women) took part in a comparative study with a convergent parallel mixed methodology. Of these, 34 participants were born and live in an urban area and three in rural areas. Forty-two migrated from one to another. Participants completed the Pittsburgh Sleep Quality Index (PSQI), Internal Acculturation Index and a sleep diary. Sixty-six participants completed a semi-structured interview focusing on the meaning of sleep, sleep patterns, routines, living environment, internal migration and the impact of the COVID-19 pandemic on their sleep. Qualitative data were recorded and transcribed verbatim. Student's T tests were used for the PSQI.

Results: Participants identify sleep as a mean of recharging energy as well as resting the brain and body. The rural environment is seen by participants as a quiet place to get better sleep. A tendency to migrate to a rural area following the COVID-19 outbreak was observed. The main motives reported for such move were to (re)connect with nature and the increasing acceptance of working remotely from home. Preliminary results do not show a significant difference in PSQI scores or any of its sub-components between the urban and rural groups. Despite both urban and rural dwellers waking up on average around the same time
(7:25 a.m.), rural participants appeared to go to bed earlier (7:50 p.m.) than urban participants (9:30 p.m.), although this difference was not statistically significant.

Conclusions: The COVID-19 pandemic leads to a redefinition of living and sleeping habits favoring rural areas to sleep and to work remotely from home. Recruitment is still in progress and further analysis are expected to show whether internal migration and acculturation are associated to the SRS in Quebec.

Disclosure: Yes

Conflict of Interest statement: The study was supported by a SSHRC grant awarded to the first author.

P643 | University stressor impact on sleep: a home-EEG sleep study

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Objectives/Introduction: Anticipatory anxiety induced by an imminent stressor might significantly lead to sleep disturbance. We aim to explore how a university stressful event impact sleep, exposing subjects to virtual reality (VR) in order to induce both anticipatory anxiety and desensitization.

Methods: 18 students (mean age = 23.67 ± 1.54; 16 females) were randomly assigned to an experimental group (EG) or a control group (CG) and were instructed to perform an online presentation of a scientific article at the end of the study. Participants in the EG were invited to rehearse their presentation at home through a VR headset which virtually replicated the final exposition environment. They were assessed with a validated home-EEG device for sleep monitoring over four consecutive nights. Primary outcomes were changes in sleep architecture between groups comparing the second and last night of the experiment. Secondary outcomes were changes in measures of state anxiety between groups comparing baseline to end-of-experiment.

Results: No difference was found in terms of age and gender frequencies between EG and CG groups. A significant increase in state-anxiety was observed in the whole sample comparing baseline to end-of-experiment ($p < 0.001$), with no effect of condition.

A significant interaction between time and condition ($p < 0.05$) was found on stage 2 Non-REM sleep percentage (N2). Subjects in the experimental condition showed a decreased N2 in the fourth night, in comparison to control group. In addition, delta of Non-REM stage 3 percentage (N3) between nights 2 and 4 revealed a non-significant difference between two groups, showing an increase in EG and a decrease in CG (EG = 3.17 ± 2.9, CG = −5.43 ± 3.21; $p = 0.063$).

Conclusions: Our preliminary results suggest an effect of VR exposure on sleep reactivity. The decrease of N2 in EG accompanied by a tendency towards an increase of N3 sleep could represent an attempt of beneficial EEG synchronization during sleep.

Disclosure: No

P644 | The association between smartphone use at night, sleep quality, and psychological well-being among healthy students: a pilot study

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Introduction: Research on the effects of smartphone use at night has reported associations between the extent of use, sleep disturbance and daytime dysfunction. The extent of smartphone use has also been associated with changes in sleep onset latency and bedtimes. These changes have been found weakly related to psychological well-being. While most studies were based on subjective reports of smartphone use, the current study addresses these changes using both subjective and objective measures of smartphone use at night. It compares these measurements and analyzes the association between frequent smartphone use, sleep quality, and psychological well-being.

Method: A total of 40 college students measured their smartphone use via an application installed on their smartphone device (QualityTime by Mobidays Inc.) This application monitored their smartphone use, detailing the type and time of application used. Each student also kept a sleep diary and filled out four questionnaires: Fear of Missing Out Scale, Trait Anxiety Inventory, Pittsburgh Sleep Quality Index, and Beck Depression Inventory.

Results: Objective measures of smartphone use showed that 40% of the participants woke up during the night and checked their smartphone. Subjective measures showed that 70% of the participants reported checking their smartphones during the night. An χ^2 test analysis of the association between objective and subjective measures of smartphone use at night was significant [χ^2 (1) = 11.42, $p < 0.01$]. All participants who checked their smartphone during the night also reported doing so. However, of those who did not check it at night, 50% ($n = 12$) reported doing so. A two-way MANOVA was conducted with objective and subjective measures of nighttime smartphone use as independent variables and sleep quality and psychological well-being measures as dependent variables. More frequent nighttime checking of one's smartphone as recorded by objective measures was associated with lower sleep quality and psychological well-being.

Conclusion: This study revealed the differences between objective and subjective measures of smartphone use at night. The findings indicated that actual use, not subjective reported use, is associated with lower sleep quality and psychological well-being. This objective measurement makes it possible to identify participants whose sleep quality and psychology well-being are at high risk.

Disclosure: No

P645 | Sleep hygiene practices, healthy sleep, mood states and well-being

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Introduction: Research studies are limited concerning the beneficial effects of sleep hygiene recommendations for nocturnal sleep in the general population (Irish et al., 2015).

Objective: To investigate associations between sleep hygiene practices, healthy sleep, mood states and well-being in a sample of employees with regular working schedules.

Methods: One hundred individuals, mostly female (74%), mean age 43.40 ± 9.91 years, filled out a booklet of questionnaires which included the Healthy Sleep Questionnaire (Silva et al., 2021) and the Portuguese versions of the Sleep Hygiene Index (SHI) (Mastin et al., 2006; Rodrigues et al., 2018), Profile of Mood States (McNair et al., 1971; Azevedo et al., 1991) and the World Health Organization Five Well-being Index (Topp et al., 2015). SHI psychometric properties were explored (reliability and factor structure analyses) and associations between variables were studied (Spearman Correlation analyses).

Results: SHI internal consistency was acceptable (Cronbach alpha, $\alpha = 0.68$). SHI factor analysis with varimax rotation, the scree plot of Cattell and interpretability of items revealed 3 factors (only items with > 0.4 loadings were retained): F1 = Inadequate sleep behaviors (5 items; $\alpha = .70$), for example, "I go to bed at different times"; F2 = Improper environment (3 items, $\alpha = 0.69$), for example, "I sleep in an uncomfortable bedroom"; F3 = Emotional regulation impairment (3 items, $\alpha = 0.61$), for example, "I go to bed feeling stressed". The three factors explained 49.9% of the total variance (F1 = 19.1%, F2 = 15.7%, F3 = 15.1%). Emotional regulation impairment (F3) was negatively associated with healthy sleep, vigor-activity, friendship, positive affect, well-being and positively correlated with tension-anxiety, depression-dejection, anger-hostility, fatigue-inertia, confusion-bewilderment and negative affect.

Conclusions: Less emotional regulation impairment was the Sleep Hygiene Index factor particularly associated with healthier sleep, better mood and enhanced well-being. Results highlight the importance of emotional regulation processes for healthy sleep and overall well-being.

Disclosure: No

P901 | The role of rank and sleep debt on compound fatigue risk in medium haul pilots

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Objectives/Introduction: Fatigue in airline pilots can arise from multiple sources, including human factors, environmental factors such as weather or noise, busy schedules, unforeseen day-of-operation changes like flight delays, or COVID-related precautions like mask-wearing. Fatigue from multiple sources creates a compound safety risk. Job experience or sleep debt may affect how individual pilots experience fatigue during operations. Neither multi-source fatigue factors nor the role of individual differences been examined in the context in medium-haul flights.

Methods: Pilots working medium-haul rosters for a major European airline were asked to rank the level of fatigue they experience from 30 separate factors across five domains:

(1) Human;
(2) Environmental;
(3) Scheduling;
(4) Day-of-Operation; and
(5) COVID-related.

Pilots were also asked to provide experience information-- total flight h, age, rank-- and to indicate their normal sleep duration and minimum sleep need to perform. Sleep debt was computed as normal sleep – minimum sleep need. Rank differences in flight h, age, and sleep debt were examined using *t*-tests. One-way analysis of variance (ANOVA) was used to examine the role of experience and sleep debt on overall fatigue, as well as fatigue for each fatigue sub-domain.

Results: $N = 135$ medium-haul pilots (64 Captains; 71 First Officers (FO); mean age: 43 ± 2 years) completed the online survey. Pilots reported needing a minimum of 5.5 ± 1 h of sleep; sleep debt did not differ by rank ($t = 1.22$; $p = 0.22$). Captains were ~11 years older than FOs ($t = 11.28$; $p < 0.001$) and had 7801 ± 860 more flight h ($t = 17.88$; $p < 0.001$). Captains reported more human factors ($F = 9.53$; $p = 0.002$), environment ($F = 9.32$; $p = 0.003$), day-of-operation ($F = 7.48$; $p < 0.001$), and overall fatigue ($t = 3.20$, $p = 0.002$) compared to FOs. Greater sleep debt predicted greater human factors ($F = 4.20$; $p = 0.042$), scheduling ($F = 8.95$; $p = 0.003$), and day-of-operation fatigue (all $p \leq 0.04$). COVID fatigue was not related to experience or sleep debt (all $p > 0.09$).

Conclusions: Captains may experience more fatigue than FOs, particularly in domains related to executive decision-making (human, environment, day-of-operation). Pilots with greater sleep debt may experience more fatigue related to circadian (scheduling, day-of-operation) or interpersonal factors (human) regardless of rank. COVID-related fatigue is not predicted by sleep or rank. These findings provide targets for fatigue mitigation due to compound risk.

Disclosure: No

P904 | Correlation between physical activity, sleep componants and quality, in the context of type and intensity: across-sectional study among medical students

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Background: Physical activity during the day is composed of different domains, specifically work related, transportation, and recreation, physical activity. We aimed at studying the correlation between energy expenditure and the corresponding metabolic equivalent of task and sleep in the context of type of physical activity, general level of activity as to be low, moderate and vigorous and the intensity of activity either moderate or vigorous physical activity.

Methodology: A cross-sectional study, participants were $n = 273$ enrolled from al-Neelain university faculty of medicine. we used the global physical activity questionnaire to measure standard metabolic equivalent of task (MET) for participants for vigorous and moderate work MET, Transportation MET, Vigorous and moderate lesiure MET, and sedentary time. we used Pittsburgh sleep quality index to assess different components of sleep (subjective sleep quality, sleep latency, habitual sleep efficiency, sleep duration, sleep disturbances, use of medications, daytime sleepiness - was further assessed using ESS) and sleep quality. Psychological distress was assessed using (kessler-10-item-questionnaire).

Results: Mean of Total-MET was (3533.36 min/week) predominantly moderated work-MET (33%). There was significant difference between good and poor sleepers in moderate work MET mean (876.36,1334.2 min/week) ($p < 0.01$).respectively. There was significant positive correlations between moderate work MET and roughly all sleep components rho = (0.196, 0.182, 0.132, 0.149) ($p < 0.01$, $p < 0.01$, $p < 0.05$, $p < 0.05$)respectively and sleep quality rho=(. 211) ($p < 0.001$). Vigorous-lesiure MET positively correlated with sleep latency rho = (0. 134) ($p < 0.01$). Psychological distress significantly correlated with Moderate work MET (0.135 $p < 0.05$) and increased Sleep latency (0.229 $p < 0.001$),severe daytime sleepiness (0.295 $p < 0.001$) and overall poor sleep quality (0.330 $p < 0.001$)

Conclusion: Our results show that poor sleep quality is primarily influenced by the type and intensity of physical activity. Eliciting a dose-response effect of different domains, being deleterious for work related physical activity as work MET is of too low intensity or too long duration for maintaining or improving cardiorespiratory fitness and cardiovascular health subsequently imposing its deleterious effect. So in order to improve quality of life for university students, special strategies and policies that leverage "good sleep" quality are warranted by limiting work related physical activity and adding on well-structured early morning exercises for University students thus improving cardiorespiratory fitness and subsequently sleep.

Disclosure: No

9: LEARNING, MEMORY AND COGNITION

P037 | Slow oscillation-spindle cross-frequency coupling, and associations with declarative memory in young and older adults

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Introduction: Decreased slow oscillation (SO) and sleep spindle activity with age may coincide with normal declines in cognition and sleep quality. Recent evidence suggests that ageing-associated changes in SO-spindle cross-frequency coupling (CFC) may also contribute to memory decline. However, many studies examining this are limited by analyzing data from only one recording visit, applying identical spindle frequency bandwidths for all participants, and not discriminating between potentially meaningful SO subgroups. Our study examined SO-spindle CFC and relations with memory between young and older adults. We hypothesized a stronger association between CFC and memory when controlling for individual differences in brain activity, and stronger associations when data are examined from SOs that overlap with a spindle (SO+spindle complex) compared to isolated SOs.

Methods: Participants completed a baseline polysomnography, followed by two (non-consecutive) experimental overnight recordings. Experimental nights included pre- and post-sleep cognitive testing, counterbalanced between a word-pair associates task and non-learning control task. Coupling strength (via Modulation Index) was quantified on all frontal (Fz) SOs (0.5–1.25 Hz) using both fixed (9–13 Hz) and individually adapted sigma power bands, and again using SOs that overlapped with a detected spindle (SO+spindle) versus not. Associations with memory were examined via linear regression (covariates: age, sleep efficiency) using CFC measured from the learning night, and using relative change in CFC between experimental nights.

Results: Fourteen young adults (YA; (*M*[*SD*] age = 24.36[3.39] years; 7 female)) and thirteen older adults (OA; (*M*[*SD*] age = 68.23[7.06] years; 9 female)) completed the study. On the learning night, fixed-band coupling strength from isolated SOs showed a trend negative association with word-pair recall gains/losses in YAs ($\beta = -.613$, $p = 0.040$), whereas OAs evidenced a trend positive association with SO+spindle CFC and overnight memory consolidation ($\beta = 0.419$, $p = 0.043$). Relative change in adapted SO+spindle coupling strength, only in OAs, was positively associated with post-sleep recall ($\beta = 0.574$, $p = 0.005$) and with overnight consolidation ($\beta = 0.574$,$p = 0.005$).

Conclusions: Findings contribute novel perspectives about relations between SO-spindle CFC and declarative memory. As the ageing trajectory varies across persons, our study highlights the importance of individualizing analyses for different participants, examining relative changes after learning, and leveraging the spontaneous co-occurrence of sleep oscillations when examining CFC.

Disclosure: No

P038 | Enhancement of vocabulary learning in an ecological home setting by closed-loop targeted memory reactivation: a pilot study

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Objectives/Introduction: Sleep is a critical time window for memory consolidation. Targeted memory reactivation (TMR) is an effective approach to promoting sleep-dependent memory processing. The presentation of sounds during Slow Wave Sleep (SWS) is used to reactivate associated memory traces. TMR is typically applied in a laboratory setting. In this pilot study, we used a wearable closed-loop TMR (CL-TMR) system to boost vocabulary learning by delivering verbal stimuli during SWS in a home setting.

Methods: Sixteen healthy young adults (mean age ± standard deviation, 24.71 years ± 2.38) took part in the study. In the evening, participants engaged in a vocabulary learning task to acquire the Italian translation of pseudo-words (T1). During the subsequent night, subjects slept wearing a commercial electroencephalographic (EEG) headband (Dreem 2 Headband–Rythm SAS, France) implemented with an algorithm for the slow oscillation (SO) detection in real-time. The headband algorithm triggered the automatic audio presentation of the pseudo-words (cued) during the ascending phase of the SOs. The stimulations consisted of 50% of the pseudo-words correctly translated at T1 and 50% of those not correctly translated. Memory recall was assessed half an h after the awakening (T2). We evaluated the CL-TMR effect by comparing the T1-T2 difference in correctly translated pseudo-words between cued and uncued items. At the EEG level, we compared the TMR-related spectral power perturbation in the 5–18 Hz frequency range between pseudo-words whose Italian translation was recalled in the morning and the unrecalled ones.

Results: The presentation of pseudo-words during sleep enhances the translation of the cued words at T2 (mean ± standard error, +10.76% ± 4.82) compared to uncued words (−3.77% 5.36; $p = 0.038$). Time-frequency analysis showed a characteristic increase in the spindle rhythm frequency at ~500 msec after the presentation of pseudo-words correctly translated at T2.

Conclusion: The pilot study extended the efficacy of the TMR paradigm in enhancing vocabulary learning to an ecological home setting. We confirmed the increase in spindle activity as the correlate of stimulation-induced memory improvement. The wearable CL-TMR system could allow boosting memory retention overnight in daily life by promoting specific oscillatory rhythms implicated in the sleep-dependent process of memory consolidation.

Disclosure: Yes

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Giulia Amicucci declared no conflict of interests.

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Domenico Corigliano declared no conflict of interests.

Daniela Tempesta declared no conflict of interests.

Aurora D'Atri declared no conflict of interests.

P039 | Diverse neocortical cell assembly dynamics during non-REM sleep following spatial learning in rats

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Introduction: Cell assemblies are groups of neurons that temporally and functionally organise to encode and store information. Convergent evidence shows that neural patterns of awake activity are replayed during non-REM sleep, likely reflecting aspects of memory consolidation. While the coordinated activity between thalamocortical oscillations including slow waves (0.5–4 Hz) and spindles (10–15 Hz) has been correlated with improvements in learning after sleep, how this links to the processing of specific information across networks of distributed cell assemblies remains unclear.

Methods: Using Neuropixels probes chronically implanted into the medial prefrontal cortex (mPFC), we simultaneously recorded from hundreds of neurons in freely behaving rats ($n = 3$). Recordings encompassed more than eight days of learning a spatial alternation task, with each session flanked by pre- and post-task periods of sleep. Cell assemblies were detected with timescales, levels of precision, and internal organisation as free parameters to

(1) evaluate heterogeneity in cell assembly dynamics across the mPFC and

(2) identify their involvement in processing spatial, rule, and reward information during sleep.

Results: We identified cell assemblies that bridged diverse temporal and anatomical scales, spanning between 20 um to over 3000 um across deep layers of the cingulate, prelimbic and infralimbic cortices. These assemblies showed striking variation between pre-task rest, task, and post-task rest periods with a preponderance of assemblies identified at longer timescales (>100 ms bins) during post-task rest. As animals became more experienced on the task, increasingly strong post-task reactivation of awake activity during non-REM sleep coincided with a greater increase in reactivation compared to pre-task sleep. Reactivation was strongest during sleep spindle oscillations and was related to the degree of coupling between spindles and slow waves.

Conclusions: These initial findings reveal the emergence of reactivation across distributed and diverse ensembles of mPFC neurons during sleep and further evidence the importance of coordinated oscillatory activity for processing previous waking experience.

Disclosure: No

P040 | Decoding of auditory low-level stimulus properties and higher-order statistics in wakefullness and sleep

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Objectives/introduction: Human perception relies to a large extent on top-down representations, such as expectations. The extent to which such representations influence the processing of upcoming stimuli in sleep has been only recently investigated. Some studies report disruption of predictive coding in sleep, whereas others argue for limited but preserved detection of violation of predictions. Here, we use passive listening/attention-free auditory task, and record simultaneous Electroencephalography (EEG) and Magnetoencephalography (MEG) data in wakefulness and sleep. We aim at exploring the extent to which low-level stimulus properties and higher-order statistics modulate the neural responses during sleep.

Methods: We presented participants ($N = 21$) with four different auditory tones, presented at a fixed presentation rate (3 Hz). We manipulated the tone transition probabilities, creating random and predictable tone sequences. Participants passively listened to the tones during wakefulness and a 2.5 h afternoon nap, while we recorded simultaneous EEG and MEG data. We used the EEG data for sleep staging, and we analyzed the MEG data using multi-level pattern analysis (MVPA) in order to decode low-level stimulus properties. We measured higher-order statistics, in the random and predictable tone sequences, by using stimulus pre-activations in a time generalization approach, as well as the classifiers' pre-stimulus classification tendencies. The results were statistically analyzed by using Bonferroni corrected between-samples *t*-test (random vs. predictable), or one-sample *t*-tests, when testing against decoding chance level (25%).

Results: Preliminary results indicate that low-level stimulus properties remain decodable in N1 and N2 after stimulus presentation ($p < 0.05$, 0 to 300 ms), although decoding accuracies drop significantly. This is in line with previous studies showing attenuated cortical activations related to the processing of low-level stimulus properties in sleep. Regarding the processing of stimulus statistics, a significant pre-stimulus effect ($p < 0.05$, 100 to 200 ms) was observed only in wakefulness. Similarly, we found higher classification tendencies for the predictable compared to the random tones ($p < 0.05$, −250 to −150 ms) in wakefulness, but that was not the case for any of the sleep stages.

Conclusions: Overall, our results suggest that although the processing of low-level stimulus properties persists in sleep, the detection of higher-order stimulus statistics appears to go undetected.

Disclosure: No

P041 | Effects of different training styles on learning performance and sleep in companion dogs

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Dogs are successfully used to non-invasively study neuro-cognition, including sleep-related cognitive functioning. In dogs, similarly to humans, both learning and emotional pre-treatment were reported to influence sleep architecture.

Our threefold aim was to investigate the effects of supportive vs. controlling training styles on dogs'

(1) behaviour during learning (expecting dogs will spend more time near their owner in the controlling condition),

(2) learning performance (will be dependent on stress level) and interference (order) effect) and

(3) sleep architecture (e.g., decreased sleep latency and sleep efficiency after controlling condition based on human data).

We tested 24 family dogs on three consecutive occasions. After the first adaptation sleep recording, dogs were trained to perform already known tasks to newly learnt commands on two occasions. The controlling/supportive conditions were presented in a balanced within-subject design. Both training sessions were followed by a test (to check dogs' learning performance) and a 2-h-long sleep conducted with non-invasive EEG method. After sleep, dogs were retested.

Results showed that dogs spent more time near their owner in the controlling condition, but only if the controlling condition was on the second occasion ($\chi^2(1) = 5.172$, $p = 0.023$). Training style affected memory consolidation; learning improvement after sleep occurred only in case of those dogs whose second occasion was a supportive one (first occasion was controlling) ($\chi^2(1) = 4.680$, $p = 0.031$). Dogs performed better on the first test and retest occasion regardless of the condition ($\chi^2(1) = 32.446$, $p < 0.001$). Sleep efficiency was higher ($\chi^2(1) = 5.837$, $p = 0.016$) and dogs fell asleep earlier ($\exp(\beta) = 0.464$, $p = 0.03$) after the controlling condition.

Based on behavioural and memory consolidation data, it seems that the first occasion (regardless of condition) might have been similarly stressful for each dog due to for example, unfamiliar environment. On the second occasion the controlling training style elicited more stress in dogs, but the supportive training style did not and thus their learning performance increased. Increased sleep efficiency and earlier sleep after the controlling training style is a unique finding in dogs and is in contrast with human data.

Disclosure: No

P042 | Effects of sleep schedule and time of learning on declarative memory performance in adolescents

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Introduction: Many adolescents obtain inadequate sleep during the school week. However, effects of repeated exposure to short sleep on learning are poorly understood. Our objective was to test effects

of different sleep schedules and time of learning on declarative memory performance in adolescents.

Methods: Adolescents (15–19 years) took part in a sleep manipulation study at a boarding school during their holidays. Participants had 2 baseline nights with 9 h of time in bed (TIB), after which they were randomly assigned to one of two sleep manipulation groups for five consecutive nights: Experiment 1, 9 h ($n = 30$) or 5 h ($n = 29$) of nocturnal TIB; Experiment 2, 6.5 h of nocturnal TIB ($n = 29$) or 5 h of nocturnal TIB ($n = 29$) with a 1.5-h nap opportunity in the afternoon; Experiment 3, 8 h of nocturnal TIB ($n = 29$) or 6.5 h of nocturnal TIB ($n = 24$) with a 1.5-h nap opportunity. Manipulation periods were followed by 2 nights of 9 h TIB recovery sleep. During sleep manipulation periods, participants studied a set of 40 word pairs each morning (9:40 a.m.) and a different set of 40 word pairs each evening (9:40 p.m.) using digital flashcards. Cued recall performance was assessed after recovery sleep. ANOVA was used to investigate effects of sleep schedule and time of learning on recall.

Results: There was an interaction between sleep schedule and time of learning on recall ($F_{5,164} = 5.40$, $p < 0.001$). Multiple comparison tests showed that adolescents with 9 h TIB performed better than their peers with 5 h TIB ($p = 0.015$). Learning was worse in the evening compared with the morning when students were allocated 6.5 h or 8 h TIB at night ($p = 0.049$ for both comparisons), but not when the total daily TIB was reapportioned to include an afternoon nap ($p > 0.05$).

Conclusions: Learning across multiple days of short sleep was associated with poorer memory. Moderately-short nocturnal sleep combined with a mid-afternoon nap boosted learning in the evening compared with continuous nocturnal sleep, without affecting morning performance. Our findings underscore the importance of a healthy sleep duration for learning and the benefit of naps when adolescents are unable to obtain sufficient sleep at night.

Disclosure: No

P043 | Daytime napping promotes the reorganization of emotional memory representations

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Introduction: Post-encoding memory processes have a major influence on memory representations. It is suspected that the post-encoding processing of salient (e.g., emotional) stimuli differs from that of neutral ones and that this processing is emphasized during sleep. The mnemonic separation task enables the estimation of the overall fidelity of memory representations by measuring the responses of participants to stimuli that are similar to previously studied stimuli. We used this task to study the reorganization of emotional memory representations during daytime napping.

Methods: We recruited healthy university students ($n = 113$) to complete the emotional variant of the mnemonic separation task. We delayed testing for 2 h after participants studied the stimulus material, which contained emotionally arousing, positively and negatively valenced pictures along with neutral stimuli. A group of participants had a nap during this interval ($n = 56$), while a control group stayed awake ($n = 57$). We used polysomnography during napping and further subdivided the experimental group based on the appearance of rapid eye movement (REM) sleep [REM group ($n = 18$) versus, NREM-only group ($n = 38$)]. We hypothesized that REM sleep supports the generalization of emotional memory, which would manifest in increased pattern completion scores for positive and negative stimuli in the REM group.

Results: We calculated the main behavioral indices of the mnemonic separation task (corrected recognition, lure discrimination, pattern completion) and observed enhanced recognition and lure discrimination specifically for negative items, and increased pattern completion for negative and positive items as compared to neutral ones. By separating the REM and the NREM groups, we found a significant interaction in pattern completion. Post hoc *t*-tests showed that pattern completion scores for positively and negatively valenced pictures were significantly higher than that for neutral stimuli in the REM group only.

Conclusions: These findings support the view that REM sleep plays an important role in post-encoding memory processes. REM sleep seems to facilitate the integration and generalization of emotional memories, which results in the loss of fine details in these memory representations. These results may facilitate further work on post-encoding memory processes in affective disorders.

Disclosure: No

P044 | Reduced attention and working memory performance as sleepiness levels of fishers increase while at sea

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Introduction: Previously, we have shown that sleep in fishers is shorter, less efficient and more fragmented at sea compared to ashore, due to for instance harsh environmental conditions and suboptimal working time arrangements. The present study investigated to what extent these sleep-related impairments also are reflected by decreased cognitive performance.

Methods: 157 of 176 Faroese fishers (mean age 42 ± 16 years) participated and worked on 16 different vessels; they were tested on the cognitive test battery COMPASS (Computerised mental performance assessment system) at the start and end of their fishing trip, lasting 3,5 (netting vessels) to 39 (longliners) days. Simple reaction time, numeric and visuospatial working memory, digit vigilance, rapid visual information processing and executive functioning were assessed taking in total between 19 and 24 min. Paired *t*-tests were conducted to compare performance at the start and end of a fishing trip.

Results: Visuospatial working memory was worse at the end (4, 4 ± 1, 9 remembered Corsi blocks) of the trip compared to the start (4, 8 ± 1,7; $p = 0{,}02$). On the simple reaction time test, the number of major lapses (rt > 1000 ms), increased from the start of the trip (0, 9 ± 1, 5) towards the end (1, 5 ± 2, 6; $p = 0{,}009$). Despite a considerable increase in Karolinska Sleepiness Scores (KSS; from 3, 5 ± 1, 7 to 5, 8 ± 1, 8, $p < 0{,}001$) at the end of the trip, all other assessed cognitive performances did not show any difference.

Conclusions: The present study shows that not all cognitive domains are equally sensitive to increased levels of sleepiness in a real-life setting of fishers at work. However, the two most affected parameters showing increased attentional lapses and reduced visuospatial working memory at the end of a working period may in fact pose fishers at risk and thereby, at least in part, contribute to the four times higher accident rates among fishers compared to people working ashore.

Disclosure: No

P045 | Targeted memory reactivation is more effective during slow-wave sleep than in sleep stage 2

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Objectives/Introduction: Sleep supports memory consolidation. Following encoding, spontaneous memory reactivations occur during sleep, which are assumed to underlie sleep's beneficial effect on memory. These spontaneous memory reactivations can be fostered by externally presenting reminder cues during sleep, using Targeted Memory Reactivation (TMR). Particularly for human declarative memories, TMR seems to stabilize memories and enhance performance. Different sleep stages have been proposed to be involved in the process of memory consolidation. While most studies implicate slow-wave sleep (SWS) in memory reactivation, others have emphasized that sleep stage 2 (S2) might also be important. In this study, we asked whether TMR leads to better memory performance when performed during SWS than S2.

Methods: Sixteen participants learned associations between 30 sounds and words in the evening. During subsequent sleep, 15 auditory cues from the learned associations (i.e., sound + first syllable of the word) were presented in SWS, and the other 15 in S2, in a counterbalanced-order. Next morning, subjects learned an interference task and afterwards memory performance of the original associations was tested. EEG recordings were cut around the cue onset, where evoked-response potentials (ERP) and time-frequency (TF) analyses were performed.

Results: Memory performance was significantly better for those associations with TMR during SWS than S2 ($p = 0.019$). TF analyses revealed higher fast spindle power around the ERP peak in response to cues presented in SWS compared to S2. Finally, we observed associations for theta and spindle power with memory performance in both conditions.

Conclusions: These findings suggest that TMR for declarative memory is more effective during SWS than S2, speaking for a functional role of SWS for declarative memory consolidation. The beneficial effects of TMR during SWS may be related to differential responses to the auditory cues in the spindle and theta frequency range.

Disclosure: No

P046 | Experimental sleep loss and low-grade inflammation attenuate behavioural control towards a cognitively less expensive but inflexible decision style

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Introduction: Behavioural control arises from a balance between model-based and model-free behaviour. Model-based behaviour is cognitively costly but enables adaptation to changes in the environment. In contrast, model-free control is fast, cognitively inexpensive, but inflexible. Overreliance on model-free control and/or reduced model-based control is found across various mental health conditions, suggesting that these modes of control may be influenced by common trans diagnostic processes. Since insufficient sleep and low-grade inflammation are highly common in mental ill-health, we assessed how they by themselves and in combination influence behavioural control.

Methods: In an ongoing study, we recruited 46 individuals who completed three sessions: sleep loss (2 nights of 4 h in bed), normal sleep (2 nights of 9 h in bed) (within-subjects), and a low-grade inflammation condition (COVID-19 vaccination) preceded by either sleep loss or normal sleep (between subjects). Blood samples were taken (not analysed), sickness symptoms were assessed using the SicknessQ, and model-based and model-free control was quantified (using a sequential decision task).

Results: Sickness symptoms were highest after vaccination with sleep loss ($M = 34.6$), followed by vaccination with normal sleep ($M = 24.3$) and sleep loss ($M = 23.8$), and normal sleep only ($M = 15.3$). Model-free behaviour increased in the vaccine as compared to the non-vaccine condition ($b = 0.23$, 95% CI 0.10, 0.37, $p < 0.001$). Model-based control decreased after sleep loss versus normal sleep (reward + common: $b = -0.47$, 95% CI −0.67, −0.28, $p < 0.001$, non-reward + rare: $b = -0.43$, 95% CI −0.63, −0.18, $p < 0.001$), which was not modulated by vaccination.

Conclusions: These results suggest that sleep loss and low-grade inflammation independently attenuate behavioural control towards a cognitively less expensive but inflexible decision style.

Disclosure: No

P047 | Responsiveness to auditory stimulation during slow wave sleep predicts long-lasting increases in memory performance in older adults

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Introduction: Previous research suggests that phase-locked acoustic stimulation (PLAS) during slow wave sleep (SWS) is able to boost ongoing oscillatory activity and – as a downstream effect – improve sleep-dependent memory consolidation. Due to an assumed bi-directional link between SWS disturbances and memory decline in aging, older adults might profit most from such interventions.

Methods: Here, 32 healthy older adults (mean age: 68.9) were allocated to an intervention ($n = 18$) or control ($n = 14$) group and completed a baseline night with sham (=no) stimulation and three consecutive experimental nights with PLAS. The control group received sham stimulation throughout the nights. Episodic memory was assessed on each evening and morning as well as at a one-week and three-months follow up.

Results: In the intervention group, PLAS induced a physiological response in form of an entrained slow oscillatory (SO) trough and a peak in all three stimulation nights compared to the baseline night. Furthermore, SO power during the stimulation period as well as spindle power temporally coupled to the entrained SO peak were increased during experimental nights compared to the baseline night. Linear regression models showed that the physiological responsiveness to PLAS in the SO-, and spindle band predicted relative memory performance at post-intervention as well as at the one-week and three-month follow-up. These effects were only observed in the intervention group, not the control group. Preliminary evidence suggests that memory performance increase at the one-week follow up is associated with a beneficial change in plasma amyloid burden in the intervention group, but not the control group.

Conclusions: We demonstrate for the first time, that PLAS can induce long lasting memory benefits in older adults. While we show inter- and intra-invidiual differences in the responsiveness of PLAS, it bears the potential to be developed into a tool for the treatment of cognitive decline.

Disclosure: No

P048 | Correlation between sleep spindles and category induced false memory

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Objective/Introduction: The effect of sleep on human memory has long been observed, but the role of its effect on false memory is not yet well understood. The sleeping brain goes through a cyclic process of various sleep stages. Sleep spindles are positively correlated with sleep-related memory benefits but their role in false memories remains elusive. Sleep helps in the production of meaning of encoded information, which might lead to the fabrication of false memory. In the present study, we investigated the relationship between sleep spindles and false memories.

Methods: A total of 12 healthy undergraduate males (age: 18.75 ± 1.05) from the Indian Institute of Technology Guwahati, volunteered for the study. Each subject participated in both the sleep and sleep deprivation experimental nights. On each experimental night, subjects completed the category associated (CA) task [which included the presentation of lists of simple line drawings of various category members]. Following this, subjects either slept or remained awake for eight h in the sleep laboratory. Forty-eight h after completing the experimental night, subjects returned to the laboratory for a retrieval test where they performed the recognition test and recall test of the studied list items. In the recognition test, non-parametric signal detection measurements (sensitivity, response bias) were calculated for memory scores. In the recall test, participants had to write the names of studied items on plain white paper. Sleep was monitored using Nihon-Kohden sleep-monitoring system. All statistical analyses were done using IBM SPSS Statistics 20 version. Significance was set at $p < 0.05$.

Results: The main results of the study suggest that, category associated false memory and sleep spindles are linked negatively in false recognition memory [$r\ (12) = -0.617$, $p < 0.03$]. The relation between response bias (conservative) of critical lures and sleep spindles was found to be negatively related [$r\ (12) = -0.615$, $p < 0.03$].

Conclusions: Spindles are disadvantageous for gist processing in category induced false memory in sleep. The sleep spindles may lead to a shift in response bias in false recognition in category associates.
Disclosure: No

P049 | A "good" night of sleep – does sleep duration have an impact on recognition memory?

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Some studies have shown that nightly sleep duration can be linked to cognitive tasks the next day thus that an optimal sleep duration leads to better sustained attention, reasoning and verbal skills. According to literature, for adults, the optimal nightly sleep duration lies at around seven h. The question of the current research is whether there is a difference in recognition memory accuracy depending on optimal sleep duration. For this reason, percentage of right answers in a memory task in the early afternoon was analysed according to subjectively reported sleep durations of the night before. It was expected that students gaining an optimal sleep duration would perform better compared to students sleeping less than the recommended seven h. Participants reported their subjective sleep duration as well as wake times during nights in a sleep diary. In a recognition memory test, word-pairs needed to be discriminated in learnt ("hits") vs. new ("correct rejections") pairs. Data from 71 young students (43 female) with an average age of 22.92 years (SD 2.75) was analysed. According to their sleep duration the night before, students were split into two groups (less than seven h (G1): $n = 41$; more or equal to seven h (G2): $n = 30$). As expected, the students that slept seven h or more, performed on average better (G2: 77.4 ± 10.3%) in a recognition test than the students that slept less than seven h (G1: 71.8 ± 13.4 %) what was marginal significant ($t(69) = -1{,}998$, $p = 0.059$). This effect was driven by significant more correctly made correct rejections for the more-sleeping group (G1: 75.7 ± 16.3%; G2: 83.4 ± 10.3 %; $t(69) = -2{,}294$, $p = 0.025$). There was no significant differences for hits between the two groups (G1: 67.9 ± 17.1 %; G2: 71.4 ± 15.3 %; $t(69) = -.884$, $p = .38$). The results partly support the prediction that optimal sleep duration benefits recognition memory accuracy. It shall be discussed whether (optimal) sleep duration might have a differential impact on recognition memory processes such as familiarity and recollection as well as on response bias.
Disclosure: No

P050 | Systematic review and meta-analyses on the effects of napping on cognition

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Introduction: Naps, the short periods of sleep that occur outside a longer main nocturnal sleep period, are increasingly considered as tools to boost cognitive performance. We quantitatively summarized the findings of existing studies on the effects of napping on cognition.
Methods: Of the 60 samples, 52 focused on memory performance. We evaluated effect sizes for overall cognition and specific domains of memory, vigilance, speed of processing and executive function. We also examined whether nap effects were moderated by study features of age group, nap length, nap start time, sleep restriction, and nap habit.
Results: We found that naps had an overall significant benefit for cognition (Cohen's $d = 0.379$, $CI_{95} = 0.296–0.462$), contributed by declarative (Cohen's $d = 0.376$, $CI_{95} = 0.269–0.482$) and procedural memory (Cohen's $d = 0.494$, $CI_{95} = 0.301 – 0.686$), vigilance (Cohen's $d = 0.610$, $CI_{95} = 0.291 – 0.929$) and speed of processing (Cohen's $d = 0.211$, $CI_{95} = 0.052 – 0.369$). There were no significant moderation effects of any study features. Nap effects were of comparable magnitude across subgroups in each category (Q values = 0.009 to 8.572, p values > 0.116).
Conclusions: In sum, naps are beneficial to cognitive performance. The results of this meta-analysis should provide guidance on how to nap as well as gaps that invite future research.
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Disclosure: No

P051 | Sleep disorders and academic performances of medical students

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Introduction: Sleep disorders have become a current and worrying issue among medical students. This study aims to analyze sleep disorders characteristic for medical students and their influence on academic performance.
Methods: This study is based on a review of articles from Google Scholar, PubMed, and Hynari from the last ten years.
Results: Medical students face stress factors such as overwork during lessons, long class h, huge amounts of information to learn and concerns about academic performance. Some students have developed burnout syndrome. Also, students reported insufficient sleep and a discrepancy between weekday and weekend amounts of sleep. Together with stress factors mentioned above, sleep depravations and the lack of sleep consistency are premorbid states for different sleep and circadian disorders. As the good sleep is the irreplaceable for a good mental work, all of above negatively affect students' academic performance.
Conclusion: Medical students should review their lifestyle and the factors which generate sleep disorders. General physicians

should have a high index of suspicion about the presence of sleep disorders which are pervasive among medical students. Most sleep disorders, once diagnosed, can be managed easily. Qualitative sleep in medical students will ensure their good academic performance.

Disclosure: No

P052 |

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Disclosure: No

P353 | **Effort during prolonged wakefulness is associated with performance to attentional and executive tasks but not with cortical excitability in late middle-aged healthy individuals**

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Sleep-loss negatively affects brain function with repercussion not only on objective measures of performance, but also on many subjective dimensions, including effort perceived for the completion of cognitive processes. This may be particularly important in aging which is characterized by important changes in sleep and wakefulness regulation. The dynamics of effort and its association with cognitive performance during prolonged wakefulness is not established, however. Here, we assessed effort and performance to cognitive tasks in 99 healthy adults (66 women; 50–70 y) during a 20 h wake extension protocol completed under strictly controlled constant routine conditions. We further explored links with cortical excitability assessed concomitantly using transcranial magnetic stimulation coupled to electroencephalography (TMS-EEG). We first show that effort increases during wake extension ($p < 0.0001$) and is highly correlated to other subjective metrics such as sleepiness, fatigue and motivation ($p < 0.0001$). Moreover, effort increase is associated with a decrease in performance to the psychomotor vigilance task (PVT) ($p < 0.04$) and to the 2-back working memory task($p < 0.006$), but not to the 3-back task and the Sustained Attention to Response Task (SART) ($p > 0.4$). Importantly effort variations decrease as one ages from 50 to 70 y ($p < 0.0001$), in line with the global decrease of the acute effect of sleep loss in aging, while more effort is associated with worse performance in the older versus, younger individuals of our sample. Finally, effort dynamics was not related to variations in cortical excitability ($p = 0.8$). These findings suggest that, in healthy late middle-aged individuals, more effort is expended to realize tasks, but is not sufficient to overcome the performance decline brought by lack of sleep and it is not strongly related to cortical neuron reactivity. The start of the seventh decade may stand as a turning point in the daily dynamics of perceived effort and its link with cognition.

Disclosure: No

P354 | **Paradoxical somato-dendritic decoupling supports cortical plasticity during REM sleep**

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Introduction: REM sleep is associated with the consolidation of emotional memories encoded by neuronal circuits from the limbic system and prefrontal cortex in mammals. Yet, the underlying neocortical circuits and synaptic mechanisms remain unclear.

Objectives and Aims: How prefrontal regions perform during REM sleep?

How do they store emotional memories during REM sleep?

Results and Methods: Here, we found that REM sleep is associated with a somato-dendritic decoupling in pyramidal neurons of the prefrontal cortex, using simultaneous 2-photon calcium imaging and electrophysiological recordings in sleeping mice. This decoupling reflects a shift of inhibitory balance between PV neurons-mediated somatic inhibition and VIP-mediated dendritic disinhibition, mostly driven by neurons from the central medial thalamus. We further showed that REM-specific optogenetic suppression of dendritic activity led to a loss of danger versus safety discrimination during associative learning and a lack of synaptic plasticity, whereas optogenetic release of somatic inhibition resulted in enhanced discrimination and synaptic potentiation.

Conclusions: Collectively, our results demonstrated that somato-dendritic decoupling during REM sleep promotes opposite synaptic plasticity mechanisms that optimize emotional response to future behavioral stressors.

Disclosure: No

P355 | **Does targeted memory reactivation during NREM sleep require complementary REM sleep for memory consolidation?**

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Objectives/Introduction: Presentation of learning-related cues during NREM sleep (targeted memory reactivation; TMR) has been shown to improve memory consolidation. Although studies suggested that REM

sleep contributes to the beneficial effects of NREM-TMR, the relationship between REM sleep and TMR processes remains unclear. We investigated here to what extent NREM-TMR followed by REM sleep is more beneficial for memory consolidation as compared to a period of NREM-TMR not completed by REM sleep.

Methods: 19 participants (mean age 24.4 years) underwent three experimental nights, each comprising a learning phase, pre- and post-sleep recall, and a nocturnal sleep interval. At each session, they learned 50 pseudoword-picture associations including known or unknown object pictures. Before sleep, half of the correctly remembered known and unknown words at pre-sleep recall were randomly selected and presented during NREM-TMR. NREM-TMR took place either before (PRE-REM) or after (POST-REM) the final REM sleep episode of the night, or participants slept undisturbed (Control).

Results: In the PRE-REM condition, TMR was successfully delivered before REM sleep (mean REM duration 30.29 ± 12.9 min.); in the POST-REM condition, REM sleep following NREM-TMR was abolished (0.18 ± 0.3 min). A repeated measures ANOVA on overall memory performance for fully remembered associations with within-subject factors Condition (PRE-REM, POST-REM, Control), Recall (Immediate vs. Delayed) and Knowledge (Known vs. Unknown) revealed a main effect of Knowledge (Known > Unknown, $p < 0.0001$). Other effects were non-significant ($ps > 0.1$).

Cueing (TMR) effects were investigated at delayed recall focusing on correctly remembered associations at pre-sleep (both to-be-cued and uncued). The ANOVA with factors Condition (PRE-REM vs. POST-REM), Cueing (Cued vs. Uncued words) and Knowledge (Known vs. Unknown) disclosed a main effect of Knowledge ($p < 0.0001$) and a Cueing x Knowledge interaction effect ($p = 0.007$). Post-hoc tests computed on the size of known versus, unknown performance differences evidenced a higher benefit of prior knowledge for cued than uncued associations ($p < 0.01$).

Conclusion: Our study did not disclose a NREM-TMR benefit for memory consolidation using this association task, nor evidenced an effect of REM sleep following NREM-TMR. Results suggest that previous knowledge is a relevant factor for TMR effects to unfold.

Disclosure: Yes

Conflict of Interest statement: R.S.O. is supported by Fonds de la Recherche Scientifique (F.R.S.-F.N.R.S., Aspirant Research Fellowship).

P356 | Sleep enhances consolidation of problem-solving skills through changes in functional connectivity among hippocampal-striatal-cortical areas compared to nap and wake

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Introduction: Procedural memory consolidation for motor skills is enhanced by sleep and is associated with strengthened functional connectivity in hippocampal-striatal-cortical areas. However, it is unknown whether a similar process occurs for procedural memory involving cognitive strategies and problem-solving skills. In the present study, we examine how resting-state functional connectivity within the hippocampal-striatal-cortical network differs after an offline consolidation interval containing either a night of sleep, daytime nap, or day of wakefulness.

Methods: Resting-state fMRI data was acquired before and after training on a procedural problem-solving task that requires the acquisition of a novel cognitive strategy, and immediately prior to the retest period (i.e., following the interval of sleep, nap, or wake).

Results: Participants ($n = 60$) were randomized into either a sleep ($n = 20$), nap ($n = 20$) or wake ($n = 20$) group. Results were corrected for multiple comparisons using False Discovery Rate (FDR). Strengthening of hippocampal-orbital frontal functional connectivity following a period of sleep versus, wake was observed using an *a priori*ROI-to-ROI 2×2 ANOVA analysis ($F(1, 38) = 8.11$, $p_{FDR} = 0.042$), and a less constrained seed-to-voxel whole-brain 2×2 analysis ($t(38) = 4.75$, $pFDR = 0.008$). The strength of the functional connectivity between these brain regions was positively associated with offline gains in problem solving skills, as shown by a 2×2 ANCOVA, when including improvement in accuracy on the behavioural task as a covariate of interest ($F(2,55) = 5.08$, $p_{FDR} = 0.028$). In addition, the less constrained, and more exploratory seed-to-whole brain analyses demonstrated greater connectivity between the caudate and somatosensory cortex when comparing sleep vs. wake ($t(38) = 5.18$, $p_{FDR} < 0.001$), whereas nap showed relative strengthened functional connectivity between the putamen and sensorimotor cortex ($t(38) = 4.91$, $p_{FDR} = 0.042$). All these brain areas are known to be critical for the sleep-related consolidation of novel problem-solving skills.

Conclusions: Here, we demonstrate that consolidation of procedural strategies benefits from both a nap and a night of sleep in terms of behavioral improvements. However, a full night of sleep is necessary for the strengthening of functional communication between key hippocampal-striatal-cortical regions that support the transformation and strengthening of memory traces, specific to problem-solving skills.

Disclosure: No

P357 | Learning and sleep-related consolidation of motor skills following action observation, motor imagery and physical practice

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Introduction: Learning a motor skill generally requires physical practice (PP) of the task. However, motor skills can be learned in the absence of overt movement either through motor imagery (MI) which involves mentally rehearsing the movement, or action observation (AO) which consists in observing others performing the skill. Motor

memory consolidation (MMC) benefits from sleep. It is suggested to be mediated by thalamo-cortical sleep spindle activity, which consists of brief oscillatory patterns (11–16 Hz) reflecting reactivation of task-related neural circuits during non-rapid eye movement stage 2 sleep (N2). Although the amount and clustering of sleep spindles in "trains" contribute to MMC after PP, their role following AO and MI practice remains unknown. The objective of this study was to determine whether N2 sleep spindles play a critical role in MMC following PP, MI and AO.

Methods: Forty-five young adults were required to learn a motor sequence task through PP, MI, or AO ($N = 15$ per group). Sleep EEG recordings were acquired during a 90 min daytime nap following practice. Behavioural retention and inter-manual transfer tests were performed to evaluate skill consolidation and transfer to the unpractised hand. The amount of N2 sleep spindles was extracted and related to behavioural performance. Time-frequency (TF) analyses were conducted to reveal the clustering and temporal organization of N2 sleep spindles.

Results: Significant positive correlations were observed between the amount of spindles and the magnitude of skill consolidation following PP ($r = 0.60$, $p = 0.019$) and MI ($r = 0.62$, $p = 0.014$). However, the magnitude of skill transfer correlated positively with the amount of spindles following AO only ($r = 0.59$, $p = 0.021$). Additionally, TF maps revealed a predominant cluster-based organization of N2 sleep spindles for all groups, with significant power increases in the spindle band every 3–4 s.

Conclusion: Our results revealed distinct behavioural outcomes in skill consolidation and transfer following PP, AO, and MI practice, despite an apparent practice-unspecific cluster-based organization of N2 sleep spindles. Altogether, we demonstrated that the amount and clustering of N2 sleep spindles during MMC may be a critical mechanism for effective long-term skill retention and transfer, irrespective of the initial practice format.

Disclosure: No

P359 | Ultra high-field MRI indications that exposure to blue enriched light increases attention brain responses during an oddball task

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New research shows that natural and artificial light regimes have the potential to weaken and strengthen cognition, attention and perception. These effects are mediated in part by melanopsin-expressing light-sensitive ganglion cells that are very sensitive to blue light (470–480 nm). These photoreceptors not only stimulate alertness, attention, vitality, and cognitive performance, but they also influence our biological clock, sleep, thermoregulation and hormonal processes.

Using high resolution ultra-high field (7T) functional magnetic resonance imaging (fMRI), we characterized the neural correlates of the alerting effect of light by assessing the reposes to an auditory oddball task. Twenty healthy young subjects (22.95 y ± 2.1 women) were requested to detect rare (20%) deviant tones (100 Hz) among more frequent (80%) standard (500 Hz) ones by pressing a button with their right index. In this task, participants were exposed to 30 s blocks of blue enriched light (4,000 K; 3 intensities: 63, 155, 308 melanopic EDI lux) and orange monochromatic light (589 nm; 0.2 melanopic EDI lux) interleaved by ~15 s dark periods.

Like many previous studies have reported, there have been activations of temporal, parietal, thalamus, intraparietal sulcus (IPS) and occipital lobes (uncorrected $p < 0.001$) during oddball task. There was increased activation in the left IPS and thalamus, under blue light in comparison to orange light ($p < 0.001$ uncorrected). This is in line with other studies that report increased activation in cortical and subcortical regions related to attention as thalamus and IPS under blue light. These preliminary results will be confirmed in a larger sample.

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Disclosure: No

P360 | Age-related reduced benefit of sleep for memory trace consolidation

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Sleep is known to enhance the realization of novel solutions to problems. As we age, both the quantity and quality of sleep are reduced. Age-related deficits in sleep-dependent memory consolidation have been recently identified, however, the scope of these deficits is not known. Here, we sought to investigate the behavioural and neuronal functional consequences of age-related changes in sleep for learning new novel cognitive strategies required for problem solving skills.

40 healthy young adults (20–25 years), and 30 healthy older adults (60–85 years)participated, and were assigned to either the nap [young-nap (YN), older-nap (ON)] or wake [young-no-nap (YNN),older-no-nap (ONN)] conditions. Participants were trained on the Tower of Hanoi (ToH) in the AM, followed by either a 90-min nap opportunity or a period of wake, and were retested afterward. The ToH is a procedural task that requires the acquisition of a novel cognitive strategy (*i.e.*, recursive logic). Alternating blocks of ToH practice and rest were performed while functional MRI scans were obtained at 3T to examine differences($pFDR < 0.05$)in brain activation from training to retest in young versus, older groups as a function of sleep [(YN-YNN)-(ON-ONN)].

Sleep significantly benefitted the young but not the older participants (speed and accuracy) on the ToH. A bilateral difference in activation of the hippocampus was observed from training to retest between young and older subjects. Specifically, YN displayed decreased activation, whereas YNN showed increased activation. The older groups showed the opposite pattern whereby ON displayed increased activation whereas ONN showed decreased activation. The same pattern was observed for the middle temporal gyrus and medial prefrontal cortex. By contrast, the opposite pattern was observed in the premotor area, inferior and superior parietal cortex.

These results suggest that sleep differentially contributes to the realization of a novel cognitive strategy in young *vs*. older individuals, consistent with the notion that as the consolidation of a newly formed memory trace progresses, the hippocampus becomes less involved over time; especially so when sleep occurs during that time. Our results suggest that sleep preferentially contributes to this process in young, but not older individuals.

Disclosure: No

P361 | Sleep improves adaptive performance in a fine-motor skill task

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The plasticity of the sensorimotor system enables the brain to adapt to the demands of new environments. In the motor domain, such a skill is referred to as motor adaptation. Previous literature has yielded contradictory results regarding the influence of sleep on motor adaptation. In this study, we aimed at investigating the role of sleep on adaptive performance using a fine-motor skill task.

We recruited 33 healthy, righ-handed males who are experts in touch-typing on the Keyboard and trained them to type 18 German, five-letter words on both a regular and a mirrored keyboard. We measured their performance before and after a retention interval of either a full night (~8 h) of sleep ($n = 16$) with polysomnography (PSG) or a period of wakefulness ($n = 17$). We evaluated their behavioral performance as a function of accuracy (the number of correct letters/word) and speed (time taken to type the whole word).

We show that, behaviorally, post-training sleep increases adaptive performance as compared to wakefulness. Non-parametric statistical analysis with two within-factors (Time: pre vs. post, and Keyboard: Regular vs. mirrored), and one between-factor (Group: Sleep vs. Wake) revealed a significant interaction Group X Time X Keyboard ($ATS(1) = 12.82$, $p = 0.003$). Bonferroni-corrected post-hoc tests demonstrated an increase in typing performance on the mirrored Keyboard after sleep ($p < 0.001$) but not after wakefulness ($p = 0.8$). Next, using machine learning algorithms, we demonstrate that the observed performance gains are paralleled by a decrease in the ability of a linear discriminant analysis (LDA) classifier trained on 11 electroencephalography (EEG) channels to differentiate between Regular and mirrored typing after sleep but not after wakefulness. Specifically, we observed a decrease in the decodability between regular and mirrored typing trials in the −0.3 s to 0.1 s pre-typing window ($\Sigma = -444.66$, $p < 0.001$) after sleep, suggesting a decrease in adaptive drive and the integration of the adaptive behavior, that is, mirorred typing, within pre-existing memory networks

These results indicate a role for sleep in promoting the adaptation of fine-motor skills. Further analysis should elucidate the contribution of different sleep stages to the consolidation of adaptive processes.

Disclosure: No

P362 | Changes in vigilance during recurrent sleep restriction and recovery in young adults

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Objectives/Introduction: Many individuals curtail their sleep on weekdays, while trying to compensate by extending their sleep on weekends. Here, we characterised changes in vigilance during two weeks of restricted and recovery sleep in young adults.

Methods: 19 young adults (mean age ± SD: 22.68 ± 1.77 years) underwent a 16-day protocol in a controlled laboratory setting, which consisted of two baseline nights (TIB = 8 h), followed by two cycles of restricted sleep for five nights (TIB = 6 h) and recovery sleep for one to two nights (TIB = 8 h). Sustained attention was assessed using a 10-min Psychomotor Vigilance Task (PVT) five times each day. A mixed model was used to determine the effect of day on the daily average number of PVT lapses (responses exceeding 500 msec).

Results: Vigilance significantly changed across study days ($p < 0.001$). Specifically, the number of PVT lapses increased moderately over the first week of sleep restriction ($p = 0.006$), replicating the cumulative effects of sleep curtailment across multiple nights on vigilance reported in previous studies. Importantly, two subsequent nights of recovery sleep simulating sleep extension over weekend nights did not significantly attenuate such vigilance deficits ($p = .336$), and vigilance performance deteriorated further during the second week of sleep restriction at a steeper rate than the first ($p < 0.05$).

Conclusions: The present study suggests that weekend sleep extension might not offer much recovery benefits to vigilance impairments induced by chronic partial sleep restriction, and might not protect one from these deficits during subsequent nights of sleep loss.

Disclosure: No

P363 | Academic performance depends on timing of tasks

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Adolescence is characterized by a delay in circadian rhythms (Roenneberg et al. 2007). Insufficient sleep is also a serious concern since almost one-third of adolescents do not get enough sleep (Chaput et al., 2016). The effects of insufficient sleep extend to all areas of life, including cognitive abilities, which are crucial for learning (Kuula et al., 2015).

The aim of this study was to investigate how chronotype and sleep are associated with academic performance. We hypothesized that evening-types sleep less and report more daytime fatigue compared to other circadian rhythm types and that evening-types perform better on tasks in the afternoon, while morning-types perform better on tasks earlier compared to other types.

The original sample was collected in 2019, when participants were in seventh grade ($n = 594$) and eighth grade ($n = 557$). In the 2020 follow-up, participants were in eighth grade ($n = 531$) and ninth grade ($n = 524$). The survey was conducted as part of normal schoolwork and data were gathered from students in the target class present during the school day.

Cognitive competence was analyzed with the Finnish learning to learn test (Hautamäki et al., 2013) including cognitive tasks measuring analogical reasoning, number reasoning and mathematical thinking. Chronotype was assessed with a single item from the Horne and Östberg Morningness-Eveningness Questionnaire assessing chronotype.

For 7th grade morning types ($n = 112$), the reasoning task mean score was negatively related to the time of day the tasks were completed ($r = -0.284$, $p < 0.01$). The earlier the morning types completed the tasks the better they performed. For 8th grade intermediate types ($n = 70$), completion of mathematical thinking task was negatively related to the time of day the tasks were completed ($r = -0.255$, $p < 0.05$). For 9th grade evening types ($n = 136$), the time of day that tasks were completed was positively associated with the mean score on reasoning tasks ($r = 0.210$, $p < 0.05$, $n = 136$) and mathematical thinking task ($r = 0.198$, $p < 0.05$, $n = 129$).

Preliminary results suggest differences in the association of task completion time and task performance between different chronotypes. Earlier task completion time seems to be more favorable for morning-types, while evening-types benefit from later task completion times.

Disclosure: No

P364 | Role of sleep in recognition memory of faces and objects

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Background: Human beings perceive and process a number of stimuli every day. Two main categories of stimuli humans encounter are objects and faces. Numerous converging evidences from behavioral, neurophysiological and electrophysiological research suggest that faces are processed separately and/or differently to other objects. The present research aims at comparing the recognition memory of faces and objects and evaluating the role of sleep in modulating these memories.

Methods: Twelve healthy undergraduates (age: 20.78 ± 2.08) from Indian Institute of Technology Guwahati, volunteered for the study. Subjects learned and later performed old/new recognition for faces and objects across multiples nights filled with either sleep or sleep restriction.

Results: Significant main effect for post learning sleep [F (1, 11) = 15.7, $p < 0.05$, partial eta square = 0.57], and stimuli [F (1, 11) = 10.7, $p < 0.05$, partial eta square = 0.39] was reported. Interaction between sleep and stimuli was non-significant. Correlation of d prime values with various sleep stages suggests positive correlation between stage N2 and both object and face recognition.

Conclusion: Sleep deferentially modulates recognition memory for faces and objects and stage N2 may be responsible with recognition memory benefits of sleep

Keywords: face, object, recognition memory, sleep

Disclosure: No

P365 | Children's sleep, a protective factor from acute periods of stress: a COVID confinement experience

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The abruptly enforced COVID-19 confinement affected sleep and mental health of adults, adolescents, and children. Already young children experience worsened sleep quality during the confinement; yet potential consequences concerning their maturation of Executive Functions (EFs) remain unexplored. Importantly, longitudinal research demonstrates that sleep quality predicts later behavioral and cognitive development. Accordingly, we propose young children's sleep quality as a protective umbrella, preventing developmental outcomes from negative influences of contextual stress. Through the lens of the confinement being an observational-experimental intervention, we tested whether worsening of young children's sleep is tied to EFs outcomes 6 months downstream confinement. We hypothesized that acutely increased night awakenings and prolonged sleep latency relate to lower later EFs scores.

We assessed sleep during the acute confinement phase (April 2020) with an online survey (Children's Sleep Habits Questionnaire) and analyzed 4 core sleep behaviors: bedtimes, sleep latency, nighttime sleep

duration, and nighttime awakenings. A retrospective sleep assessment referred to the time pre-CONFINEMENT, and an assessment referred to the time of survey completion (during-CONFINEMENT). A second survey assessed EFs with the BRIEF-P scale (November 2020, FOLLOW-UP), a standard behavior scale for EFs in young children.

In 45 children aged 36–72 months, we quantified differences in the 4 sleep behavior from pre- to during-CONFINEMENT (Wilcoxon signed-rank tests), and applied linear mixed models. For each EFs (Subscale, Index, and Global-Composite-Score) the best fitting model was identified separately (backward selection, Akaike-Information-Criterion).

We demonstrated that children's sleep acutely changed during confinement (more regular bedtimes $p = 0.003$; shorter sleep latency $p = 0.002$). Further, sleep quality was linked to later EFs: Acutely increased nocturnal awakenings predicted lower inhibitory self-control indices at FOLLOW-UP ($p = 0.021$) and lower subscales Inhibit and Emotional-Control ($p = 0.036$; $p = 0.032$). Associations were specific to the confinement-induced sleep-change and not the sleep measures per se.

These findings highlight mid-term (i.e., 6 months downstream) behavioral consequences of confinement, predicted by acute changes in young children's sleep. These findings transfer the concept formerly evidenced in animals to humans, that inducing poor sleep during developmental periods affects later brain function, thereby supporting the protective sleep-umbrella model.

Disclosure: No

P366 | Effect of toluene chronic inhalation on learning, memory and sleep in rats

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Objectives/Introduction: Inhaled solvents such as toluene are of particular concern due to their abuse potential that is easily exposed to the environment. Toluene, found in glues and cleaners, is among the inhalants most commonly abused by workers and young drug addicts. The inhalation of toluene causes various learning, behavioral and sleep problems, the effect of long-term exposure of toluene on changes in sleep over time after exposure and the accompanying pathological characteristics have not been fully identified.

Methods: We exposed male Wistar rats at ages P 20–25 (adolescents) and P 90–95 (adults) to 2000 ppm inhaled toluene for 40 days. The immediate and persisting effects of toluene misuse (immediately after the end of toluene chronic inhalation and 90-day after the end of toluene chronic inhalation, correspondingly) were evaluated. Animal Studies Committee of I. Beritashvili Center of Experimental Biomedicine approved experimental protocol.

Results: Thesealterationsdonotprogresssignificantlyduringabstinence-period:somealtered parameters were almost the same as observed the day following immediately after toluene misuse and others were very close to observed in control animals. Therefore, in adolescent rats the most expressed was immediate effect of toluene misuse. Contrary to it: in adult rats most alterations significantly progress during 90 *d* period of abstinence. Therefore, in these animals more substantial was persistent effect of toluene chronic exposure.

The major findings are:

(1) toluene misuse alters exploratory activity and recognition memory in adolescent and adult rats;

(2) the level of alterations depends upon the postnatal age of testing animals;

(3) Chronic exposure to toluene changes the sleep disorders.

Effects of toluene exposure were compared using one-way ANOVA. For post hoc comparisons, Bonferroni test was used. Differences were considered significant when $p < 0.05$.

Conclusions: On the bases of our data, it is possible to suggest that adolescent rats may show partial recovery from once the toluene toxic effect no longer persists. Also toluene exposure disrupts the sleep-wake cycle by response related to sleep.

Disclosure: No

P646 | Spindle trains during daytime sleep help to consolidate spatial declarative memory

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Introduction/Objectives: Memory consolidation refers to the process whereby freshly encoded memories are strengthened and retained over time. A large body of research demonstrates that sleep plays an important role in this process, for both procedural and declarative memories (DM). While it is believed that memory traces are reactivated and reprocessed during non-rapid eye movement (NREM) sleep in synch with specific events, like spindles, it is unclear whether consolidation of different memory types are sub served by similar mechanisms or not. Our group has previously reported evidence that procedural memory consolidation is related to spindles grouped in "trains" (i.e., occurring less than 6 seconds apart). Thus, we seek here to investigate whether these electroencephalographic events are also involved in DM consolidation by demonstrating that:

(1) a 90-min nap improves DM consolidation and

(2) sleep-related memory performance correlates with spindle train metric(s).

Methods: In a mixed experimental design, participants were assigned to either nap ($N = 14$;$m_{age} = 23.73$ years) or no-nap ($N = 15$; $m_{age} = 23.94$ years) groups and were required to perform a spatial object-location memory task before and after sleep (nap) or an equivalent wake period (no-nap). Electroencephalography was recorded in both groups. Parametric and non-parametric tests compared group differences in behavioral performance and its association with spindle train metrics (for the nap group only).

Results: Despite starting off with a better pre-sleep performance (77% vs. 70.4%), the no-nap group lost 3.15% of their overall performance after a 90-min wake period, whereas the nap group gained 0.79% after sleep [$F(1,27) = 3.06$, $p = 0.05$]. A comparison of memory gains vs. loses revealed that only 33.3% of participants had gains in the no-nap, as compared to 78.6 in the nap condition [$\chi^2(df = 1) = 17.76$, $p < 0.001$]. Importantly, the number of spindle trains recorded at the parietal (Pz) site during NREM2 sleep correlated positively and significantly with memory consolidation in the nap group ($R^2 = 0.37$).

Conclusions: Our results indicate that a 90-min nap improves declarative memory consolidation, and this improvement is related to the number of spindle trains generated during NREM2 sleep. Corroborating these findings with our previous results, we suggest that a similar sleep mechanism underlies the consolidation of both declarative and procedural memories.

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Disclosure: No

P647 | Odor cueing during sleep improves consolidation of a history lesson in a school setting

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Introduction: Sleep is a key factor in memory consolidation. During sleep, information is reactivated, transferred, and redistributed to neocortical areas, thus favoring memory consolidation and integration. While they occur spontaneously, these reactivations can also be induced using external cues linked to the acquired information. Hence, the target memory reactivation during sleep represents an advantageous tool to improve school content in real-life settings. Our goal was to improve consolidation of complex information such as a history lesson, using odor reactivations during sleep.

Methods: Students received a history lesson at school in the presence of a coconut odor (day 1) and they were immediately tested (multiple choice). They received one reactivation round (Reactivation group: coconut ($N = 22$); No reactivation group: violets ($N = 23$)) while sleeping in their homes on the same night of the acquisition, without using additional study sessions. They were finally tested on day 8 (multiple choice). Data were analyzed with repeated measures ANOVA with "group" as an intersubject factor and "day" as a within-subject factor.

Results: There was a significant "group" per "day" interaction ($F(1,43) = 4.76$, $p = 0.035$). Thus, we performed simple effects analyses of "group" within each level of "day". We found that the groups reached a similar score on day 1 (R group: 58.0 ± 4.1; NR group: 57.5 ± 3.1, simple effects $F(1,43) = 0.010$, $p = 0.919$). On the other hand, the Reactivation group showed a significantly higher score on day 8 than the No reactivation group (R group: 50.0 ± 3.4; NR group: 37.1 ± 3.6, simple effects $F(1,43) = 6.68$, $p = 0.013$). We further found that there was a significant memory decay between the short term and long term memory sessions for the No Reactivation group and a trend for the Reactivation group (simple effects, FNR $(1,43) = 26.54$, $p < 0.001$; FR$(1,43) = 3.94$, $p = 0.053$).

Discussion: Complex information can be associated with an odor in the classroom, and one session of reactivation during the first night of sleep in the students' houses improves its consolidation. These results bring new evidence for the implementation of reactivation during sleep in real-life settings.

Disclosure: No

P648 | The coupling between slow oscillations and sleep spindles in overnight memory - the role of *BDNF*Val66Met?

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Introduction: The synchrony between slow oscillations (SO) and sleep spindles is considered consequential for memory consolidation. Specifically, sleep spindles that occur during the depolarized upstate of slow oscillations form circumstances that promote the induction of persisting synaptic changes. Accordingly, behavioral human studies have shown solid associations between SO-spindle coupling and memory outcome over sleep-filled delays. Inter-individual factors contributing to this synchrony are scarcely studied. Of specific interest are gene polymorphisms that are proposed to implicate synaptic plasticity, neuroanatomy and functional brain activation, such as *BDNF* Val66Met. However, the role of*BDNF* in memory retention over sleep is scarcely studied.

Methods: The associations between SO-spindle coupling and overnight memory outcome were examined among two different samples. In study I, a sample consisting of young adults ($N = 26$) underwent a verbal memory task (cued recall) consisting of novel metaphoric associations. In study II, the recognition memory for pictures (of varying emotionality) was tested in a sample consisting of 17 years old adolescents ($N = 151$). The latter sample was genotyped in order to examine the effects of*BDNF* Val66Met on oscillatory characteristics and

memory outcome. Overnight polysomnography was conducted for all participants. SO-spindle coupling was operationalized either as the percentage (Study I) or number (Study II) of spindles peaking ± 45° from the depolarized SO peak (Upstate% or Upstate#, respectively).

Results: It was found SO-spindle coupling predicted memory outcome. First, Upstate% associated with less forgetting of the novel metaphors ($t = -3.796$, $p < 0.001$; $N = 26$). Second, overnight picture recognition associated positively with Upstate# ($F = 6.421$, $p = 0.012$; $N = 151$). Moreover, this association was moderated by *BDNF* Val66Met ($F = 4.669$, $p = 0.032$): SO-coupled fast spindles associated positively only in Val_{BDNF} homozygotes ($F = 12.933$, $p < 0.001$; $n = 104$) but not in Met_{BDNF} carriers ($F = 0.024$, $p = 0.877$; $n = 47$).

Conclusions: The findings provide further evidence for the importance of SO-upstate-coupled fast spindles in overnight memory and may reflect memory consolidation during sleep. Genetic propensity for synaptic plasticity may enhance the effect of events that promote consolidation - are the benefits of sleep constant and equal across individuals?

Disclosure: No

P649 | A 30 min mid-afternoon nap boosts sustained attention and memory encoding

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Objectives/Introduction: Mid-afternoon naps can be used to offset the negative effects of shortened nocturnal sleep on cognitive performance. However, the time course of benefit across different cognitive domains and nap durations remains unclear. Here, we evaluated the same participants after 10, 30 and 60 min of polysomnographically-monitored naps against a wake control condition.

Methods: 20 young adults underwent 4 experimental conditions in a fully-within design: (1) wake, (2) 10-min nap, (3) 30-min nap, and (4) 60-min nap. Each performed a 10-min cognitive battery assessing subjective sleepiness, mood, speed of processing and sustained attention at 5-time points: a pre-nap baseline, and at intervals of 5, 30, 60 and 240 min post-nap. To assess memory encoding, participants encoded pictures 90 min after the nap and retrieved them after a 210-min delay.

Results: General linear models were used to compare post-nap test performance relative to pre-nap between the wake control and each nap condition, as well as memory encoding accuracy and retrieval performance between wake and the nap conditions ($N = 20$). The 10-min nap resulted in the least sleep inertia, but cognitive benefits were not sustained beyond 60-min post-nap (30, 60-min intervals: ps < 0.05, 240-min interval: $p = 0.28$). For the 60-min nap, despite significant sleep inertia on the speed of processing, benefits for subjective sleepiness and mood lasted up to 240 min post-nap (30, 60, 240-min intervals: ps < 0.05). The 30-min nap showed minimal sleep inertia that did not affect later improvements to sustained attention, benefits of which were maintained up to 240 min post-nap (30, 60, 240-min intervals: ps < 0.05). Further, only the 30-min nap boosted memory encoding (A') compared to wake (nap condition: $\chi 2 = 7.74$, $p = 0.05$, 30-min nap vs. wake: $t = 2.84$, $p < 0.01$).

Conclusions: These preliminary findings suggest that a 30-min nap may achieve a balance between practicability and timely benefit, making it a suitable nap duration for students and workers.

Disclosure: No

P650 | Neural mechanisms of memory suppression are impaired by sleep deprivation

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Introduction: Intrusive thoughts occur when everyday events trigger the retrieval of memories for aversive experiences. In previous work, we showed that the ability to suppress unwanted memories when confronted with reminders is impaired by sleep deprivation. Memory suppression is orchestrated by the right dorsolateral prefrontal cortex (rDLPFC), which, via top-down inhibitory pathways, downregulates memory retrieval operations in hippocampus. In the current study, we tested the hypothesis that sleep deprivation impairs this memory suppression network, and thereby gives rise to intrusive thoughts.

Methods: Participants learned face-scene associations before a night of sleep or total sleep deprivation. The next morning, participants were presented with face cues while undergoing functional magnetic resonance imaging (fMRI) and were instructed to actively retrieve or suppress the corresponding scenes. We carried out region of interest (ROI) analyses on an area of rDLPFC that has been heavily implicated in inhibitory memory control, and right hippocampus, to determine the impact of sleep deprivation on the neural correlates of memory suppression.

Results: Sleep deprived participants ($N = 36$) were unable to suppress face-scene associations as effectively as well-rested participants ($N = 34$, $p < 0.05$), replicating our previous behavioural finding that sleep loss leads to deficient control over intrusive thoughts. Critically, sleep deprivation (vs sleep) led to weaker engagement of rDLPFC during memory suppression (vs retrieval), but stronger engagement of right hippocampus (ROI analysis; $p < 0.05$, corrected), suggesting that rDLPFC was unable to downregulate hippocampal retrieval operations following an absence of sleep.

Conclusions: Our findings suggest that an impairment of top-down inhibitory memory control by rDLPFC is a mechanism by which sleep deprivation gives rise to intrusive thoughts. These findings could have important implications for our understanding of psychiatric disorders associated with intrusive symptomatology and co-occurring sleep disturbances.

Disclosure: No

P651 | cardiac responses to auditory deviants track variations of hierarchical perceptual processing during sleep

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Objectives: Embodied cognition proposes that visceral signals play a fundamental role in perceptual processing. The evidence showing that variations in arousal can be tracked by modulations of cardiac responses to violations of hierarchical auditory expectations have come so far from pathological low arousal states (Raimondo et al., 2017). We study this question during sleep by investigating cardiac responses to auditory deviants in a local-global paradigm - a modified version of the classic oddball.

Methods: We re-analyzed a dataset of 23 healthy adults (18–35 years old) who heard the local-global paradigm while having a morning nap (Strauss et al., 2015). We tested cardiac modulations after auditory deviants by comparing the time difference between the R-peak of the heartbeat before and after the onset of auditory deviants according to previous methodology (Raimondo et al., 2017).

Results: We found differences in cardiac responses before and after the onset of deviants depending on the hierarchical level of prediction and arousal state (3-way repeated measures ANOVA, triple interaction: $F(3,196) = 3.92$, $p = 0.010$). We replicated previous findings that no cardiac modulations are observed after auditory deviants in wakeful subjects (Student's t-test for local: $t(21) = -0.19$, $p = 0.848$, global: $t(21) = 1.93$, $p = 0.134$; corrected for multiple comparisons) (Raimondo et al., 2017). No modulations of cardiac responses were also observed in deep NREM sleep (local: $t(5) = 0.59$, $p = 0.578$, global: $t(5) = -1.18$, $p = 0.578$; corrected for multiple comparisons). However, an acceleration of the heartbeat was found in light NREM and REM sleep after local deviants (light NREM: $t(15) = -3.67$, $p = 0.004$, REM: $t(8) = -2.51$, $p = 0.036$; corrected for multiple comparisons), but not after global deviants (NREM: $t(15) = 1.26$, $p = 0.735$, REM: $t(8) = 1.26$, $p = 0.488$; corrected for multiple comparisons).

Conclusions: Cardiac modulations to violations of auditory expectations during sleep are consistent with observations at the cerebral level that show a preservation of low-level hierarchical predictions but an absence of high-level hierarchical expectations in the light NREM sleep and REM sleep stages (Strauss et al., 2015). Our results thus confirm that cardiac modulations can track the variations of hierarchical perceptual processing during sleep.

Code and data frames for statistical analyses can be accessed here: https://gitlab.uliege.be/Matthieu.Koroma/sleep_localglobal

Dr. Mélanie Strauss and Dr. Athena Demertzi are co-last authors.

Disclosure: No

P652 | No benefit in memory performance after nocturnal targeted memory reactivation coupled with theta transcranial alternating current stimulation

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Introduction/Objectives: Sleep plays a beneficial role in the process of memory consolidation, presumably due to memory reactivations in hippocampal and neocortical brain areas during non-REM sleep. Inducing memory reactivations by presenting external reminder cues (targeted memory reactivation, TMR) has been proven effective in enhancing consolidation during sleep. Moreover, several studies suggest that theta activity is an important neural correlate of a successful reactivation of memories by TMR. Here, we examined the causal role of theta oscillations for TMR by using transcranial alternating current stimulation (tACS) applied during non-REM sleep.

Methods: 40 healthy subjects learned word-pairs before going to bed. During non-REM sleep, we applied theta-tACS during TMR, either in a continuous manner (blocks of 9 min) or time-locked shortly after the reminder cues (2 s). In both groups, theta-tACS was applied simultaneously over the prefrontal cortex and the hippocampus and compared to a control stimulation (23 Hz). Each stimulation was applied during one of the two first sleep cycles, the order being randomised.

Results: In contrast to our prediction, repeated measure analyses of variances revealed no frequency-specific benefit of theta-tACS coupled with TMR during sleep on memory performance, neither for continuous nor time-locked stimulation. In fact, both stimulation protocols blocked the TMR-induced memory benefits during sleep, resulting in no memory enhancement by TMR in both the theta and control conditions.

Conclusion: We conclude that tACS might have an unspecific disturbing effect on reactivating memories during sleep by TMR. Alternatively, the specific stimulation montage might have led to a desynchronisation of the hemispheres, leading to detrimental effects on the consolidation of reactivated memories.

Disclosure: No

P653 | Sleep adaptation processes during non-consecutive nights in familiar and unfamiliar environments

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Objective/ Introduction: Sleep during the first night in an unfamiliar environment is associated with reduced sleep quality and changes in sleep architecture. This so-called First Night Effect (FNE) is well-established in sleep research and best examined for two consecutive nights. However, too little attention has been paid to the adaptation processes in non-consecutive nights. This is of high interest as in

many sleep experiments adaptation nights, which are implemented to control for the FNE, take place several days before the experimental sessions.

Methods: In order to fill this scientific gap, we examined adaptation processes over four non-consecutive nights. All nights were one week apart. In the first study, 45 subjects spent four nights in the sleep laboratory. Within the second study, 30 subjects spent two nights in the sleep laboratory, and two nights at home in a counterbalanced order. During all nights, sleep was recorded using mobile polysomnography.

Results: In both experiments, repeated measures analysis of variances revealed that sleep onset latency (SOL) was longer in the first and the second night compared to the following nights. Additionally, an FNE was observed for wake time after sleep onset. In other sleep parameters (e.g., Slow Wave Sleep (SWS) and sleep stage N2), no FNE was detectable. Interestingly, Experiment 2 showed an adaptation advantage when sleeping first at home: The SOL of the first night in the sleep laboratory was not significantly enhanced, when participants already slept at home with the mobile recording setup.

Conclusions: Our results indicate that sleep parameters (e.g., SOL) adapt over non-consecutive nights, whereas SWS and N2 do not show a significant adaptation. We conclude that non-consecutive adaptation nights are able to control for some sleep parameters. Moreover, adaptation nights in familiar environments (e.g., at home) might be interesting alternatives for upcoming sleep studies.

Disclosure: No

P654 | Brain activations time locked to slow wave-coupled sleep spindles correlates with intellectual abilities

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Introduction: Sleep spindles (SP) are one of the few known electrophysiological neuronal biomarkers of intellectual abilities. Spindles can occur as part of slow wave (SW) – SP – hippocampal ripple complexes, or in isolation. Spindle-related cerebral activation of specific high-order regions are specifically correlated with Fluid Intelligence, but not Crystalized Intelligence. Whether this relationship is specific to uncoupled SP, uncoupled SW or SW-SP complexes remains to be explored.

Methods: A total of 28 participants age 20–35 years were included in the study. All participants completed the Cambridge Brain Sciences (CBS) tests online to yield measures of Fluid and Crystalized Intelligence.

Polysomnographic (PSG) recordings were obtained using a 64-channel MRI-compatible EEG system. Spindles were automatically detected from Fz, Cz and Pz using an established individualized threshold approach. Slow waves were automatically detected from the same channels during movement artifact-free NREM sleep using a period amplitude analysis detection algorithm. Spindles were marked as coupled SW-SP complexes when the spindle occurred within the 4-s time window around the slow wave negative peak.

A 3.0 Tesla MRI system were used to obtain brain images. The onset for each coupled SW-SP, uncoupled spindle and slow wave events were identified from the EEG and considered events of interest in the MRI analyses. Pre-defined ROIs were built using WFUpickatlas based on the previous studies. Activation beta values were extracted for each ROI and event type using Marsbar. Linear regression analyses were conducted to explore the relationship between CBS tests scores and the brain activation for each event type.

Results: Activation of the putamen time-locked to SW-SP coupled events was positively associated with Fluid Intelligence ($sr = 0.415$, $p = 0.039$) over-and-above Crystallized Intelligence. A negative association was found between Fluid Intelligence and hippocampal activation, related to only uncoupled slow waves ($sr = -0.414$, $p = 0.040$).

Conclusions: Our results suggest that SW-SP coupling is mainly responsible for the relationship between interindividual differences in activation of the putamen and Fluid Intelligence. The negative association for the hippocampus could indicate a more trait-like refractory mechanism, in which this relationship remains negative in the absence of new information to process.

Disclosure: No

P655 | Comparing the effects of sleep and wake on consolidation of recently acquired schematic knowledge structures

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Objectives: The independent contributions of sleep to declarative memory consolidation as well as the benefits of schemas to memory are well established. Here we investigated if sleep benefits the consolidation of schemas across 12 and 24 h intervals.

Methods: Our sample comprised of 53 adolescents (age: 15–19 year) divided into the wake and sleep groups. For schema-learning we used a protocol based on transitive inference (i.e., If B>C and C>D then B>D). Participants were tested immediately after learning and following 12-h, and 24-h intervals of wake or sleep for both the adjacent (relational memory) and inference pairs: (e.g.: B-D,B-E,C-E). Change in memory following the respective 12-h and 24-h intervals was analysed using a mixed ANOVA with schema (schema, no-schema) and pair-type (adjacent, inference) as within-subjects factors and consolidation condition (sleep, wake) as the between-subjects factor.

Results: For the 12-h interval, we found significant main effects of consolidation condition (sleep, wake), as well as a significant consolidation condition (sleep, wake) by schema interaction, whereby schema-related memory was significantly better preserved in the sleep condition compared to wake. Performance particularly improved for the schema-related inference following sleep. We also found that

higher number of sleep spindles predicted the enhanced overnight schema-driven memory benefits, indicating that spindles play a role in transformation of schema-related memories. After 24 h, the memory benefit of sleep was diminished such that the trend remained but became statistically non-significant.

Conclusions: Our results suggests that there is an early benefit of sleep on stabilisation of a newly acquired schema compared with wake that may be associated with higher spindle density. However, this advantage may be diminished over 24 h and beyond.

Disclosure: No

P656 | Modifications of oscillations related to sleep-dependent memory consolidation in breast cancer patients

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Objectives/Introduction: Our aim was to compare characteristics of sleep oscillations related to memory consolidation between breast cancer (BC) patients either treated or not by endocrine therapy, and healthy controls (HC).

Previous reports have shown sleep structure modifications in BC patients that may affect sleep-dependent memory consolidation through modifications of slow waves and spindles characteristics. Moreover, neuroimaging studies in BC patients have consistently shown structural and functional modifications in prefrontal cortex that may alter slow waves generation and spindles occurrence particularly at frontal sites of the scalp.

Methods: Thirty-five BC patients, treated either by radiotherapy only (n = 17, ET-) or with radiotherapy and endocrine therapy (n = 18, ET+), and 21 HC, matched in age (ET-, 63 ± 4; ET+, 60 ± 6; HC, 62 ± 4, years old) and education levels (ET-, 11.24 ± 3.28; ET+, 12.31 ± 3.32; HC, 11.76 ± 1.73, years) underwent polysomnography at home. None of patients had received chemotherapy, and radiotherapy was finished since at least 6 months. During Stages 2 and 3, we quantified spindles both in centro-parietal (fast spindles, FS) and frontal electrodes (slow spindles, SS) and slow waves (SW) in central and frontal electrodes, using SpiSOP software. We conducted ANCOVA analyses using apnea/hypopnea index as a covariate followed by Tuckey's post hoc for each variable of interest.

Results: During Stage 2, SS did not differ between groups while FS's density and duration were lower in ET+ compared to ET- and HC (main groups effects: ps < 0.05 for C4 and P4, ps < 0.07 for C3 and Cz). During Stage 3, SW's density was lower for frontal electrodes (main group effects: ps < 0.05 for *F4*, *F8*, *F3*, *F7*, ps < 0.01 for FP1, FP2 and Fz) in both patients' groups compared to HC.

Conclusions: Here, we show SW modifications at frontal sites in BC patients compared to HC. Moreover, centro-parietal spindles were modified in patients treated with endocrine therapy. SW generation seems thus impaired in BC patients which could have deleterious impact on co-occurence with spindles in centro-parietal electrodes, leading to lower sleep-dependent memory consolidation. Such a conclusion is currently being tested and will be presented along the above results.

Disclosure: No

P657 | Signaled night awakening and its association with psychomotor development, executive functioning, social information processing, and socio-emotional development in infancy

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Objective: Sleep is an important part of healthy development and shown to affect multiple developmental outcomes. It is not clear, however, whether sleep disruptions in infancy are associated with different aspects of development.

Methods: Children with (waking group n = 75, ≥3 awakenings/night) and without signalled night awakenings (nonwaking group n = 63, ≤1 awakening/night) at 8 months of age were studied within the CHILD-SLEEP birth cohort at 8 and 24 months of age. Psychomotor development was studied with Bayley Scales of Infant and Toddler Development. Executive functioning (EF) was investigated with an eye-tracking method and with behavioural tasks and a parent-rating of EF. Social information processing was studied with eye-tracking and socio-emotional development was investigated with parent-rating.

Results: Linear mixed models (LMM) revealed that the waking group had lower performance in an eye-tracking EF task at 24 months of age than nonwaking group. The two groups did not differ with parent-ratings of EF or in behavioural EF tasks at 24 months of age. In addition, LMM revealed that the waking group showed a different longitudinal pattern of attention to emotional faces than the nonwaking group. The waking group had more parent-reported dysregulation problems and lower social competence than the nonwaking group at 24 months of age. Finally, according to LMMs, the two groups did not differ in psychomotor development (cognitive, language or motor functioning) at 8 or 24 months of age.

Conclusions: According to our results, signalled night awakening seem to be particularly related to higher-order cognitive functioning and social or emotional information processing and behaviour in infancy. The differences in development were not witnessed in psychomotor

development of the child. According to the results, it seems that signalled night awakening is a larger problem of self-regulation that possibly predisposes children to later developmental challenges.

Disclosure: No

P658 | Poor false sleep feedback does not affect pre-sleep cognitive arousal or subjective sleep continuity in healthy sleepers: a pilot study

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Objectives/introduction: Modern wearable devices are commonly used to measure sleep and can calculate a numerical metric of sleep quality (sleep feedback). This is intended to allow users to monitor and improve their sleep, however, this is likely to negatively affect pre-sleep cognitive arousal and subjective sleep. The aim of this study was to examine if poor false sleep feedback, derived from subjective sleep diaries, negatively affected pre-sleep arousal and subjective sleep continuity. It was expected that poor sleep feedback would: (1) increase pre-sleep cognitive arousal, and (2) negatively affect subjective sleep continuity, relative to good sleep feedback.

Methods: On Day 0, healthy good sleepers ($n = 54$) were randomly allocated to receive either good ($n = 25$) or poor sleep feedback ($n = 24$). Pre-sleep cognitive and somatic arousal was measured prior to sleep using the Pre-Sleep Arousal Scale (Nicassio et al., 1985). Subjective sleep continuity was measured using Consensus Sleep Diaries (CSD-M; Carney et al., 2012). Measures of subjective sleep continuity (TST, TIB, SE%, NWAK & WASO) were derived from the CSD-M. Participants completed the PSAS on Night 0, Night 7 and Night 14. The CSD-M was completed daily (Days 1–7, and Days 8–14).

Participants in the good sleep feedback condition were shown the statement: "Congratulations! Based on your data, your sleep score is 92/100. Well done!", and participants in the poor sleep feedback condition were shown the statement: "Sorry! Based on your data, your sleep score is: 22/100".

PSAS somatic and cognitive subscores were compared between groups using a 2 (group) × 3 (time point: Night 0, Night 7, Night 14) mixed analysis of variance (ANOVA). CSD-M sleep continuity values were compared between groups using 2 (group) × 2 (time) mixed ANOVAs.

Results: There were no differences in pre-sleep cognitive or somatic arousal (p-values > 0.05), or sleep continuity (adjusted p-values > 0.008)

Conclusions: Unexpectedly, poor sleep feedback did not affect pre-sleep cognitive arousal or sleep continuity relative to good sleep feedback. These results indicate that occasionally monitoring poor sleep feedback is unlikely to disrupt cognitive arousal or subjective sleep in healthy sleepers.

Disclosure: No

P659 | The influences of circadian rhythm dysregulation on the academic performances of medical students

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Introduction: The study aims to study the influence of circadian rhythm on the performances of medical students.

Methods: This research represents a literature review based on 12 articles selected from the databases PUBMED published in the framework 2010-2022 using the keywords: "Circadian rhythm and medical students".

Results: Factors that affect circadian rhythm include personal habits, diet, physical condition, ambient temperature, background sound, light, medications etc. Their sleep-wake cycle is characterized by insufficient sleep duration, delayed onset of sleep and drowsiness during the day. Also, there are a lot of eveningness students and their academic performances a lower than morningness ones. The students with short sleep duration have a lower academic performance compared to those who have a normal duration of sleep.

Conclusion: The medical students are exposed to sleep deprivation and delayed onset of sleep, both are decreasing the quality of learning through circadian rhythm dysregulation. The correction of these wrong behaviors in the population of medical students would improve their circadian rhythm and as a result and their academic performances.

Disclosure: No

P907 | Sleep and mood problems affect the ability to recognize faces during the lock down by COVID-19

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Objectives/Introduction: Crime victims often experience sleep and mood disturbances in the post-crime period. When it comes to studying the impact of these variables on judicial processes, the science of eyewitnesses has faced a practical and ethical difficulties, since it is impossible to reproduce the conditions of a real crime in the laboratory. In this sense, the situation of isolation derived from the Covid-19 pandemic presents a particularly good opportunity to observe how depression, anxiety and sleep loss affect the ability to recognize faces and recount events, since these afflictions have increased significantly in the general population.

Methods: To this end, we showed the participants a video containing a violent situation. Subsequently, they carried out simple and repeated line-ups and performed episodic memory tasks. Scales were used to determine the degree of emotional symptomatology and loss of sleep quality.

Results: The resulting sample was made up of 72 subjects. The results showed that those subjects with a better quality of sleep had a better performance in the Final line-up (if they always had access to the perpetrator), and a better chronological order. Additionally, anxiety was shown to have a mixed effect, favoring memory if it is high in encoding, but detrimental if it is high in recall. Finally, the most depressed participants showed a better performance in recognition and testimony, than those with low depression.

Conclusions: The findings of this work accompany some specific postulates present in the bibliography, about how sleep favors the coding and consolidation of information, depression usually leads to biases in processing, and anxiety has differential effects, depending on its time of appearance.

Disclosure: No

P908 | The impact of sleep pressure on the formation of false memories due to fake news exposure: preliminary results

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The term "fake news" gained popularity and its used spread after Donald Trump accused the press of fabricating fake news against him in the context of the 2016 United States presidential election campaign, but this kind of information has always existed and became more dangerous with the extension of internet use. In the last decade, this phenomenon has been studied from a novel perspective, finding that fake news can be responsible for the generation of false memories and this effect increased significantly when the information was consistent with the ideology. In addition to this cognitive variable, the optimal functioning of these capacities depends directly on the delicate homeostatic balance of our brain. The saturation of the cortical and limbic areas usually occurs after an arduous day of learning. Therefore, our main objective of this work was to analyze if there is an interaction between the congruence effect and the sleep pressure that people have when performing a fake news implantation task. For this, we used a sample of 250 psychology students and graduates who had defined dichotomous positions of their academic orientation. It was decided to use this population because, In the field of psychology in Argentina, there is an extensive theoretical debate between psychoanalysis, widely rooted in society, and evidence-based practices such as cognitive behavioral therapy or neurosciences. The sample was divided between the participants who preferred one theory and another, and they were also divided into low or high sleep pressure. Participants were exposed to half of fake news that affected one theory and the other half to another. A trend was observed indicating that in high sleep pressure the group that supports evidence-based practices generates more false memories of the news that harm the rival, but this effect is not observed in the other type of fake news. This result may not be observed due to the smaller sample of psychoanalyst adepts that was collected. In the future it is necessary to expand this sample. These preliminary results partially suggest that there is a detrimental effect of sleep pressure on the generation of false memories.

Disclosure: No

10: DREAMING

P053 | The matter dreams are made of: a dictionary-based analysis and categorization of dream reports

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Introduction: Verbal reports represent the primary source of insight into oneiric activity. Computational linguistic methods could be used to extract and objectively quantify information about dream contents in an automatized and reproducible manner. Aim of this study was to investigate linguistic features of dream reports and the possible existence of dream prototypes in the healthy adult population.

Methods: Eighty-six healthy Italian native language speakers (50F, 21–64 y) filled out questionnaires assessing sleep quality (Pittsburgh Sleep Quality Index, PSQI), and spontaneous/deliberate mind-wandering (MW-S/D). Then, they had to record a report of their last dream experience each morning upon awakening for 14 days. We performed a dictionary-based content analysis on 718 dream reports using the Italian dictionary of *Linguistic Inquiry and Word Count* (LIWC). Specifically, we applied a word-by-word classification of lexical items into 15 distinct categories, including first-person perspective, third-person perspective, affective processes, cognitive processes, sensory processes, inhibition, social interactions, time, space, movements, and body. For each dream and category, relative word frequency counts were obtained. The existence of dream clusters was assessed using a k-means algorithm based on cosine distance. The optimal number of clusters was defined according to the silhouette criterion.

Results: Dream reports clustered around ten semantic dimensions independently of subjects' linguistic idiosyncrasies. Seven clusters polarized to single specific dimensions: social interactions (11%), third-person plural (8%), space (9%), time (9%), negative emotions (9%), body (9%), first-person plural (11%). Two clusters polarized to two dimensions: one to positive emotions and third-person singular (8%), and one to first-person singular and present (9%). Finally, one cluster polarized to multiple dimensions (16%). Spearman correlation

analyses evidenced a negative correlation of PSQI scores with references to negative emotions and third-person singular perspective, a positive correlation between MW-S scores and references to time, past and movement and a negative correlation between MW-S and present (all $p < 0.05$).

Conclusions: Present results indicate the existence of specific dream prototypes according to objective and generalizable semantic dimensions and illustrate the potential value of automated linguistic analyses for the analysis of oneiric experiences. The same analyses could allow to identify and quantitatively characterize alterations of dream experiences in clinical populations.

Disclosure: No

P054 | Nightmares, mindfulness and lucid dreaming

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Objectives/Introduction: A theoretical and empirical association between lucid dreaming and mindfulness, as well as lucid dreaming and nightmares has previously been observed; however, the relationship between nightmares and mindfulness has received surprisingly little attention, especially when considering the increasingly reported benefits of mindfulness on well-being.

Methods: Here, we present the findings of two studies exploring the relation of nightmare frequency and distress with two components of mindfulness, termed presence and acceptance, as measured by the Freiburg Mindfulness Inventory (FMI). Lucid dreaming frequency was also assessed. Study 1 ($N = 338$) consisted of a low percentage of frequent lucid dreamers whereas Study 2 ($N = 187$) consisted primarily of frequent lucid dreamers that used lucid dream induction training techniques and meditation.

Results: Bivariate correlation and ordinal regression was conducted in order to assess the data. In both studies, mindfulness, was negatively correlated to nightmare frequency and distress, with mindful acceptance (Study 1: $\beta = -.127, \chi 2 = 17.86, p < 0.001$; Study 2: $\beta = -.084, \chi^2 = 4.73, p = 0.03$) showing a more robust association with nightmare frequency in comparison to mindful presence (Study 1: $\beta = -4.04e\text{-}4, \chi 2 = 9.86e\text{-}5, p = .992$; Study 2: $\beta = 0.098, \chi^2 = 3.07, p = 0.08$). Moreover, nightmares were less frequent in participants who reported practicing meditation ($n = 145$; non-meditators, $n = 42$; $U = 2050, p = 0.001, r_{rb} = 0.33$). Meditation expertise and the practice of lucid dreaming induction techniques were inversely related to nightmare frequency. Finally, in Study 2 a positive correlation between lucid dreaming frequency and mindfulness was apparent, which is in congruence with the literature.

Conclusions: The present findings support the notion that wakeful mindfulness is associated with the quality of dreams and extend previous research by suggesting a disentangled role of the two facets of mindfulness in dream variation and more specifically nightmare related variables. However, this association remains open for experimental manipulation, the result of which could have clinical implications such as the use of mindfulness based prevention and intervention techniques for nightmare prone individuals.

Disclosure: No

P372 | Tracking sleep during the menstrual cycle: a study combining smart watch and self-report data

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Sleep plays an essential role in a person's physical and cognitive functioning. Like numerous other bodily functions, sleep is reportedly to be strongly affected during the premenstrual phase of the menstrual cycle. Many women report a poor quality of sleep, having difficulty falling asleep, interruption of sleep and an increase in dreams and change in dream content. The current study was conducted with sample of 27 pre-menopausal women aged between 18 and 50 years, to understand how the hormonal changes experienced during the menstrual cycle affect objective and subjective characteristics of sleep quality, as well as dreams and their content. The participants were provided with a smartwatch to monitor the objective sleep characteristics and filled out a brief questionnaire about their hormonal status and subjective sleep experience upon waking for 7 days consecutively. For the preliminary analyses, we have grouped the consecutive daily measurements into early-premenstrual, late-premenstrual and menstrual phases based on the hormonal status of the participants. Longitudinal mixed models were built in *R* for each measurement on sleep quality. The only predictor was the hormone status coded as 1 early-premenstrual, 2 late-premenstrual and 3 menstrual phase. It was seen that hormone status 3 (menstrual phase) had a significant effect (p-value < 0.05; compared to hormone status (1) on subjective reports on dream where participants reported a higher degree of dream recall and an increased bizarre dream content. The objective and subjective parameters of sleep, however, were not impacted by change in the female hormonal status. These results suggest that female hormonal status may alter the subjective dream recall performance without a significant effect on sleep duration, sleep stage patterning and subjective assessment of sleep quality.

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Disclosure: No

P373 | Trait predictors of dream recall frequency in healthy adult individuals

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Introduction: Understanding potential sources of inter-subject variability in dream recall frequency (DRF) has fundamental implications for the study of dream neurophysiology. Here we investigated the possible impact of demographic variables, attitude towards dreaming (ATD), and memory abilities on DRF.

Methods: One-hundred healthy Italian native language speakers (39M, 21–65 y) were asked to fill out questionnaires assessing their general health, sleep quality, mental imagery, DRF, and ATD. The latter explored the general meaning and significance assigned by participants to dreams (Bulkeley, K., Schredl, M., Int. J. Dream Res., 2019). Then, participants had to record a report of their last dream experience each morning upon awakening for 14 days. If subjects had the perception of having dreamt but could not remember any feature of the experience, they had to refer this perception ("white dream"). If they did not have the feeling of having dreamt, they just had to record this ("no recall"). Afterwards, we measured participants' visuospatial and verbal memory through the Rey-Osterrieth Complex Figure and the Babcock Story Recall Test, respectively. We performed a multiple linear regression including DRF as the dependent variable and subjects' age, gender, ATD, and visuospatial and verbal memory as independent variables.

Results: We estimated a daily DRF of 0.58 ± 0.26 (range 0.07–1.00). The daily frequency of "no recall" was 0.32 ± 0.24 (range 0–0.93), while it was 0.10 ± 0.12 (range 0–0.43) for white dreams. A comparison of DRF estimated from provided reports and self-reported DRF revealed a significant correlation between the two measures (Spearman's correlation; $r = 0.47$, $p < 0.0001$). A stronger statistical association was found when white dreams were counted in the report-based estimates ($r = 0.53$, $p < 0.0001$), suggesting that measures of self-reported DRF might be influenced by both recalled and white dreams. The multiple regression analysis ($F_{(5,81)} = 4.69$, $p < 0.0001$, $R^2 = 0.2$) revealed significant effects of ATD ($p = 0.0005$) and verbal memory ($p = 0.004$) on DRF. Other examined variables showed no significant effects (all $p > 0.15$).

Conclusions: Present results indicate that ATD and verbal memory are strong predictors of DRF. As such, their assessment should be considered in studies on dream neurophysiology for which inter-subject variability might represent a relevant confound.

Disclosure: No

P374 | Refining our picture of lucid dreaming: an EEG mega-analysis

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Introduction: Lucid dreaming, the phenomenon of becoming aware of the current dream state during ongoing sleep, rarely occurs spontaneously, and reliable induction approaches are still lacking. Accordingly, the neuroscientific description of lucid dreaming is still sparse, with EEG studies relying on very small sample sizes.

Methods: Aiming to address this problem, we integrate in this work EEG datasets from different laboratories that allow direct comparisons of waking, REM, and lucid dream episodes within a night recording. This resulted in the most comprehensive total EEG data set in lucid dream research to date ($N = 33$; each at least 6 electrodes) and a standardized preprocessing pipeline that also excludes the influence of micro saccades on the EEG signal.

Results: Using methods comparable to previous investigations, we find no significant differences between lucid dream episodes and non-lucid REM sleep in classical spectral bands. This stands in contrast with previous EEG studies.

Conclusions: Considering the heterogeneity between previous spectral findings from single studies with small sample sizes, it is possible that lucid dreaming does not represent a unified spectral construct. Follow-up studies should increasingly address spatial filtering of high-resolution EEG data (e.g., beamforming) as well as potential non-stationary correlates that might be revealed, for example, by temporal signal decomposition. For future studies, we propose to instruct a "pure" metacognitive/meditative state during lucid dreaming to obtain a signal as free as possible from specific cognitive and motor potentials. To support future efforts to understand the neurophysiology of lucid dreaming, we also provide a freely available and automated preprocessing pipeline that enables unproblematic integration and exploration of EEG lucid dream datasets.

Disclosure: No

P663 | Decoding of motor activity during lucid dreaming

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Introduction & Objective: While brain-computer interface (BCI) setups help locked-in patients regain communication ability, improvements to their success are limited by a lack of ecologically valid training data. Lucid dreaming, a natural state of meta-cognitive awareness during sleep, shows a striking similarity to the locked-in syndrome as it combines full possession of mental capabilities with near-complete

muscle atonia. In this study, we set out to test whether decoding subjective motor actions during lucid dreaming is feasible. To this end, we trained BCI models on real and imagined hand clenches to classify events of dreamed hand-clenching, which were signalled from within the lucid dream via eye movements.

Methods: High-density EEG (64 channels) with EMGs and EOGs were recorded from $N = 9$ subjects. $N = 4$ provided signalled events of subjective hand clenching during sleep. We trained BCI models individually based on performed real and various forms of imagined awake hand clenches. [description pipeline]. Classification performance of these models (decoding left vs. right-hand clench) was tested during lucid dreaming based on voluntary eye signal events as read from sleep EOGs.

Results: We achieved decoding of sequential dreamed hand-clenches with 88% and 100% accuracy in 2 subjects. On the individual level, decoding results for lucid execution of hand clenching differed significantly from adjacent pre/post dummy time intervals ($p < 0.05$, Wilcoxon signed-rank test).

Conclusions: This study presents a BCI pipeline that can predict the laterality of dreamed hand clenches from neural signals with high accuracy. Given the potentially infinite behavioural repertoire of subjective actions available during lucid dreams, these results open future opportunities to decode more comprehensive motor activities, which will likely prove invaluable for decoding motor imagery in clinical locked-in states.

Disclosure: No

P664 | Influencing dreams through sensory stimulation: a systematic review

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Introduction: It is commonly acknowledged that while we sleep, we enter a state of disconnection from our environment, yet instances of external sensory stimuli affecting the course of dreams have been reported for centuries. Hence, it remains unclear how the interplay between internal cognitive resources and external stimuli may define conscious experiences during sleep. Investigating this interaction could help us understand the mechanisms of sensory disconnection and dream generation. Therefore, we performed a systematic review to evaluate the evidence regarding the influence of sensory stimulation during sleep on dream activity.

Methods: A literature search was carried out in February 2021 from the following electronic databases: PsycNET, PubMed, Science Direct, and Scopus. We included any experimental study reporting dream data collected from a confirmed sleep episode during which visual, auditory, olfactory, gustatory, or somatosensory stimulation was performed. Studies focusing exclusively on lucid dreaming or using neuromodulation techniques were excluded.

Results: The search inquiry yielded a total of 8293 initial entries, of which 462 were duplicates. Out of the remaining 7831 screened publications, 34 met the inclusion criteria: 9 reported data related to somatosensory stimulation, 17 to auditory stimulation, 7 to olfactory stimulation, 3 to visual stimulation, and 1 to multi-modal stimulation (audio-visual). The reported probability of sensory-dependent dream changes (SDDC) ranges from 0% to ~80%. Such variability likely reflects the large heterogeneity of experimental and methodological approaches among the selected studies, both across and within sensory modalities. Indeed, the adopted definition of SDDC varied significantly between investigations, namely including cases of direct incorporation, indirect incorporation, and/or non-stimulus-specific modulations. Moreover, sample sizes were relatively small, especially in older studies ($m = 15.69 \pm 13.29$, range 3–60). Besides, the neural correlates of SDDC and the potential role of arousal have not been systematically evaluated.

Discussion: Our review identified a lack of consistency among the current evidence about the occurrence and underlying mechanisms of SDDC, which urges the need to provide new experimental guidelines to extend our knowledge within this field of research. Recommendations for future investigations include using larger sample sizes, standardising SDDC definition criteria, and systematically assessing EEG data regarding specific SDDC correlates.

Disclosure: No

P665 | The activation-synthesis hypothesis of dream generation - a proposed update

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Objectives/Introduction: The Activation-Synthesis Hypothesis is a neurophysiological model of dreaming proposed by Hobson and McCarley (1977). According to the model, dreaming results from the stimulation of the cortex by PGO waves originating from the brain stem, thereby randomly activating cortical memory fragments (Activation process), which in turn are synthesized by the cortex into a semi-coherent dream narrative (Synthesis process). The model thus proposes that dream images are cognitive correlates of the sleeping brain's self-organization. However, it does not address the forebrain mechanisms and the regions involved in the synthesis process.

Methods: A narrative literature review was conducted, synthesizing the sleep and dream literature with more recent lesion and neuroimaging studies from the memory field, thus modeling the synthesis process of the Activation-Synthesis Hypothesis.

Results: Using different neuroimaging modalities, including PET, fMRI, and MEG, several studies showed that the mPFC and hippocampus are highly active during REM sleep when most vivid dreams are

experienced. A more recent line of studies has established that both the hippocampus and medial prefrontal cortex (mPFC) are part of the brain network involved in constructing novel imagined scenarios and simulating possible future events during wake, a process which is very similar to the synthesis process in ASH. Recent neuroimaging findings suggest that the mPFC drives activity in the hippocampus and initiates reconstructing/constructing coherent scene imagery. Lesion studies also showed that the hippocampus and mPFC damages significantly impact the ability to construct future events. Interestingly, only lesions in the white matter of the mPFC and not hippocampal lesions lead to the complete cessation of dream reports.

Conclusions: In this review and theoretical modeling approach, we propose that the mPFC is the ideal neuroanatomic candidate for the synthesis process in the Activation-Synthesis Hypothesis: both scene imagery construction and synthesis processes are constructive in nature and entail integrating information from memory into a coherent narrative. We, thus, suggest that the mPFC, which is responsible for the former process, is also the key region driving the latter.

Disclosure: No

11: SLEEP DEPRIVATION

P055 | Chemogenetic enhancement of cyclic adenosine monophosphate signaling renders hippocampal synaptic plasticity resilient to the impact of acute sleep deprivation

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Introduction: Memory for tasks that involve the hippocampus are particularly sensitive to sleep loss, and sleep deprivation also leads to deficits in hippocampal long-term potentiation (LTP). Previous work in our lab has found that sleep deprivation (SD) reduces levels of cyclic adenosine monophosphate (cAMP) in the hippocampus, and that the reduction of cAMP mediates the hippocampal memory deficit. There are a multitude of signaling cascades that are altered by SD in the hippocampus, and it is not known whether elevation of cAMP can prevent the deficit in LTP. Furthermore, it is not known when in SD that cAMP signaling begins to be affected, and whether the early or latter half of SD is more significant in terms of alterations in cAMP signaling.

Methods: C57BL/6J mice were sleep deprived by gentle handling for 5 h starting from the beginning of the light cycle (ZT0). To manipulate levels of cAMP in the hippocampus, we virally expressed the heterologous *Drosophila Melanogaster* Gαs-protein coupled octopamine receptor (DmOctβ1R) in hippocampal neurons. Viral control conditions received AAV-eGFP. Using this technique, we were able to increase cAMP levels in DmOctβ1R expressing neurons following systemic injection of the ligand, octopamine, at the ZT0 and ZT2.5. Immediately following sleep deprivation hippocampal slices were prepared for electrophysiological recordings.

Results: We found that two injections of octopamine during SD in DmOctβ1R mice prevents deficits in a long-lasting form of LTP ($n = 8$; 170.5 ± 17.74%) compared to the vehicle injection ($n = 8$; 115 ± 9.64%; $t(14) = 2.749$, $p = 0.016$). eGFP mice were not significantly different between vehicle and octopamine conditions ($t(16) = 1.219$, $p = 0.24$). Furthermore, a single injection of octopamine in DmOctβ1R mice sufficiently prevented deficits in L-LTP regardless of if it was administered at ZT0 ($n = 8$; 230.6 ± 16.87%) or ZT2.5 ($n = 8$; 182.8 ± 19.27%; $t(15) = 1.844$, $p = 0.085$).

Conclusion: This finding supports the view that decreased cAMP signaling acts as a central mediator for the effects of SD on hippocampal function. That either injection of octopamine was capable of preventing deficits in LTP was intriguing and possibly indicates that there is a critical level of cAMP lost that causes LTP deficit, and either injection maintains hippocampal cAMP above that point.

Disclosure: No

P056 | The effects of moderate sleep restriction on memory consolidation and interference in a real-life declarative learning task – preliminary results

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Objectives/Introduction: Here, we examined the effects of moderate sleep restriction (5 h sleep/4 consecutive nights) on a real-life declarative learning task with memory interference, that is, learning Spanish and corresponding Finnish vocabulary.

Methods: After an adaptation night (day 1), 15 healthy subjects (6 female) between 18 and 33 years ($M = 23.27$, SD = 4.30) were randomly assigned to a SLEEP DEPRIVATION ($n = 9$, 3 female) or a NORMAL ($n = 6$; 3 female, no deprivation) group. On day 5, they were asked to learn and retrieve 51 Spanish word-picture associations (SRET1). After sleeping for 5 h respectively 8 h, participants completed a second retrieval of the Spanish word-picture associations (SRET2), followed by learning and retrieving (FRET1) Finnish word-picture associations for a subset of 34 of the 51 pictures (i.e., memory interference). Subsequently, they performed another retrieval of the Spanish (SRET3) and Finnish (FRET2) words. On the following two days, all participants slept 8 h per night. On day 8, participants performed a final retrieval session of Spanish and Finnish vocabulary (SRET4 and FRET3).

Results: After an initial overnight improvement, behavioral results showed a steady deterioration of Spanish retrieval performance in the SLEEP DEPRIVATION group ($\chi^2(3) = 14.54$; $p = 0.002$) while there were no significant performance changes in the NORMAL group

(i.e., memory stabilization). Regarding sleep parameters, subjects of the NORMAL group with higher N3 slow oscillation up-state peak amplitudes showed better overnight memory change ($r_\rho = 0.886$, $p = 0.019$) and better memory retention after interference learning ($r_\rho = 0.986$, $p < 0.001$). In the SLEEP DEPRIVATION group, there were no correlations for overnight memory change. However, better memory retention after interference learning was related to higher N3 slow oscillation up-state peak amplitudes ($r_\rho = 0.766$, $p = 0.016$) as well as to higher NREM fast spindle activity at electrode position C4 ($r_\rho = 0.724$, $p = 0.028$) during post-learning sleep.

Conclusions: Our results show that a moderate sleep restriction of 3 h per night for four consecutive days can have detrimental effects on memory performance and retention. However, we demonstrate that slow oscillations and fast sleep spindle activity facilitate and prevent memory consolidation from interference in both sleep deprived and non-sleep deprived participants.

Disclosure: No

P057 | The impact of acute and chronic sleep deprivation on migraine-related phenotypes

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Introduction: There is a bidirectional link between sleep and migraine with poor sleep reported as both a migraine trigger and symptom. Orofacial allodynia, or hypersensitivity to a non-painful stimulus, is a commonly reported migraine symptom. This study aimed to determine whether acute and chronic sleep deprivation results in orofacial allodynia, and whether recovery sleep can reverse this.

Methods: Experiment 1: 24 C57/bl/6J mice were subjected to either 6 or 3 h of sleep deprivation using the gentle handling method, or no sleep deprivation ($n = 8$ per group) on three intermittent days (Day 1, 3 & 5). Experiment 2: 24 C57/bl/6J mice were subjected to 6 h of sleep deprivation using the gentle handling method, or no sleep deprivation ($n = 12$ per group) on three consecutive days (Day 1, 2 & 3). All mice were then allowed to sleep for 3 h on the final day after initial testing. Periorbital mechanical withdrawal thresholds were tested pre and post both deprivation and recovery sleep using the Von Frey assay.

Results: Experiment 1: mice which were sleep deprived for 6 h had significantly lower mechanical withdrawal thresholds than mice deprived for 3 h on Day 1 ($p = 0.033$), but not on Days 3 and 5. There was no significant difference between mice sleep deprived for 3 h and those not sleep deprived (all $p \geq 0.05$).

Experiment 2: sleep deprived mice had significantly lower mechanical withdrawal thresholds than non-sleep deprived mice compared to baseline ($p = 0.004$). This effect was maintained but not significantly exacerbated across days ($p = 0.508$). There was no significant difference between previously sleep deprived and non-sleep deprived mice after recovery sleep ($p = 0.538$).

Conclusions: These findings demonstrate that sleep deprivation leads to orofacial allodynia in mice. Moreover, this can be induced by a single instance of 6-h sleep deprivation and is maintained across consecutive days of deprivation. This effect can be reversed by brief recovery sleep. Thus, sleep deprivation may increase susceptibility to migraine symptoms including orofacial allodynia. Sleep should be explored as a potential therapeutic intervention for migraine.

Disclosure: Yes

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P058 | Effects of total sleep deprivation on manual spacecraft docking performance

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Objectives/Introduction: In space, sleep is disturbed by environmental, psychological and mission-related stressors. Therefore, sleep deprivation and disruption of circadian rhythm are highly prevalent among astronauts. Sleepiness has been shown to impair cognitive performance, especially vigilant attention. Constantly high levels of vigilance and operational performance are critical for safety-relevant tasks, for example, the manual docking of a spacecraft. In this context, we aimed to assess if sleep deprivation will affect performance not only in the *Psychomotor Vigilance Test* (PVT), but also in a complex operational task, the manual docking simulation *6df*.

Methods: Sixty-two participants (aged 18–39) completed the docking simulation *6df* and the PVT in two sessions, once after eight h of sleep and once after a night of total sleep deprivation, in counterbalanced order. The simulation started at moderate task difficulty and subsequently adapted difficulty to the participant's skill level. We analysed docking accuracy as well as the highest difficulty level participants achieved in each session. In addition, we assessed the impact of sleep deprivation on PVT reaction speed and the relationship between PVT and *6df* performance.

Results: Participants' docking performance was impaired significantly by sleep deprivation. Docking accuracy decreased during sleep deprivation compared to rested performance (linear mixed model, $p = 0.01$). In consequence, participants on average reached marginally lower *6df* difficulty levels after sleep deprivation than after normal sleep (Wilcoxon signed-rank test, $p = 0.05$). Both effects were most pronounced for the first session, which was also the first docking

experience participants had. As expected, PVT performance deteriorated under sleep deprivation (ANOVA, $p < 0.001$). PVT reaction speed was related to docking accuracy (linear regression, $p = 0.01$), but not to the highest level reached.

Conclusions: Sleepiness led to impaired *6df* performance which was partially associated with impairments of vigilant attention. However, compared to the substantial effect of sleep deprivation on reaction speed in the PVT, only small deteriorations in manual docking performance occurred. Effects were most pronounced for the first session, which could point to initial comprehension problems with the task during sleep deprivation. Heightened motivation due to the novelty and attractiveness of the task might be a factor that helped compensate effects of sleepiness.

Disclosure: No

P059 | Napping improves wakefulness in athletes but has less influence on endurance performance

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Introduction: The sleep quality of athletes is often poor or reduced because of stress, altitude exposure, travel within different time zones and competition fear. Most previous studies found positive effects of napping particularly on sprint performances and strength measurement tests where others didn't (Lastella et al. 2021; Botonis et al. 2021). Therefore we examined the effects of napping after partial sleep deprivation (PSD) on endurance performance and wakefulness in athletes.

Materials and Methods: Twelve healthy and trained participants (7 female and 5 male) underwent three test sessions. After one control night (eight h of sleep) the participants slept randomized 5 h without nap (NoNap) and with a 30-min nap opportunity (Nap30). PSD and the nap were quantified with pupillography (monotony resistance state, MRS), a subjective level of sleepiness questionnaire (Karolinska Sleepiness Scale, KSS) and polysomnography. After each night the participants performed a maximal cycling ergometry test, which determines time to exhaustion (TTE) and maximal oxygen uptake (VO2max).

Results: The main results include a significant increase in the KSS after 5 h of sleep compared with the control condition ($p < 0.01$, $\eta p^2 = 0.52$). From pre to post nap the KSS decreased significantly (5.4 vs. 3.2, $p = 0.004$). Aside from that MRS increased pre-post nap significantly (76.7 vs. 90.7, $p = 0.003$). There was no significant effect of sleeping condition on TTE ($p = 0.601$, $\eta p^2 = 0.045$) and VO2max ($p = 0.364$, $\eta p^2 = 0.088$).

Conclusion: The results indicate that napping or PSD has no significant influence on endurance performance in our study design. We conclude that exercise performance is a multidimensional construct where the condition of sleep could be less relevant. However, napping is a good method to increase wakefulness and concentration, which can be beneficial for sports competitions.

Disclosure: No

P060 | Effects of sleeprestriction and light intensity on effort-related cardiovascular response during cognitive challenge

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Objectives/Introduction: Brehm and Self's (1989) motivational intensity theory predicts that invested effort is proportional to task demand, as long as success is possible and effort is justified. Task demand can increase through high subjective sleepiness, for example, as occurring after short sleep or when exposed to dim light. We expected stronger effort after sleep restriction versus, well-rested conditions and in participants exposed to dim versus, bright light.

Methods: Thirty-nine participants (18–34 years, 25 women) underwent two experimental sessions (after 5 vs. 8 h of sleep, within-subject), consisting of an 8-min baseline, 15-min light exposure (1 lx vs. 100 lx, between-subject) while reading magazines, and a 5-min auditory 2-back task. We measured effort as changes in sympathetic beta-adrenergic impact on the heart, indexed by cardiac pre-ejection period (PEP) and systolic blood pressure (SBP), along with heart rate (HR) and diastolic blood pressure. Subjective sleepiness and task difficulty were assessed.

Results: As expected, both shorter sleep and dim light induced higher sleepiness levels ($p < 0.001$ and $p = 0.04$, respectively). Contrary to our predictions, we could not observe significant effects for PEP or SBP during task performance. However, HR significantly decreased in sleep-restricted participants ($p = 0.026$). The decrease in HR was particularly pronounced in participants exposed to the higher light intensity, indicated by a significant interaction term sleep duration x light intensity ($p = 0.041$). Light conditions did not yield a significant main effect on any of the cardiovascular measures.

Subjective task difficulty was higher in sleep-restricted than well-rested participants ($p = 0.045$), but not influenced by light intensity. Task performance did not differ significantly between sleep or light conditions.

Conclusions: Whilst we could not find any effects of light intensity on effort-related cardiovascular response, findings indicate a possible effect of experimentally manipulated sleep restriction. However, the observed decrease in HR cannot unambiguously be linked to a reduction in mental effort because HR is under sympathetic and

parasympathetic control. Furthermore, sleep-restricted participants experienced higher task demand. Sleep restriction and exposure to artificial light are typical in our society. Thus, sleep-loss-related and light-evoked changes in cardiovascular activity warrant further elaboration.

Disclosure: No

P061 | Total sleep deprivation at definite time windows following incomplete learning of active avoidance disturbs memory retention in rats

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Objectives/Introduction: Leon Kamin, in his classical experiments, researched the recall of incompletely learned active avoidance (AA) response in rats. Obtained data resulted in a U-shaped retention curve (Kamin effect). We aimed to examine total sleep deprivation (TSD) effect on the occurrence of Kamin effect and its influence on memory recall of incompletely learned AA task.

Methods: 84 inbred albino adult laboratory rats, both male and female, were randomly divided into two major experimental sets. The first experimental set ($n = 55$) included 7 groups with different retention intervals (RI) between learning and relearning sessions of AA. RI for these groups was 0, 1, 1.5, 2, 3, 6 and 24 h. These groups during RI were housed back in their home cages, maintaining a regular sleep-wakefulness cycle. The second experimental set ($n = 29$) included 4 groups with RIs of 2, 3, 6 and 24 h. These groups underwent 1 h TSD, using gentle handling method in home cages. TSD was performed one h after the start of each RI. Before and after TSD animals were allowed to sleep. For each experimental group both learning and relearning tasks were 25 trials of standard AA procedure. We measured the mean number of avoidances for each AA session to assess the learning level of the given task.

Results: The first experimental set showed that rats with RI of 1.5 h don't display any improvement in relearning sessions (9.9 ± 1.8; $n = 9$) compared to the learning sessions (9.3 ± 0.4; $n = 55$; $p = 0.752$). Whereas, all other groups displayed a significantly higher number of avoidances in relearning sessions ($p < 0.001$), indicating successful retention of learned AA. Groups which underwent 1 h TSD during RI displayed a major decrease in the number of avoidances in relearning sessions, showing no significant difference between learning and relearning sessions following any given RI ($0.315 < p < 0.954$), flattening the U-shaped curve of memory recall.

Conclusions: Obtained data indicate that keeping animals in the waking state during the definite time window of RI interferes both with the development of Kamin effect and the memory consolidation of AA.

Disclosure: No

P375 | Can phase-targeted auditory stimulation (PTAS) during sleep counteract effects of chronic sleep restriction?

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Background: In chronic sleep restriction (cSR) the opportunity for sleep-associated restoration is reduced. This leads to increased sleep pressure, reflected by increased initial slow wave activity (SWA) post cSR and neurobehavioral impairments. Since slow waves are thought to actively contribute to restoration, we investigated whether:

(1) SWA enhancement by phase-targeted auditory stimulation (PTAS) counteracts accumulation of sleep pressure during cSR and

(2) if PTAS during cSR mitigates neurobehavioral impairments.

Methods: We analysed data of 16 young male subjects who underwent two weeks of cSR, with PTAS in one week (Stim) and no PTAS in the other week (Sham). We calculated the increase of SWA during the first 30 min of artefact-free non-rapid eye movement (NREM) sleep in the night after cSR relative to baseline levels. Impairments in inhibitory control were quantified as error rate in the antisaccade task and impairments in sustained attention as transformed lapses in the psychomotor vigilance task (PVT), both relative to baseline levels. Data was analysed using a linear mixed model with predictors time point (pre or post cSR), condition (Stim or Sham), their interaction, period (cSR week) and a random factor subject. Values are reported as difference post cSR–pre cSR.

Results: If PTAS was applied, SWA showed a significant smaller increase after cSR (−28.64 %, $p_{\text{time point} \times \text{condition}} = 0.032$) and the error rate in the antisaccade task tended to increase less (−9.13%, $p_{\text{time point} \times \text{condition}} = 0.088$). In contrast, PTAS did not affect the increase in lapses in the PVT (+0.3, $p_{\text{time point} \times \text{condition}} = 0.58$).

Conclusions: We find first indications that PTAS boosts the restorative function of sleep, reflected by a smaller increase of SWA post cSR when PTAS is applied. Top-down inhibitory impairments tended to be smaller after applying PTAS, suggesting that some, but not all,

neurobehavioral impairments can benefit from PTAS. We show that PTAS might be a promising tool to counteract insufficient sleep, not only during an acute intervention but also in long-term applications, with the possibility to dampen some neurobehavioral impairments associated with insufficient sleep.

Disclosure: No

P376 | Don't lose sleep over esports: exploring how total sleep deprivation affects cognitive and in-game performance of rocket league players

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Objectives/Introduction: Previous research suggests esport athletes experience short and poor-quality sleep, with high risk of insomnia and excessive daytime sleepiness (Lee et al, 2020; Moen et al, 2021). As esports performance depends on cognitive abilities (Campbell et al., 2018) which degrade with sleep loss (Lim & Dinges, 2010), it is believed that losing sleep decreases esports performance; however this has not yet been studied. Here we explore how total sleep deprivation affects cognitive and in-game performance for the popular esport, Rocket League. We hypothesised that sleep deprivation would decrease both cognitive and in-game performance.

Methods: 16 young adults (age = 20.44 ± 2.28, 1 female) who play Rocket League have completed the study. Participants with similar in-game rank were paired across two test sessions, in which they completed the Karolinska Sleepiness Scale (KSS), Alertness Visual Analog Scales (VAS), Psychomotor Vigilance Task (PVT), Category Switch Task (CST), and played seven Rocket League matches against their paired opponent. In one session, both participants were well rested, while in the other, one participant was sleep deprived (~28.29 ± 1.25 h). Differences in outcome measures were analysed using linear mixed models/ ANCOVAs.

Results: Sleep deprived participants experienced increased daytime sleepiness ($p = 0.004$), decreased subjective alertness, ($p = 0.003$), degraded PVT performance ($p < 0.001$) and choice reaction time components of the CST ($p = 0.008$). Sleep deprived individuals *improved* their overall in-game performance compared to well-rested counterparts (M = 1.11 goals/match, $p = 0.035$, 95%CI [0.08, 2.13]). Performance indicator analysis (see Smithies et al., 2021) uncovered that sleep-deprived players spent less time *in the air* (M= 0.60% of match, $p = 0.051$, 95%CI [−0.002, 1.20]) and more time*goalside of the ball* (M = 3.42% of match, $p = 0.006$, 95%CI [1.02, 5.81]).

Conclusions: Sleep deprivation resulted in poorer subjective and objective measures of sleepiness, alertness, and psychomotor performance. Contrary to our hypothesis, sleep deprivation *improved* in-game Rocket League performance, with performance indicator analyses suggesting this was achieved through the adoption of a safer playstyle. These findings have potential implications both for esport science and our understanding of the practical effects of sleep loss more broadly.

Disclosure: No

P377 | How sleep-deprived people see and evaluate others' faces: an experimental study

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Introduction: Acute sleep loss increases brain reactivity toward positive and negative affective stimuli. Thus, we hypothesized that sleep-deprived observers would allocate more time gazing at images of happy, angry, and fearful faces than at images of neutral faces. We also examined if facial expressions are perceived differently after acute sleep loss.

Methods: In the present within-subjects study, 45 young adults participated in one night with total sleep deprivation and one night with an 8-h sleep opportunity. On the following morning, we used an eye tracker to measure participants' time fixating on images of happy, angry, fearful, and neutral faces. Participants also evaluated faces' attractiveness, trustworthiness, and healthiness on a 100-mm visual analogue scale.

Results: Using generalized linear mixed models, we found that after sleep loss, participants spent less time fixating their eyes on the face images than after sleep. Differences in total fixation duration ranged from 6.3% to 10.6% between the sleep and sleep loss conditions ($p < 0.001$). This decrease occurred irrespective of the displayed emotion ($p = 0.235$ for sleep × emotion interaction) and was seen for the upper ($p < 0.001$) but not the lower part of the faces (except for the lower part of angry faces). Overall, faces were evaluated as less trustworthy (−2.6 mm) and attractive (−3.6 mm) after sleep loss ($p < 0.05$).

Conclusions: Facial expressions are important in social interaction. Thus, spending less time fixating on faces after acute sleep loss may come along with several problems for social interaction, for example, inaccurate or delayed judgment of the emotional state of others. In addition, a more negative impression of other people may increase the risk of the sleep-deprived becoming socially isolated.

Disclosure: No

P379 | Factors affecting daytime sleepiness and fatigue levels in professional and amateur drivers

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Objectives/Introduction: One of the most important problems that modern society has to solve is that of road safety. In recent years, a

great effort is being made in our country and throughout the European Union to reduce road accidents, but the problem of road safety remains at a high level. Road safety is a problem that is affected by critical factors, such as fatigue and daytime sleepiness. The purpose of this study is to identify the presence and relationship of those factors associated with driver's behavior and daytime fatigue and sleepiness levels.

Methods: In the current study, 100 drivers (50 amateurs and 50 professionals) volunteered to participate. Drivers completed a series of questionnaires related to quality of life, daytime sleepiness and fatigue as well as parameters related to physical health such as body composition, blood pressure, heart rate, grip strength, blood sugar and total cholesterol levels. Independent *T*-test was used to examine possible differences between groups (SPSS/PASW-25).

Results: Drivers with high levels of fatigue (≥5 FSS score) had reported the lowest levels of physical activity ($p = 0.038$) and the highest levels of daytime sleepiness ($p = 0.001$). Also, drivers with high levels of daytime sleepiness (≥10 ESS score) have worse quality of life levels ($p = 0.001$). In addition, drivers with the lowest quality of sleep (≥5 PSQI score) have higher abdominal fat deposition and poorer mental health ($p = 0.001$). Drivers with the most working h per week (≥60) have reported poorer sleep quality and higher levels of daytime sleepiness ($p = 0.001$).

Conclusion: Physical and mental health levels influence driving behavior, while drivers with high levels of fatigue and reduced physical wellness have more chances of drowsiness and distracted driving. Interventions improving overall health such as regular exercise and good sleep could positively affect the physical and mental health of individuals, by ameliorating key risk factors of road accidents.

Disclosure: No

P380 | A single night of short-early sleep or short-late sleep impairs neurobehavioral performance but not glucose tolerance in young adults

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Introduction: Repeated exposure to short sleep is associated with decreased glucose tolerance. However, the time course of changes in blood glucose and the effects of sleep timing are unclear. We tested whether a single night of short sleep, timed either in the early or late part of the night, would result in higher capillary blood glucose and poorer neurobehavioral performance in young adults.

Methods: Students from the National University of Singapore ($n = 121$, 21–30 y) took part in a field study in which they were assigned to 3 baseline nights of sleep with 9 h time in bed (TIB: 10:00 p.m.–7:00 a.m.), followed by a night of healthy sleep ($n = 42$; 9 h TIB, 10:00 p.m.–7:00 a.m.), short-early sleep ($n = 38$; 5 h TIB, 10:00 p.m.–3:00 a.m.) or short-late sleep ($n = 41$; 5 h TIB, 2:00 p.m.–7:00 a.m.). Participants' adherence to the sleep schedule was verified using actigraphy watches and daily diaries. Oral glucose tolerance tests (OGTTs; 75 g glucose) with finger-prick blood glucose measurements (fasting & 2-h post-load) were conducted on mornings after the third baseline night (9 h TIB) and after the sleep manipulation night (9 h TIB or 5 h TIB early/late). Self-rated sleepiness was assessed using the Karolinska Sleepiness Scale (KSS) and sustained visual attention was assessed using the Psychomotor Vigilance Task (PVT) between blood glucose measurements. ANOVA was used to investigate effects of sleep group (healthy, short-early, short-late) and session (baseline night, manipulation night) on blood glucose and performance.

Results: There were no differences in fasting glucose ($p = 0.20$) or 2-h post-load glucose ($p = 0.47$) between sleep groups, or after exposure to short early/late sleep ($p > 0.10$ for all pairwise comparisons). In contrast, there was an interaction between sleep group and session on performance ($p < 0.01$), whereby KSS scores and PVT reaction times were higher after exposure to either short-early sleep or short-late sleep ($p < 0.01$ for both comparisons) compared with baseline sleep.

Conclusions: One night of short sleep (5 h early or 5 h late) induced neurobehavioral impairment but did not alter glucose levels in young adults who underwent an oral glucose tolerance test. The threshold level of sleep loss for impairment may differ across neurobehavioral and physiological outcomes.

Disclosure: No

P381 | Sleep duration and psychological well-being of young adults during the first wave of the COVID-19 pandemic in Quebec, Canada

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Introduction: The COVID-19 pandemic has caused significant disruptions in the daily routines of young adults, including sleep. Young adults have been identified as a vulnerable group at risk of adverse mental health outcomes. This study aimed to document changes in sleep duration among young adults during the onset of the COVID-19 pandemic in Quebec, Canada, and the associations between these changes and severe symptoms of anxiety and depression.

Methods: In the summer of 2020 (July-August, first wave), 1182 young adults (22 years old, Longitudinal Study of Child Development in Quebec [QLSCD]) reported their current sleep duration as well as their symptoms of depression and anxiety using standardized scales. Participants also retrospectively reported their sleep duration before the pandemic (March 2020). Sleep duration change scores were calculated by subtracting sleep duration before the outbreak from sleep duration during the outbreak. Binary logistic regression analyses were used to determine whether changes in sleep duration were associated with an increased likelihood of experiencing severe anxiety and depression during the outbreak, adjusting for gender, maternal education, and weekly alcohol consumption.

Results: Sleep duration decreased in 20.4%, increased in 39.5%, and remained the same in 40.1% of participants from before to during the first wave of the pandemic in Quebec. The regression analysis revealed an association between decreased sleep duration and the presence of severe symptoms of anxiety (OR: 1.26; 95% CI: 1.00–1.58), but not depression (OR: 1.04; 95% CI: 0.89–1.23).

Conclusions: Sleep duration during the first wave of COVID-19 remained the same or increased for the majority of participants. While a decrease in sleep duration was reported in a small proportion of young adults, it appears to be a risk factor for severe anxiety levels. Clinicians should inquire about changes in sleep duration since the onset of the pandemic and evaluate if there are associated changes in mental health.

Disclosure: No

P666 | The effect of sleep deprivation on sustained attention and response inhibition to emotional stimuli of young adult men with attention deficit/hyperactivity disorder

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Objective: Attention Deficit/Hyperactivity Disorder (ADHD) is associated with deficits in sustained attention and inhibitory control. Given the emotional and social deficits of individuals with ADHD, the present study examined whether young adults with ADHD have more difficulties in sustained attention and inhibitory control in the context of emotional stimuli compared with young adults without ADHD. Moreover, as ADHD is associated with sleep disturbances and sleepiness, the present study also examined whether the difficulties of individuals with ADHD in sustained attention and inhibitory control worsen following sleep deprivation.

Method: Forty-one young adult men (M = 25.6) with ($n = 24$) or without ($n = 17$) ADHD were included in this study. The participants completed an emotional stop signal task twice: at the beginning and after 26 h of sustained wakefulness in a controlled environment (i.e., sleep deprivation). The task required the participants to distinguish between stimuli with a negative emotional valance and emotionally neutral stimuli, when in some conditions they were instructed to respond while in others they were required to inhibit their response. Failures in response inhibition and sustained attention were indicated by commission errors and omission errors, respectively.

Results: In relation to response inhibition, a main effect for Time [$f(1,31) = 8.86$, $p = 0.006$] indicated that sleep deprivation increased the number of commission errors in both groups. There was no significant Time X Stimulus Type interaction nor Time X Group interaction. In relation to response inhibition, there was a significant Stimulus Type X Group X Time interaction [$f(1,39) = 5.72$, $p = 0.022$]. Follow up analysis revealed that the number of omission errors increased only in the ADHD group. Moreover, this deprivation–induced increase was greater when the participants were exposed to emotionally neutral stimuli [Before: $M = 17.50$, SD = 23.74; After: $M = 41.17$, SD = 39.74 ($p < 0.01$)] compared with emotionally negative stimuli [Before: $M = 29.63$, SD = 21.75; After: $M = 42.04$, SD = 26.06 ($p < 0.05$)].

Conclusion: Sleep deprivation impairs response inhibition in young adults with and without ADHD. In contrast, sleep deprivation disrupts sustained attention only in young adults with ADHD, and this effect is more pronounced when the stimulus presented is neutral rather than emotional, possibly reflecting channeling of depleted attentional resources to stimuli that may be more relevant to survival.

Disclosure: No

P667 | Effect of total sleep deprivation on risk-taking behaviour: an ERP study

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Objectives: The primary aim of this study was to examine the differential effect of sleep and sleep deprivation on the behavioural and neural patterns of risky decision making.

Methodology: Seventeen healthy participants were tested after one night of regular sleep, and after one night of total sleep deprivation (TSD), performance and electroencephalogram data were collected. Design: Event-related brain potentials (ERPs) during the performance of the BART task were obtained in a within-subject, counter-balanced, repeated-measures design. Sleep deprivation and data collection were conducted in a laboratory setting.

Results and Conclusion: Repeated measure ANOVAs were performed to find out the risk-taking behaviour of participants across sleep and sleep-deprived conditions. Result reveal the main significant effect of

sleep condition (sleep = 46.79 ± 2.3 vs. sleep deprivation = 58.55 ± 2.25, F (1, 16) = 22.94; $p < 0.05$; Cohen's $d = 0.58$). The pair-wise comparison revealed that the Feedback-related negativity (FRN) was larger for sleep conditions indicating subjects are more loss-sensitive (sleep = −5.39 ± 0.50, sleep deprivation = −3.78 ± 0.57) as compared to sleep deprivation conditions. P300 amplitude was larger in response to negative feedback (39.62 ± 1.5) than to positive feedback (21.27 ± 1.6). During the trials immediately following negative feedback, subjects pumped the balloon more times in the sleep deprivation condition than in the full night sleep condition. These results suggest that one night of sleep deprivation impaired error detection and feedback actions. These findings provide evidence that Sleep deprivation showed insensitivity to negative feedback in risky decision making, which may help to clarify the differential cognitive mechanism of risky decision making across sleep and sleep deprivation.

Keywords: Sleep deprivation, Feedback-related negativity, risky decision, Event-related Potential

Disclosure: No

P668 | Sleep homeostasis in the European jackdaw (*coloeus monedula*): Sleep deprivation increases NREM sleep time and EEG power while reducing hemispheric asymmetry

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Introduction: Sleep is a wide-spread phenomenon that is thought to occur in all animals. Yet, the function of it remains an enigma. Conducting sleep experiments in different species may shed light on the evolution and functions of sleep. Therefore, we studied sleep architecture and sleep homeostatic responses to sleep deprivation in the European jackdaw (*Coloeus monedula*).

Methods: A total of nine young adult birds were implanted with epidural electrodes and equipped with miniature data loggers for recording movement activity (accelerometery) and electroencephalogram (EEG). Individually-housed jackdaws were recorded under controlled conditions with a 12:12-h light-dark cycle.

Results: During baseline, the birds spent on average 48.5% of the time asleep (39.8% non-rapid eye movement (NREM) sleep and 8.7% rapid eye movement (REM) sleep). Most of the sleep occurred during the dark phase (dark phase: 75.3% NREM sleep and 17.2% REM sleep; light phase 4.3% NREM sleep and 0.1% REM sleep). After sleep deprivation of 4 and 8 h starting at lights off, the birds showed a dose-dependent increase in NREM sleep time. Also, NREM sleep EEG power in the 1.5–3 Hz frequency range, which is considered to be a marker of sleep homeostasis in mammals, was significantly increased for 1-2 h after both 4SD and 8SD. While there was little true unihemispheric sleep in the Jackdaws, there was a certain degree of hemispheric asymmetry in NREM sleep EEG power during baseline, which reduced after sleep deprivation in a dose-dependent manner.

Conclusion: In conclusion, jackdaws display homeostatic regulation of NREM sleep and sleep pressure promotes coherence in EEG power.

Disclosure: No

P669 | Effects of sleep restriction in maternal behavior and lactation in the postpartum rat

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Although sleep restriction (SR) is a characteristic shared by most mammals during the early stages of motherhood, its consequences have been understudied. SR is considered a stressful condition itself, causing a wide variety of physiological alterations in non-lactating animals, from cognitive, hormonal to immunological status. Besides, stressful situations can alter not only milk ejection capacity, but also milk composition and maternal care. Thus, we wonder if maternal behavior, milk ejection and its composition would be disrupted when mother rats are challenged with acute SR (ASR) or chronic SR (CSR).

For that purpose, on postpartum day 1 (PPD1), lactating rats were implanted for polysomnographic recordings and for deep brain electrical stimulation for sleep deprivation procedure. On PPD5-9 mother rats were sleep restricted for 6 h during five days (CSR; $n = 8$), one day (ASR on PPD9; $n = 8$) or untreated (control, C; $n = 10$). Maternal behavior was evaluated every day after SR or C, and the litter was weighted at the begging and the end of SR to indirectly measure of the amount of milk ejected. On PPD9 mothers were milked for posterior macronutrients (protein, carbohydrates and fat) analysis.

Our main results showed that CSR decrease the amount of milk ejected compared to C on PPD6 (C: 3.55 ± 0.52, CSR: 1.12 ± 0.51 g, $p = 0.005$) and PPD7 (C: 3.57 ± 0.49, CSR: 1.18 ± 0.43 g, $p = 0.003$). Also, milk protein content decreased in ASR group (6.1 ± 0.2 g/100 ml) compared to CSR (7.6 ± 0.3 g/100 ml, $p = 0.007$) and C (7.7 ± 0.4 g/100 ml, $p = 0.003$). Besides, after CSR maternal behavior was disrupted, being the number of corporal lickings decreased compared to C on PPD8 (C: 27.09 ± 5.12, CSR: 13.13 ± 2.22; $p = 0.04$) and on PPD9 (C: 34.18 ± 4.55, CSR: 12.88 ± 3.89; $p = 0.007$), and anogenital licking was also decreased after CSR (6.50 ± 2.35) on PPD9 compared to C (22.00 ± 3.90, $p = 0.005$). These results suggest a homeostatic recovery in breastfeeding, possibly to ensure the survival of the litter, but not in the active maternal behaviors.

Disclosure: No

P670 | Does local sleep contribute to behavioural lapses during sleep deprivation?

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Introduction: Theta oscillations in the wake mammalian electroencephalogram (EEG) are hypothesized to reflect local sleep during sleep deprivation. We wished to test whether these events correspond to behavioural lapses in humans. However, microsleeps (whole-brain sleep events lasting 1-15 s with eye closure) also appear during sleep deprivation. We therefore needed to determine to what extent lapses in behaviour could be attributed to microsleeps, and to what extent they could be driven by local sleep.
Methods: 19 young healthy adults (10 female) participated in a 24 h sleep deprivation experiment, recording high density EEG and eye tracking. Participants performed the Lateralized Attention Task (LAT) in which faint grey circles would appear every 2–10 s in half of the visual field and shrink within 0.5 s. Participants had to push a button as soon as they saw the stimulus; responses given before the circle disappeared were considered correct, responses within 1 s considered late, and no response a lapse. Participants performed the 15 min LAT three times at baseline (BL), and three times following sleep deprivation (SD).
Results: 15 participants were included in the following analyses. Paired *t*-tests were conducted to compare within-subject conditions. Time spent with eyes closed increased from 5% of the recording at BL to 15% at SD ($p < 0.001$). Lapses due to eyes closed increased from 1% to 7% of all trials ($p = 0.001$), whereas lapses with eyes open increased from 12% to 27% of all trials ($p < 0.001$). Theta power was higher during eyes-open SD lapses relative to SD correct responses over right-central channels, not correcting for multiple comparisons.
Conclusions: Discounting lapses due to eyes closed, lapses during sleep deprivation more than doubled from baseline. While local theta was increased in these lapses, the effect was weak, suggesting additional factors may contribute to lapses during sleep deprivation. If theta truly reflects local sleep, lapses due to local sleep may be a relatively rare occurrence in humans. Altogether, these results imply multiple causes contribute to behavioural lapses during sleep deprivation.
Disclosure: No

P671 | The association between shift work and dyslipidemia disorders among health care worker

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Background: Work shift among nurses can affect metabolic disturbances such as dyslipidemia. The aim of this study was to evaluate the relationship of shift work of nursing staff with sleep problems and their lipid profile in a large referral medical center in Tehran, Iran.
Methods: This cross-sectional study was conducted on 1772 nurses (1399 women and 373 men) working in Imam Khomeini Hospital in Tehran in 2020. Baseline characteristics including gender, age, weight and height, medical history and medications, marital status, educational level, history of smoking, physical activity and diet status, as well as their job status details, especially shift work, work experience, job category, and employment status were collected. Intravenous blood samples were taken from all personnel after 12 h of fasting and sent to the hospital laboratory for evaluation of lipid profile.
Results: Hypertriglyceridemia was revealed in 34.2%, hypercholesterolemia in 34.0%, abnormal raising LDL level in 13.6%, abnormal reducing HDL in 28.7% and overall dyslipidemia in 50.3%. As revealed by the multivariable linear regression modeling, shifting work along with sleep problem, lack of physical activity, and unhealthy dietary regimen could predict abnormal serum LDL level.
Conclusion: shift work has been associated with negative outcomes for lifestyle behaviors and health risks.
Disclosure: No

12: INSTRUMENTATION AND METHODOLOGY (BASIC SLEEP SCIENCE)

P062 | How many h do you sleep? A comparison of subjective and objective sleep duration measures in a sample of insomnia patients and good sleepers

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Introduction: Habitual sleep duration assessed with one question is a widely investigated variable in epidemiological research and associations with several health outcomes have been described. Previous research has found that people have difficulties estimating their sleep duration with a single question and from insomnia research we know that many patients show a marked discrepancy between objectively measured and subjectively experienced sleep. The aim of this work is to compare multiple sleep duration measures in a retrospective sample of insomnia patients and good sleepers.
Materials and Methods: We analyzed data of 123 patients with insomnia (ID) and 123 age- and gender-matched good sleeper controls

(GSC). All of them completed one single question on subjective habitual sleep duration (taken from the Pittsburgh Sleep Quality Index = PSQI), a sleep diary for at least five days, two nights of polysomnography (PSG) and two corresponding morning estimates of subjective total sleep time. Descriptive statistics, linear regression analyses and Bland-Altman plots were used to describe the linear relationship and (dis)agreement between sleep duration measures.

Results: Linear regression analyses showed the greatest relationship between the PSQI question and the sleep diary for both groups ($\beta = 0.84$, $p < 0.001$), but Bland-Altman plots demonstrated that they only agreed to within ± 2 h in ID and within ± 1 h in GSC. Relationships between PSG and the single item question as well as between PSG and sleep diary were weak to non-existent. Subjective measures and PSG only agreed to within ± 2 to 3 h. ID, on average, reported shorter sleep duration compared to PSG while GSC, on average, reported longer sleep duration compared to PSG. All sleep duration measures differed significantly between ID and GSC ($p < 0.05$), except the second PSG ($p = 0.131$), with the greatest average difference of 91.8 min in the PSQI item.

Conclusion: Results of epidemiological studies using one single item questions for measuring sleep duration should be interpreted with caution as they may not reflect associations between physiological sleep duration and health outcomes. Future studies assessing sleep duration should take into account the investigated population and the assessment method when interpreting results.

Disclosure: No

P063 | Channel-resolved artifact detection, repair, and visualization of high-density sleep electroencephalography

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Introduction: Identifying and handling artifacts in multichannel sleep electroencephalography (EEG) is notoriously challenging given that unwanted activity may stem from numerous sources with evolving patterns of topographical expression. Manual cleaning is subjective, time-consuming, and often relies on simplifications (e.g., complete removal of channels or epochs), while automated cleaning is not optimized for continuous sleep recordings (e.g., prohibitively slow, false positives/negatives) and does not accommodate channel-specific artifacts.

Methods: We developed a fully automated approach for channel-resolved detection and repair of sleep EEG artifacts. The tool is part of the Matlab-based toolbox SleepTrip, a branch of FieldTrip dedicated to the analysis of sleep EEG. First, data are optionally subjected to independent component analysis, with auto-labeled components reflecting eye, heart, muscle and line noise activity removed. Second, continuous artifacts of five types (low-frequency/high-frequency/signal jump/flatline/deviating channel) are identified on a channel-by-channel basis. Third, continuous artifacts are converted to a discrete 5-s segment basis, with additional rules specifying a rejection matrix (segments to fully reject) and a repair matrix (channels marked for repair for each segment). Fourth, bad channels are repaired segment-wise using a weighted interpolation from intact channels. Moreover, visualization functionality both offers high-level summaries of data integrity and enables viewing individual artifacts or repair/rejection matrices overlaid on EEG traces.

Results: We applied our approach to 560 overnight high-density EEG recordings of 371 individuals (47.4 ± 13.7 y, 261 female). Percentages of data marked for repair dropped significantly from before to after cleaning (249 channels overall: 8.4 vs. 3.7, W: 11.9 vs. 8.0, N1: 9.7 vs. 5.5, N2: 8.0 vs. 3.2, N3: 6.3 vs. 2.0, R: 9.1 vs. 4.0; 15 channels overall: 7.3 vs. 1.9, W: 14.5 vs. 7.1, N1: 8.9 vs. 2.9, N2: 6.1 vs. 1.0, N3: 3.9 vs. 0.4, R: 7.7 vs. 1.5; paired *t*-tests: all $p < 10^{-30}$). Moreover, extensive visual examinations indicated clear qualitative improvements across sleep stages. Runtimes were ~1 h and ~2 min for high-/low-density recordings, respectively.

Conclusions: We introduce a free, fast, and fully automated approach for handling artifacts in low- and high-density sleep EEG. By enabling high-throughput data cleaning, this tool could accelerate fundamental and clinical sleep EEG research.

Disclosure: No

P064 | REM sleep without atonia and EMG spectral power analysis

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Objectives: Patients with REM sleep behavior disorder (RBD) show loss of muscle atonia during REM-sleep (RWA). The commonly used method for detecting RWA is time-domain analysis of the electromyographic (EMG) signal, defining segments of high EMG-activation. However, these methods depend on the background noise and measurements with different threshold levels cannot be compared. The aim of the study was to quantify RWA with a frequency domain oriented approach.

Methods: Three-night PSG of 256 patients (78,5 % male, 21,5 % female) clinically suspected to have RBD, were used. Nights with- < 15 min REM-sleep or a chin EMG signal with background threshold exceeding 1 μV in the REM-episodes were excluded. Time domain RWA estimation was made with our automatic RWA scoring algorithm based on criteria of the Montreal method and of a simplified method called Ikelos-RWA. The EMG frequency power spectrum during REM was calculated for mini-epochs of 3 s using Fast Fourier Transformation (FFT). Median spectrum power >10 μV^2 in the 55–95 Hz range was considered as RWA. Mini-epochs with a high 50 Hz noise or lost signal were discarded. The FFT-RWA is the percentage of all mini-epochs exceeding 10 μV^2. In order to explore the continuity

of RWA we determined all mini-epochs in REM exceeding 10 μV^2, where in addition both the preceding and succeeding mini-epoch also exceeded the 10 μV^2 criterion. This FFT-RWA-cont is the fraction of all REM mini-epochs in percent.

Results: 510 PSG-nights were included. The FFT-RWA correlated significantly with the RWA estimates of phasic Montreal ($r = 0.95$; $p < 0.0001$), tonic Montreal ($r = 0.91$; $p < 0.0001$) and Ikelos-RWA ($r = 0.95$; $p < 0.0001$). Tonic Montreal highly correlates with the continuous FFT-RWA-cont ($r = 0.93$; $p < 0.0001$).

Conclusions: Data suggest that the FFT-RWA is a reliable method for RWA quantification. Frequency domain based calculations are more robust against EMG background noise intrusion than the usual time-domain based approaches. Thus, FFT-RWA may prove beneficial, also due to the use of the median through a wide range of frequencies. For signals with background noise above 1 μV, we showed that envelope-based methods consistently under-rated RWA.

Disclosure: No

P065 | Automatized selective slow-wave sleep suppression through auditory closed-loop stimulation

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Objectives/Introduction: Recent studies indicate that selective suppression of slow wave sleep (SWS), potentially through modifications of synaptic plasticity, may represent an alternative to therapeutic sleep deprivation in patients with major depression (MDD). The purpose of this project was to develop and evaluate a fully automatized selective suppression protocol of SWS based on closed-loop auditory stimulation in a healthy population, which would allow for broader clinical implementation without the need for online supervision.

Methods: A new automatized SWS suppression approach was developed and evaluated in a healthy, young population (N = 15). Participants underwent a repeated-measures design consisting of one adaptation night and two experimental nights (auditory stimulation and sham nights counterbalanced). Stimulation was applied upon detection of SWS. The detection protocol relied on a topographical template of slow waves. Stimulation consisted of bursts of pink noise with a randomized duration (50-500ms) and inter-onset-interval (1–4 s). A random walk (+,−2.5 dB) was superimposed on the linear increase of volume (40–106 dB in 60 s) to add unpredictability.

Results: The stimulation protocol lead to a significant reduction of SWS (−39%), with an associated increase in sleep stage N2 (+11%), and a decrease in REM sleep (−11%) as compared to sham. Slow wave activity (SWA) across the night and cumulative slow wave energy at the end of the night were both significantly reduced by 30%, without changes in other frequency bands, and with SWA changes specific to SWS. While undisturbed sleep lead to an expected evening to morning reduction of wake EEG theta, believed to reflect renormalization of synaptic homeostasis, wake theta reduction was completely inhibited after stimulation. SWS duration correlated with wake theta; the more SWS duration was reduced the more theta power was increased in the morning after stimulation.

Conclusions: We demonstrate, to our knowledge for the first time, that a fully automatized approach can suppress SWS. Future studies are needed to investigate functional consequences such as changes to synaptic plasticity and depressive symptomatology in MDD patients. Further developments bear the potential for translation to broader and even ambulatory use of automated SWS detection and modulation, and potentially for new treatment developments for major depression.

Disclosure: No

P066 | Preliminary results of validation of circadian type inventory for use among shift healthcare workers in Poland

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Objectives/Introduction: Variations in human circadian rhythms mostly focus on the dimension of morningness-eveningness. However, individual differences can also be shown when it comes to amplitude and stability of chronotype. These factors play a role in night work adjustment – workers with flexibility and low amplitude of rhythms may find it easier to adjust to this type of work. The aim of this study was to translate Circadian type Inventory (CTI) assessing flexibility/rigidity (FR) of sleep times and languid/vigorous (LV) chronotype and verify its usability among shift workers in healthcare.

Methods: 64 shift working nurses filled in a two factor 11-item CTI, Insomnia Severity Index (ISI), Epworth Sleepiness Scale (ESS) and Pittsburgh Sleep Quality Index (PSQI).

Results: Results showed that subscales of CTI present good internal stability (Cronbach's $\alpha = 0.784$ for LV and $\alpha = 0.785$ for FR). However, confirmatory factor analysis with varimax rotation showed that

items 6, 9, 10 and 11 should be removed based on factor extraction. We nevertheless proceeded with full scale.

LV subscale correlated with age (−0.252, $p = 0.044$), but not with night shift work experience, ISI (0.280, $p = 0.025$), but not with ESS. The PSQI components which were significantly correlated with LV are sleep efficiency (.253, $p = 0.043$) and sleep latency (0.304, $p = 0.015$). We also checked correlations between LV and individual ISI questions. There were significant associations with questions about difficulties with sleep initiation (0.311, $p = 0.012$), how noticeable sleep problems are in term of quality of life for others (0.444, $p < 0.001$), worries about sleep problems (0.323, $p = 0.009$) and interference with daily functioning (0.294, $p = 0.018$).

FR subscale was not associated with age, night shift work experience, ISI and ESS overall scores. It did correlate with daytime dysfunction component of PSQI (−0.271, $p = 0.031$) and how noticeable sleep problems are in term of quality of life for others (−0.264, $p = 0.035$)

Conclusions: Further CTI validation in Polish is needed since at this preliminary stage satisfactory psychometric qualities of CITI were not fully confirmed.

Disclosure: Yes

Conflict of Interest statement: Acknowledgements: The research was supported by a grant no. 2019/33/N/HS6/02572 from the National Science Centre in Poland.

P382 | Discrepancy between self-perceived sleep characteristics and polysomnographic parameters amongst patients of a referral sleep clinic

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Objective/introduction: In this study we aimed to examine the differences between self-reported vs. Polysomnography (PSG)-measured sleep parameters as well as the association of sleep misperception with demographic, clinical, and psychological factors.

Methods: This retrospective study was conducted in our referral tertiary university hospital. All adult patients who underwent complete overnight PSG and filled post-PSG questionnaires from 2018 to 2020 were included. All enrolled participants were monitored all night (at least 5 h) by an expert sleep technician via PSG device. Recorded components in PSG sleep scoring data included: total sleep time (TST), sleep latency (SL), wake after sleep onset (WASO), sleep efficiency percentage (SE), respiratory disturbance index (RDI), N1%, N2%, N3%, and rapid eye movement% (REM). All patients completed a battery of validated and reliable Persian version of questionnaires (Insomnia Severity Index (ISI), Beck depression inventory-II (BDI-II), and Epworth sleepiness scale (ESS)).

Results: After evaluating 2,895 patients, a total of 2,090 patients (male, 1,480 (70.8%); mean age, 46.1 ± 12.9) were enrolled in the current study. According to the post-PSG questionnaire, the mean of SL, TST, and wake up episodes were 40.4 ± 61.0 min, 359.1 ± 18.7 min, and 3.2 ± 22.5, respectively. Our PSG findings revealed that mean of SL, TST, WASO, and SE were 29.3 ± 83.2 min, 402.5 ± 75.2 min, 74.4 ± 50.9 min, and 79.9% ± 79.3, respectively. A significant difference between self-reported and observed-TST was detected ($p < 0.001$) that had association with sex ($p = 0.001$), self-reported wake up episodes ($p < 0.001$), self-reported SL ($p < 0.001$), BDI-II score ($p < 0.001$), and ISI score ($p < 0.001$). Further analyses showed a significant difference between self-reported and PSG-measured SL ($p < 0.001$), which had association with self-reported wake up episodes ($p < 0.001$), self-reported TST ($p < 0.001$), WASO ($p < 0.001$), and BDI-II score ($p = 0.04$).

Conclusions: Patients, especially those with higher wake up episodes, mostly exaggerate their sleep problems and report higher SL and lower TST. This pattern is more observed in insomniac and depressed patients which necessitate use of a reliable objective measuring tool for medical interventions.

Disclosure: No

P383 | Utilizing neuronal complexity and the spectral slope of human scalp EEG to differentiate cognitive states during sleep

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Human brain activity is naturally modulated by different sleep stages. However, it still remains difficult to distinguish sleep stages solely based on their brain activity without physiological data. Recent literature indicates that the spectral slope provides an aperiodic marker of brain activity that can reliably differentiate especially REM sleep from wakefulness. On the other hand, neuronal complexity is also discussed as being sensitive to alterations in brain activity during sleep.

We analysed spectral slope and neuronal complexity in an existing full-night polysomnography dataset ($N = 28$ males, 21.54 ± 1.90 years, three nights per subject). Thereby, we strived to differentiate sleep stages solely with these EEG markers and to compare their performance. We used the Lempel-Ziv-Welch algorithm to compute neuronal complexity and estimated the spectral slope of EEG power spectra by applying robust linear fits in log-log space from 30–45 Hz and 3–45 Hz. Differences across sleep stages were analysed

with semi-parametric factorial and multivariate pattern analyses to take the repeated measurements and topographical patterns into account.

Both, neuronal complexity ($F_{WTS}(4) = 517.56$, $p < 0.001$) and spectral slope ($F_{WTS}(4) = 124.63$, $p < 0.001$) were significantly modulated by sleep stages. When additionally considering topographical patterns, both parameters classified sleep above chance-level (20%) with a significantly higher accuracy for the neuronal complexity (55%) than for the spectral slope (33.51%, $F_{WTS}(1) = 627.29$, $p < 0.001$). Critically, while the slope from 30–45 Hz and neuronal complexity were both decreasing from wakefulness to N3 sleep, they behaved differently during REM sleep. The slope was still significantly more negative in REM (−2.55) than in N3 sleep (−2.01;$F_{WTS}(1) = 23.96$, $p_{adj.} < 0.001$), but complexity was significantly elevated (0.37 vs. 0.32; $F_{WTS}(1) = 300.44$,$p_{adj.} < 0.001$). Results between slope and complexity became much more similar when fitting a broader frequency range (3–45 Hz), indicating that the narrowband slope (30–45 Hz) carries distinct information, which is not represented in neuronal complexity. All results were highly stable and emerged across all three recordings per subject.

Our findings suggest that neuronal complexity and spectral slope are both informative and intra-individually robust electrophysiological markers of altered brain states, which are easily accessible and might be useful for studying sleep and other altered states of consciousness.

Disclosure: No

P384 | Accurate 4-class sleep scoring based on interbeat intervals using low-cost wearables

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Objectives: Sleep scoring based on polysomnography (PSG) performed by human experts is the gold standard for the objective measurement of sleep. Both, PSG and manual sleep scoring is however resource intensive and time-consuming rendering the gold standard impractical for monitoring sleep over longer periods, for example, along multiple week treatment protocols for insomnia. Therefore, new low-cost, automatized and most importantly scientifically validated alternatives to PSG are highly needed. Here, we provide evidence that inter heartbeat interval (IBI) estimations from affordable consumer wearables in combination with deep learning algorithms can be used as a convenient tool to provide reliable 4-class sleep scorings to end-users on a daily basis.

Methods: An attention-based deep neural network model was developed and trained to classify sleep into four stages (Wake, Light (N1 + N2), Deep, Rem) solely using IBIs.

Model training was performed on automatically extracted IBIs from the ECG channels of a large collection ($N = 8898$) of publicly available PSG recordings that have been sleep-scored by human experts based on standard AASM criteria. The trained model was then adjusted and applied to one of our own in-lab PSG datasets ($N = 51$) that—besides expert-based sleep scorings from PSG—included time-synchronised IBI estimations from two low-cost (< 100€) consumer wearables; an optical (Photoplethysmography, PPG) heart rate sensor (Polar OH1) and a 1-channel ECG breast belt (Polar H10). Model performance was expressed using overall accuracy rates and cohen's kappa κ.

Results: Overall epoch-by-epoch accuracy on a test split (25%) of the training dataset was 80% ($\kappa = 0.702$). Classification accuracy on our in-lab data was 77.5% ($\kappa = 0.651$) based on the PPG Sensor and 77.9% ($\kappa = 0.657$) based on the 1-channel ECG breast belt, which was practically identical to the accuracy achieved using a gold-standard ECG channel (77.2%, $\kappa = 0.652$).

Conclusions: IBIs derived from consumer wearables can be used to reliably score sleep into four classes. The achieved accuracy rates are close to interrater agreement scores reported for 5-class sleep scorings performed by human experts based on full PSG.

Disclosure: No

P385 | Rebooting the twilight zone: redefining MSLT thresholds after four decades of objective sleepiness assessment

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Background: Sleepiness is one of the major risk factors in road and work accidents and has severe psychophysiological consequences, leading to a significant socio-economic impact. To this day, the Multiple Sleep Latency Test (MSLT) has been regarded as the gold standard of objective sleepiness measurement. From a methodological standpoint, there is still confusion about the best cut-off point to differentiate problematic from normal sleepiness and multiple studies have suggested that the current thresholds may not be sensitive enough to discern normal from pathological levels of sleepiness. This paper wants to be the first to challenge the thresholds through large-scale psychometric analysis.

Methods: By means of Rasch analysis we will try to overcome the raised methodological drawbacks to redefine sleep latency categories of the MSLT through three different datasets. One dataset includes MSLT data from a 36-h sleep deprivation experiment. The two other datasets are a collection of 596 clinical MSLT's from the Brugmann Hospital (CHUB) and the University Hospital of Antwerp (UZA). Different thresholds will be examined and compared in order to find the most adequate thresholds in terms of sensitivity, reliability, dimensionality and construct validity.

Results: Rasch analyses showed that the original one-minute catgeory thresholds ranging from 0-20 were inadequate in terms of overlap and dimensionality, item and person fit and rating scale functioning. The category thresholds proposed in the literature (0-5; 5–10; 10–15 and 15–20 min) showed limited improvement. After thorough examination, Rasch analysis revealed the most optimal thresholds were

distributed [BD1]into four categories ranging from 0–4, 4–8, 9–19 and 20 min or more.

Conclusion: The current and theoretical category thresholds of the MSLT can be optimized as seen by Rasch analysis. All category thresholds were examined throughout all the datasets and resulted in similar outcomes, showing the importance of an up-to-date revision of the current approach on objective sleepiness measurement.

Disclosure: No

P386 | Cicada: an open source software for analysing actigraphy and data from other wearable devices

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Objectives: Wearable devices use a variety of sensors to monitor one's physiology, behaviour and environment, and these devices have a long-standing history in both sleep medicine and sleep research. Despite the fact that many sleep laboratories use wearable devices among their standard equipment, the know-how to comprehensively analyze its data is still rather limited. In part, this is due to the limited analysis options in proprietary software or the need for coding for example, using R-packages. Cicada is an open-source application to import data from various wearable data sources and offer research-grade analysis options through a user-friendly interface.

Methods: Cicada is a Matlab application, that can be installed as a stand-alone application as well. All its code is open-source and available through github.com/rickwassing/cicada-develop. The documentation website is hosted on cicada-actigraphy-suite.readthedocs.io and can be easily maintained through using restructured-text files. A validation study is currently underway to confirm that the application's output is equal to that of GGIR, the most widely used R-package to analyze actigraphy data. This validation study will use a wide range of study populations (clinical, healthy subjects, athletes) to compare the output of the algorithms implemented in GGIR (gold-standard) and Cicada (new method) to detect non-wear periods, calibrate and annotate actigraphy data and detect sleep windows.

Results: The beta-version (current 0.10.2) has been used successfully in 5 research studies at 3 research institutes, and the first stable version will be released along with validation data before September 2022.

Conclusions: Cicada is an open-source and user-friendly application to import and analyse data from various wearable devices. Clinicians may use the application to comprehensively – albeit easily – analyse wearable data from patients which has the potential to inform clinical pathways. Finally, the project aims to attract interest from the wearable-research community to advance this open-science project.

Disclosure: No

P387 | Review of the maintenance of wakefulness test in central disorders of hypersomnolence

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Objectives: To review the usefulness of the Maintenance of Wakefulness Test (MWT) as assessment of daytime sleepiness in the evaluation of treatment effects and driving fitness in central disorders of hypersomnolence (CDH).

Methods: We performed a scoping review of studies using the MWT in patients with CDH (i.e., narcolepsy types 1 and 2, and idiopathic hypersomnia). MWT effect sizes were compared to the Clinical Global Impression (GCI) scale and the Epworth Sleepiness Scale (ESS). MWT sleep latency was correlated to objective driving performances. The role of motivation was evaluated by comparing MWTs of treatment studies (low motivation) to driving fitness studies (high motivation to stay awake). Healthy controls were compared to norm values.

Results: $N = 20$ articles were included, comprising 683 patients and 129 controls. MWT and CGI were both impacted by the same treatment, however the MWT has higher effect sizes and was more sensitive to measure these effects. The MWT correlated fairly to moderately to objective driving performance. Motivation played a major role on MWT sleep latencies. Current norm values may not be valid, as sleep latency may be impacted by age.

Conclusions: The MWT's applicability to measure treatment effects in CDH was confirmed, but age-adjusted norm values are needed. For a more complete evaluation of EDS it should be combined with subjective measures. Its reliability for driving fitness evaluation is insufficient, and motivation plays a major role. To predict or monitor driving performance in CDH, valid and easy methods should be developed.

Disclosure: No

P678 | Stages and channels affect spindle detection performance across manual and automatic detectors

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Spindles are implicated in sleep and memory processes, but their detection can be difficult and biased. Furthermore, characteristics

(e.g., stage and location) of spindles is often overlooked during detection validation. In this project, we have compared the manual detection and confidence of 10 raters with 8 different automatic detections of spindles.

Methods: The EEG dataset used was composed of randomly selected period of 5–10 min of N2 and N3 sleep per cycle from30 good sleepers (age: 42.5 ± 18.9; 18F; Total N2 = 1029 min; N3 = 582 min). Three manual raters per segment scored spindles on Fz, Cz and Pz and specified their level of confidence (low, medium, high). We created a consensus based on the 3 raters' detection and confidence (8 levels of confidence). We also detected spindles using 8 commonly used automatic detections. We extracted spindle parameters for each detection and compared agreement within and between manual and automatic detectors (F1 score).

Results: Detections and confidences varied between manual raters depending on channels and stages, but confidences were highest for spindle on Pz during N2 and lowest in Fz during N3. Consensus of three raters per segment revealed that spindles with the highest amplitude, duration and peak frequency were the more confidently detected (all $p < 0.001$). The 8 automatic detections were highly different in count ($H = 579$, $p < 0.001$), density ($H = 864$, $p < 0.001$), amplitude ($F = 21.9$, $p < 0.001$) and duration ($H = 805$, $p < 0.001$) while peak frequency was relatively consistent across detectors. Consequently, agreement between detectors was relatively low for spindles depending on stage and channels (from 12% in N3-Fz to 80% in N2-Pz). Analyses of agreement between automatic detectors and manual detections revealed small-to-moderate agreement (from 1%–60%) where automatic detectors would only detect the spindles manually detected with the highest confidence in Cz (4%–53%) and Pz (4%–60%) during N2 but exhibited lowest agreement with spindles manually detected in Fz-N3 (1%–40%).

Conclusion: This systematic comparison of spindle characteristics revealed high variability between both manual and automatic detections. Specifically, stages and channels impact stereotypical spindle features and confidence ratings, which critically influence both manual and automatic spindle detection, and should be considered when investigating spindle mechanisms and functions.

Disclosure: No

P679 | Nap scoring: Comparison between single channel autoscoring and visual sleep staging in young and older volunteers

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Introduction: Visual sleep scoring (VS) is time consuming and characterized by inter-scorer variability. The later may be further amplified by scoring shorter-duration day- and nighttime naps, compared to classical scoring of consolidated night-time sleep. Moreover, full polysomnography montage is bulky which may deter from recording naps. Thus, the search of reliable alternatives needing less parameters to discriminate sleep stages is relevant. The single-channel automatic sleep scoring (AS) software ASEEGA has been previously validated on all-night sleep recordings in young and older volunteers and in patients. Here, we aimed to evaluate this software in the specific case of nap scoring, in both young and older volunteers.

Methods: 200 nap recordings from 10 young men (23+/−2 years) and 10 older (5 women, 69+/−3 years) volunteers that underwent a 40-h nap protocol encompassing 10 nap periods over day and night were included. Visual scoring was performed by two experts from different sleep centers (VS1 and VS2) according to the AASM rules. AS analyzed the single EEG channel CzPz, without any information from EOG nor EMG. Epoch-by-epoch agreements (concordance, C, and Conger's kappa coefficient, *k*) were computed pairwise and between AS and consensual VS (VSc). Sensitivity (SE) and its reciprocal, positive predictive value (PPV), associated with Wake, REM and NREM were also computed between AS and VSc.

Results: Overall agreement between AS and VSc was $C = 85.5\%$, $k = 0.79$. Regarding comparisons in young (respectively, in older), agreements were $C = 82.0\%$, $k = 0.75$ ($C = 77.5\%$, $k = 0.68$) between AS and VS1, AS and VS2: 73.4%, $k = 0.64$ ($C = 73.7\%$, $k = 0.63$), VS1 and VS2: 77.1%, $k = 0.68$ ($C = 80.4\%$, $k = 0.73$). Agreement between AS and VSc was 88.2%, $k = 0.82$ ($C = 83.0\%$, $k = 0.75$). Se/PPV were Wake = 91.3/99.2, REM = 87.1/69.8, NREM = 93.5/90.8 in young, Wake = 95.5/89.5, REM = 76.1/90.6, NREM = 91.5/93.1 in older.

Conclusions: The agreement between AS and VS is comparable to that reported for the inter-expert agreement, which supports the use of autoscoring for nap sleep. Interestingly, sensitivity and PPV were inversed for REM in older, compared to young. Two opposite interpretations: AS misses REM manifestation in the older or AS scores REM constantly through age groups, whereas VS may be more inclined to search for REM manifestation in older adults.

Disclosure: Yes

Conflict of Interest statement: C. Berthomier & P.Berthomier have ownership/directorship and are employees of Physip who owns Aseega. The other authors have no conflict of interest to disclose.

P680 | A systematic review of reviews of generic and disease-specific sleep questionnaires in adults

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Introduction: In sleep medicine, a broad range of Patient-Reported Outcome Measures (PROMs), also called "sleep questionnaires", are

available to identify sleep disturbances and sleep-related impairment in adult patients. Yet, an overview of existing sleep questionnaires and a critical appraisal of one of its most important measurement properties, content validity, is lacking. This systematic review of generic and disease-specific sleep questionnaires provides clinicians and researchers with an overview and evaluation of the content validity of currently available questionnaires.

Methods: A systematic search was performed in Web of Science, PsycINFO, and PubMed to identify available sleep questionnaires. Search terms consisted of (sleep* OR sleep apnea OR insomnia OR restless legs syndrome OR narcolepsy OR parasomnia) AND (questionnaire* OR scale* OR patient-reported outcome measure* OR PROM*) AND (psychometric* OR clinimetric*). Generic and disease-specific sleep questionnaires were retrieved from available reviews fulfilling our criteria within this search, and additional cited reference search and search in grey literature. Next, information about key characteristics of available sleep questionnaires was extracted from the development studies and a Risk Of Bias (ROB) assessment was performed, based upon the COnsensus-based Standards for the selection of health Measurement INstruments (COSMIN) checklist for assessing the content validity of PROMs.

Results: A total of 33 eligible systematic review studies were identified, including 58 unique sleep questionnaires fulfilling our criteria. Particularly, we identified 20 generic sleep questionnaires, 19 insomnia questionnaires, 13 obstructive sleep apnea questionnaires, and 6 restless legs questionnaires. Questionnaire characteristics (e.g., constructs, target population, intended context of use, number of items, recall period, response options) and content validity of the available questionnaires varied largely between questionnaires. Although more recent development studies design, conduct, analyze, and report according to best practices in PROMs research, risk of bias of the overall content validity of available sleep questionnaires is often found insufficient or inconsistent.

Conclusions: Most sleep questionnaire were disease-specific, yet, not all major sleep disorders were represented. The majority of development studies of available sleep questionnaires reported on the reliability and construct validity, yet, the content validity of these questionnaires is understudied. Recommendations for future research are provided.

Disclosure: No

P681 | Assessing the feasibility of reducing slow-wave activity with a wearable device in a home setting

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Objective: Sleep deprivation has been shown to reverse depressive symptoms in approximately 60% of patients with major depression. Its therapeutic utility, however, is hampered by the typical relapse into the depressive state after recovery sleep and the detrimental physiological and psychological effects of prolonged wakefulness. This pilot aims to assess the feasibility of reducing slow-wave activity (SWA) by performing auditory stimulation using a wearable device (MHSL-Sleepband v3) in a home setting.

Methods: We recorded frontal EEG in five healthy participants (24.3 ± 2.3 years old) for six consecutive nights with tone application (verum) and six nights without (sham). The device precisely delivered tones upon detecting the slow-wave down-phase (before the negative peak) and N2/N3 sleep, using alternating 10-s ON-OFF window pairs. Device usability was assessed on a scale from 0, not at all difficult, to 5, very difficult. Sleep scoring (30 s epochs) was performed according to AASM guidelines. Separately considering ON and OFF windows, we used linear mixed effects models to analyze potential differences in SWA (0.5–4.0 Hz) between verum and sham stimulation nights.

Results: All five participants used the wearable device for twelve nights. The device was considered easy to use (all participants scored < 2). Due to artefacts (signal loss of > 20%), four nights of one participant were excluded from analysis. Fifty-six nights were included in the analysis ($n = 27$ sham, $n = 29$ verum). We saw an effect of tone application, with SWA in OFF windows being lower on verum nights (166 μV^2, 95%-CI 68 to 266, $p < 0.01$) and unchanged in ON windows ($p = 0.99$) as compared to sham nights. When averaging SWA from ON and OFF windows we found no difference between verum and sham ($p = 0.21$). Sleep architecture (stage percentage) did not change due to conditions or nights ($p > 0.05$ for all stages).

Conclusions: This proof-of-concept study in healthy volunteers suggests that down-phase sleep modulation with the MHSL-Sleepband v3 is feasible and reduces SWA in N2/N3 sleep. Future clinical trials are planned to evaluate the efficacy of lowering SWA without disrupting the overall sleep architecture in depressed patients.

Disclosure: No

P682 | A prediction model of cardiovascular disease based on artificial intelligence in patients with sleep-disordered breathing

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Objectives/Introduction: This study proposes a method of prediction of cardiovascular diseases (CVDs) that can develop within ten years in patients with sleep-disordered breathing (SDB).

Methods: From the data during a baseline period when patients did not have any CVD, we extracted 18 features from electrography (ECG) based on signal processing methods, 30 ECG features based on artificial intelligence (AI), ten clinical risk factors for CVD. We trained the model and evaluated it by using CVD outcomes result, monitored in follow-ups. The optimal feature vectors were selected through statistical analysis and support vector machine recursive feature elimination (SVM-RFE) of the extracted feature vectors. Features based on AI, a novel proposal from this study, showed excellent performance out of all selected feature vectors. Also, new parameters based on AI were possibly meaningful predictors for CVD, when used in addition to the predictors for CVD that are already known. The selected features were used as inputs to the prediction model based on SVM for CVD, determining the development of CVD-free, coronary heart disease (CHD), HF, or stroke within ten years.

Results: The respective recall and precision values were 82.9% and 87.5% for CVD-free; 71.9% and 63.8% for CVD; 57.2% and 55.4% for CHD; 52.6% and 40.8% for HF; 52.4% and 44.6% for stroke. The F1-score between CVD and CVD-free was 76.5%, and it was 59.1% in class four.

Conclusion: Our results confirm the excellence of the prediction model for CVD in patients with SDB and verify the possibility of prediction within ten years of the CVDs that may occur in patients with SDB.

Disclosure: No

P683 | Comparison of in-ear EEG against psg system for sleep staging

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Introduction: The IDUN GUARDIAN is a mobile 2-channel in-ear electroencephalogram (EEG) system, optimised for long-term to address the drawbacks of conventional Polysomnography (PSG) systems which require long set up times and are built for lab settings.

Methods: The GUARDIAN was compared against a gold-standard PSG system. Sleep onset data was gathered by recording 1 h daytime naps with 18 healthy participants (8 females; age range: 21–43) to collect 22 data sets. Sleep staging of the data was done based on the AASM (Version 2.6; Berry et al., 2020) criteria. 30 s epochs were scored as wakefulness (W), non-REM 1 (N1), non-REM 2 (N2), deep non-REM 3 (N3), or REM sleep (R) stages. PSG data (SOMNOscreen plus, Randersacker, Germany) included 5 EEG channels (F3, F4, C3, C4, O1; referenced to contralateral mastoid), 2 EMG channels placed on the chin, 2 EOG channels placed around the eyes, and ECG channels (Lead II placement) on the torso. Data was gathered from both systems simultaneously and synchronized for temporal comparison of the signal and scored epochs.

Results: Visual comparison between in-ear and scalp-EEG channels revealed a clear correlation of neural activity differentiating sleep stages. Sleep markers included alpha and beta activity during W, alpha-to-theta shift during sleep onset (W-N1), sleep spindles and K complexes during N2, slow wave activity in N3, and short bursts of arousal during different sleep stages. In addition, the GUARDIAN revealed the onset of slow rhythmic eye movements, characteristic for the transition between wakefulness and sleep in some participants. Sleep scoring was first performed independently on the PSG channels (F3, C3, O1, EMG, EOG, and ECG), and the in-ear EEG channels. Pearson's correlation coefficients between the resulting sleep scores of both devices revealed moderate to high correlations across all datasets (average: $r = 0.75$).

Conclusions: The IDUN GUARDIAN was found to produce EEG that could be used to accurately detect sleep markers. The mobility of the GUARDIAN may allow it to be used to support the narcolepsy patient journey by identifying sleep attacks throughout the day and potentially support treatment decisions regarding medications and lifestyle in an unobtrusive and comfortable way.

Disclosure: Yes

Conflict of Interest statement: IDUN Technologies develops in-ear conductive electrodes (GUARDIAN) for brain-computer interface product development used in the study.

P903 | Comparing sleep in shared and individual rooms during a training camp in elite youth soccer players

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Introduction: In recent years, the growing interest in understanding how athletes sleep has boosted the number of scientific studies on the topic. In fact, athletes and coaches have ranked sleep as the most important recovery strategy. However, athletes often spend nights in unfamiliar environments during training camps that may disrupt sleep.

Objective: Therefore, the purpose of this study was to analyse the impact of sleeping in shared vs. individual bedrooms on objective and subjective sleep, and on cardiac autonomic activity in elite youth soccer players during an official training camp.

Methods: Thirteen elite male youth soccer players (aged: 17.9 ± 0.4 years; mean ± SD) participated in the study. Sleep indices were examined using wrist actigraphy and a 7-point Likert scale. Heart rate (HR) monitors were used to examine cardiac autonomic activity during slow-wave sleep (SWS)-derived episodes throughout two training camps (training camp with players sleeping in individual bedrooms [TCIR] vs. training camp with players sleeping in shared bedrooms with separate beds [TCSR]). Workload was characterized using global positioning system (GPS) units and the session rating of perceived exertion (s-RPE). Differences in objective and subjective sleep, SWS-

derived cardiac autonomic activity, and training and match workload variables between both training camps were examined using linear mixed model analysis.

Results: Players slept significantly longer during TCIR than TCSR (+ 1:28 [1:18–1:42] min, $p < 0.001$).Sleep efficiency was significantly higher during TCIRthan TCSR(+ 12 [10–15] %; $p < 0.001$), while sleep latency was significantly shorter during TCIR than TCSR(−3 [−15 to −4] min; $p < 0.001$). Subjective sleep quality was significantly lower during TCIR than TCSR(−2 [−3 to −2] arbitrary units; $p < 0.001$). No significant differences were found for SWS-derived cardiac autonomic activity, neither for training and match workloads between training camps.

Conclusions: Overall, this study suggests that sleeping in an individual bedroom compared to shared bedroom may improve objective and subjective sleep in elite male youth soccer player's during training camps.

Disclosure: No

13: COMPUTATION / MODELLING

P069 | Awakening is correlated with a widespread increase in high-frequency connectivity

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Background: The neurophysiological signature of the awakening brain is not fully understood. Here we leveraged on stereo-electroencephalography (SEEG) recordings providing high spatio-temporal resolution to assess the process of awakening at a local level. We assessed spectral and connectivity changes during the awakening process in different brain regions.

Methods: We used simultaneous polysomnography and SEEG recordings of awakenings of 16 patients with focal drug-resistant epilepsy undergoing pre-surgical epilepsy evaluation, as only in this population prolonged invasive recordings are possible. We performed spectral and phase locking value connectivity analyses from 15 min prior to 15 min following awakenings in 601 normal non-epileptic electrode contacts. Contacts were grouped within 17 regions, using a reduced version of the anatomical MICCAI atlas and the Yeo7 network atlas. Awakening data were compared to a wakefulness reference distribution as percentiles, and changes in power and connectivity were assessed using Bonferroni-corrected Mann Whitney tests.

Results: Awakening is a process that arises in the order of tens of seconds (−32 to +71 s) in the investigated brain regions when compared to the scalp EEG awakening (SEA) time. Awakenings from NREM sleep were accompanied by a decrease in delta power and an increase in the gamma-ripple power in frontal, parietal and insular regions ($p < 0.001$) within −8 to +33 s from the SEA. Awakenings from REM sleep showed an increase in the gamma-ripple power in temporal, parietal and frontal regions ($p < 0.01$), and a decrease in delta power in frontal regions ($p = 0.03$) within −32 to +71 s from the SEA. Connectivity analysis showed an increase in the gamma-ripple bands following awakenings from REM and NREM in the default mode, attention and somato-motor networks ($p < 0.01$) within −6 to +23 s from the SEA, while lower frequencies showed little to no change.

Conclusions: Awakening from sleep is a spatio-temporal heterogenous process, with spectral differences in low and high frequencies in awakenings from NREM and REM sleep. Finally, we found an increase in the high frequency connectivity following awakenings from NREM and REM sleep, likely coordinating the process of regaining consciousness.

Disclosure: No

P070 | Genome-wide association study of z-drug purchases discovers genetic causality with psychiatric traits

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Introduction: Approximately 5%–10% of the European and US populations use hypnotics and sedatives. In this project, we wanted to understand the use patterns, benefits and genetic determinants of sleep medications.

Methods: We used the FinnGen Release 7 cohort (311,892 participants) with registered Z-drug purchases defined as N05CF ICD10/ATC category (Benzodiazepine related drugs; Zopiclone, Zolpidem and Zaleplon) and performed a genome-wide association study (GWAS), genetic correlation, Mendelian randomization (MR) and explored the functional consequences of the variants.

Results: In the GWAS ($N = 311,892$) we identified 27 genetic loci significantly associated with Z-drug purchases ($p < 5 \times 10^{-8}$) and 14 loci were gender specific. As expected, genetic correlation demonstrated significant correlation between Z-drugs and insomnia ($p = 1.14 \times 10^{-62}$). In addition, psychiatric comorbidity was notable with depression ($p = 2.86 \times 10^{-89}$), schizophrenia ($p = 2.52 \times 10^{-21}$), mood

instability ($p = 1.18 \times 10^{-20}$) and anxiety ($p = 2.88 \times 10^{-27}$) showing significant genetic correlation. These results were further tested using two-sample MR to demonstrate significant causal links between Z-drugs and; anxiety (IVW $p = 8.6 \times 10^{-12}$, Odds Ratio (OR) [95% Confidence Interval (CI)] = 1.03[1.02–1.04]), depression (IVW $p = 4.5 \times 10^{-5}$, OR[95%CI] = 2.13 [1.48–3.06]), insomnia (IVW $p = 3.6 \times 10^{-61}$, OR[95%CI] = 1.07[1.06–1.08]) and schizophrenia (IVW $p = 2 \times 10^{-4}$, OR[95%CI] = 1.02[1.01–1.03]), suggesting these conditions as risk factors for Z-drug use. In addition, the variants were enriched near genes that are expressed in the pituitary gland and in the brain, and we identified two missense variants in GPR101 and in TNRC6 suggesting direct biological mechanisms that are related to Z drug use.

Conclusions: These results build on the growing literature between sleep and psychiatric traits and connect sleep medications with psychiatric traits and provide novel biology to understand the connection between sleep and psychiatric traits.

Disclosure: No

P071 | Automatic sleep staging based on subcutaneous EEG in healthy adults: results from the ultra long-term sleep study

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Objectives/introduction: Polysomnography (PSG) is the gold standard in sleep staging. PSG recordings are manually scored in the clinic, which is very time-consuming. Recent advancements in machine learning-based solutions show great potential for automatic methods to be used in the clinic. This study compares automatic sleep staging based on subcutaneous EEG (sqEEG) with manually scored PSGs. The subcutaneous implant allows us to record for many consecutive nights for each subject due to its unobtrusiveness.

Methods: Twenty healthy subjects (33 ± 13 years of age) are enrolled in a clinical trial to investigate seasonal sleep changes by recording EEG in situ for 365 consecutive nights. The data is collected in the Ultra Long-term Sleep (ULTS) study (ClinicalTrials.gov Identifier: NCT04513743). Six PSGs per subject will be recorded and scored by a sleep technician. This creates ground truth labels for the automatic sleep staging. We tested two different state-of-the-art sleep staging models in this interim analysis: SeqSleepNet and Sleep Transformer. Both models were trained and evaluated using ten-fold cross-validation. Sleep Transformer was initially pre-trained on more than the 4000 PSGs from the publicly available dataset from the Sleep Heart Health Study, and then fine-tuned on the ULTS dataset.

Results: The first fourteen subjects have now completed the study. These preliminary results are based on the data from all twenty subjects and at least two PSGs per subject. Both models were evaluated using macro F1-score (F1) and Cohen's kappa (κ). SeqSleepNet had F1 = 0.77 and κ = 0.77. Sleep Transformer had F1 = 0.78 and κ = 0.78.

Conclusions: Our findings show that it is possible to automatically sleep stage based on sqEEG. Sleep Transformer had better performance than the smaller model SeqSleepNet. These preliminary results compare favourably to the inter-rater agreement between sleep technicians as found in the literature. This suggests that the output of the sleep staging models has clinical relevance.

Disclosure: Yes

Conflict of Interest statement: This research is supported by Innovation Fund Denmark. Troels W. Kjær is a consultant for UNEEG medical.

P388 | A personalized semi-automatic spindle detection (PSASD) Framework

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Introduction: Sleep plays an essential role in maintaining homeostasis of multiple organ systems and cognitive function. Sleep spindles have been associated with memory formation and synaptic plasticity. Spindles have been posited to represent potential biomarkers of neuropsychiatric disease. While spindle characteristics vary across subjects and lifespan, they remain stable within an individual. In this work, we developed a framework for the detection of spindles that is personalized to individual sleep recordings, addressing limitation of current approaches that are commonly trained on limited number of datasets with restricted age ranges (typically biased toward younger healthy adults).

Methods: Our underlying model is based on the DETOKS algorithm (Parekh, Selesnick et al. 2015), in which a generative model is assumed for electroencephalogram (EEG) signal with multi-compartment optimized to EEG amplitude. To personalize spindle detection, few epochs (30-second intervals) that have been scored by sleep technologists are used to tune the DETOKS algorithm. A grid search approach is then employed in which different combinations of model parameters are tested to find the best set of parameters for an optimal trade-off between precision and recall measures.

Results: We tested our Personalized Semi-Automatic Spindle Detection (PSASD) framework on the DREAMS dataset (Devuyst, Dutoit et al. 2011), previously used for benchmarking spindle detection approaches. PSASD achieved an average F1 score of 0.74 ± 0.02 (mean ± SEM), outperforming DETOKS by 4%. Additional analysis revealed that four epochs are enough to fine-tune model parameters

of PSASD. We have also developed a universal graphical user interface for both manual scorings of spindles and verification of automatically detected spindles.

Conclusions: Overall, PSASD enhances detection of sleep spindles in the DREAMS dataset and could help us to improve detection of this sleep EEG marker in older adults and patient populations. Furthermore, the developed graphical user interface allows rejection of false positives (events that are detected as spindles by the algorithms but are not true spindles) to enhance the quality of scientific conclusions.

Disclosure: No

P389 | Structure and validation of freely available automatic blood oxygen saturation signal analysis software

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Introduction: Most clinical polysomnography analysis software have automatic tools to detect desaturation events from the oxygen saturation (SpO_2) signal. However, these software do not provide sophisticated SpO_2 signal-based parameters, for example, desaturation severity (DesSev) [Kulkas, *J.Med.Eng.Technol*, 2013] or hypoxic burden [Azarbarzin,*EHJ*, 2019], which have been shown to improve the severity estimation of sleep apnoea. In addition, the clinical software require expensive licenses and lack batch processing tools making the analysis of large datasets troublesome in scientific research. To tackle these limitations, we developed a freely available automatic blood oxygen saturation analysis software (ABOSA).

Methods: ABOSA was programmed with MATLAB. ABOSA detects desaturations and following recoveries automatically from the SpO_2 signals (EDF files) and calculates numerous parameters, such as oxygen desaturation index (ODI) and DesSev. We evaluated the accuracy of ABOSA by comparing its desaturation scorings to manual scorings in two sleep apnoea patient datasets (Kuopio, n = 1981; Loewenstein, $n = 934$). The validation was performed by calculating Matthews correlation coefficients (MCC) in a second-by-second manner, and median differences in parameter values. Furthermore, in 100 patient subpopulations, the performance of ABOSA software was compared to automatic scorings of two commercial software, Noxturnal and Profusion. Custom-made functions were used to calculate the novel desaturation parameters from Noxturnal and Profusion desaturation scorings as these software cannot calculate them.

Results: The agreements between ABOSA and manual desaturation scorings were great in both Kuopio (MCC = 0.800) and Loewenstein (MCC = 0.859) datasets. Median differences in ODIs were 0.8 (Kuopio) and 0.6 (Loewenstein) events/h with ABOSA slightly overestimating the values. Similarly, median difference in DesSev was 0.02 percentage points in both datasets. Furthermore, ABOSA, Noxturnal, and Profusion software performed very similarly in both Kuopio ($MCC_{ABOSA} = 0.804$, $MCC_{Noxturnal} = 0.807$, $MCC_{Profusion} = 0.811$) and Loewenstein ($MCC_{ABOSA} = 0.868$, $MCC_{Noxturnal} = 0.886$, $MCC_{Profusion} = 0.850$) datasets. Similar to ABOSA, Noxturnal and Profusion slightly overestimated the desaturation parameter values.

Conclusions: The developed ABOSA software accurately detects desaturation events. ABOSA provides traditional clinical parameters as well as novel desaturation and recovery parameters and event-specific metrics which no other software currently provides. In addition, ABOSA is freely available (https://zenodo.org/record/6198838) and it enables easy batch analysis of large datasets which is not supported by the current clinical software.

Disclosure: No

P390 | Multimodal sleep monitoring in ageing

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Objectives/Introduction: Sleep disturbances are common in ageing and among people living with dementia. Currently, few technologies exist to longitudinally monitor sleep that are validated in older people. Here, we develop machine learning models that use multimodal data (cardiac signals and actigraphy) to accurately classify sleep and wake (task 0) and discriminate between sleep stages; task 1 (Wake, NREM [N1+N2+N3], REM), and task 2 (Wake, REM, Light Sleep [N1+N2] and Deep Sleep [N3]).

Methods: We analysed two datasets: the Multi-Ethnic Study of Atherosclerosis (MESA) and the Surrey Sleep Research Centre-UK DRI (SRCDRI001) data with 1743 (54–94 y) and 18 participants (65–80 y), respectively. Both datasets consist of an overnight polysomnography recording (PSG, including ECG) with actigraphy. In addition, the SRCDRI001 data included 16-h of cardiac signals derived from photoplethysmography (PPG) from the Empatica-E4 wristband. We evaluated (i) conventional machine learning methods using cardiac features from either ECG or PPG and statistical features from the actigraphy data and (ii) deep learning models using the raw data. For validation, the MESA dataset was randomly divided into the train (80%) and test (20%) subsets, and the 3-fold cross-validation technique was used for SRCDRI001. Single modality (actigraphy or cardiac signals) and multimodality (both signals) approaches were evaluated for all tasks.

Results: Task 0 – our proposed DL model and multimodal data improved wake classification (up to 36% higher) and had a similar

sleep epoch detection performance (86.2%) compared with the single modality (86.9%). Using the E4 data and extending the monitoring time to 16-h gave only a slightly lower accuracy (84.1%) than using the ECG in the SRCDRI001 data (85%). Tasks 1 and 2 – results demonstrate that multimodal inputs especially cardiac signals can increase the performance of the classifiers (up to 16%) for multistage classification. REM and deep sleep stages were underestimated in almost all scenarios in tasks 1 and 2, respectively. In addition, among all stages, cardiac signals had the most discriminative power for REM stage classification.

Conclusions: In older adults without dementia, combining multimodal data from wearables with machine learning methods improved wake and sleep stages classification. This approach holds promise for 24-h sleep monitoring.

Disclosure: No

P684 | SOM-CPC: a new clustering method for sleep recordings to facilitate pattern recognition

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Objectives/introduction: The expressiveness of a hypnogram is limited due to the assignment of one AASM label per sleep epoch. We explored a new pattern-recognition method to further study sleep structure, possibly yielding new insights in disordered sleep. Cluster analysis is a common approach for unsupervised pattern recognition, but classical methods are typically applied on handcrafted features (e.g., spectral power bands), selection of which relies on expert knowledge and often limits an approach to specific applications. We propose SOM-CPC, a method that learns features using Contrastive Predictive Coding (CPC), and directly clusters, as well as visualizes, them using a Self-Organizing Map (SOM). SOM-CPC is sensor-agnostic and takes temporal information into account.

Methods: Video-polysomnography recordings of 96 healthy subjects were studied (60 F, age: 33 ± 13.6 years) from which we sub-selected F3/F4, C3/C4, O1/O2, Chin1/Chin2 and E1/E2 derivations. We created a hold-out test set of the even channels from $n = 11$ recordings on which conclusions were drawn. The rest of the data were used for training and validating the model. SOM-CPC resulted in a 2-dimensional grid of 100 clusters. For interpretability, each cluster was labelled both with the most-frequent AASM sleep stage label and average time-of-night. Cluster statistics were compared using the non-parametric Mann Whitney U test.

Results: Labelling each cluster with the most-frequent AASM label of the training set, yielded a Cohen's kappa of 0.6 ± 0.16 with respect to the expert annotations of the test set. Assigning a *distribution* over AASM labels to each cluster, revealed non-transitional clusters and transitional clusters that received varying labels. Interestingly, these transitional clusters were positioned at the boundaries of non-transitional clusters on the grid. Adding time-of-night labelling, we found a cluster of early-night ($n = 147$, median epoch: 19) and late-night Wake epochs ($n = 262$, median epoch: 498; $U = 6.4e3$, $p = 2.2e\text{-}29$).

Conclusions: We propose a new approach to cluster raw sleep recordings. Visualizing the grid of clusters labelled with different variables per cluster, allows for recognition of patterns beyond those that can be deducted from the hypnogram. Next, training on data from patients with different sleep disorders may cluster certain patients with specific demographics.

Disclosure: No

P685 | Distinct sleep patterns linked to mental health, cognition and lifestyle with associated RSFC signatures

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Sleep is central to optimal daytime functioning and health with numerous direct and indirect effects on cognitive performance, physical and mental health. While such associations are typically studied separately, we take a multidimensional data-driven approach to extract latent components (i.e., sleep-behavior profiles) that simultaneously relate self-reported sleep patterns to clinical, cognitive, and lifestyle factors.

Leveraging a large dataset of healthy young adults (Human Connectome Project; $N = 770$; 28.8 ± 3.6 years; 54% female; mean PSQI score 5.1 ± 2.7), we deployed canonical correlation analysis, a multivariate statistical technique that aims to maximize the correlation between two data matrices by deriving latent profiles (LP), to relate the 7 sleep components of the Pittsburgh Sleep Quality Index (PSQI) to 118 behavioral variables. Furthermore, we explored whole-brain resting-state functional connectivity (RSFC) patterns associated with identified sleep-behavior profiles.

Our analyses revealed five significant latent profiles linking sleep components to pattern of behaviors. The first latent profiles (LP1) revealed a significant association ($r = 0.69$, $p = 0.0002$) between general psychopathology (i.e., negative affect, depressive, internalizing and anxiety problems) with general worsening of all sleep components. In contrast, LP2 revealed a significant association ($r = 0.53$, $p = 0.0002$) between psychopathology (especially inattention problems) and no report of sleep difficulties except for daytime complaints, that might suggest sleep resilience despite daytime issues. Next, LP3 was characterized by regular intake of sleep-inducing medication associated with cognitive problems, but also gratifying social life ($r = 0.49$, $p = 0.0002$). LP4 was driven by short sleep duration associated with emotional dysregulation and poor cognitive performance, especially in social cognition ($r = 0.44$, $p = 0.0002$). Finally, LP5 linked sleep disturbances and poor sleep satisfaction to psychiatric symptoms (e.g., aggressive behavior, thought problems), substance use and poor working memory and language processing ($r = 0.42$, $p = 0.0003$). Each component was associated with a unique RSFC signature that was shared across all participants.

While PSQI components are limited by their subjective nature, we were able to demonstrate five robustly distinct patterns of sleep related to mental health, cognition, substance use, with unique associated RSFC patterns. By using a multidimensional approach to identifying sleep-behavior profiles we can begin to untangle the interplay between individuals' variability in sleep, health, cognition, lifestyle and brain connectivity.

Disclosure: No

14: SLEEP DISORDERS - BREATHING

P072 | Sleep disordered breathing and atrial fibrillation and their impact on long-term outcome of acute ischemic stroke and transient ischemic attacks – a prospective observational cohort study

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Introduction: Sleep disordered breathing (SDB) is an independent cardio-cerebrovascular risk factor and is frequent in patients with atrial fibrillation (AF). The coexistence of SDB and AF represents a significant public health concern due to several common risk factors, including age, sex, and metabolic diseases. Despite the evidence of a complex and bidirectional relationship between SDB and AF on cardio-cerebrovascular events (CCVE), studies investigating the long-term effects of this association in stroke patients are still rare.

Methods: We prospectively studied 4706 patients with acute ischemic stroke/transient ischemic attacks. The apnea-hypopnea index (AHI) was determined within 3 days after stroke with Respiratory Polygraphy/ApneaLink. 7-days long-term electrocardiograms were performed at the acute phase, 3 months, and 6 months. The long-term outcome was a composite of recurrent fatal (death from any cause) and non-fatal cardio-cerebrovascular events (stroke/TIA, myocardial infarction, heart failure, and unstable angina). Cox proportional hazard regression was used to test the impact of comorbid SDB and AF on recurrent CCVE during 36 months visits.

Results: Preliminary analysis was performed in a subgroup of 395 patients. Among these patients, 118 patients (33%) had moderate-severe SDB (AHI ≥15/h). AF was diagnosed in 56 patients (16%) and 28 patients (8%) had both AF and SDB (AHI≥15/h). During the 36 months follow-up, 95 new events were recorded including 25 fatal casualties. Multivariate Cox regression revealed that stroke patients with comorbid SDB (AHI≥15/h) and AF have an increased risk of an incident CCVE or fatal event compared with either AF or SDB (SDB+AF vs. SDB: Hazard Ratio (HR), 2.5, 95%CI: 1.2–5.2; SDB+AF vs. AF: HR, 1.6, 95%CI: 0.6–4.4) after adjusting for age, sex, body mass index, hypertension, diabetes, dyslipidemia, and history of heart failure. Meanwhile, we found that the risk conveyed by SDB (AHI≥15/h: HR: 1.0, 95%CI: 0.6–1.7; AHI≥30/h: HR: 1.3, 95%CI: 0.7–2.4) depended partly on AF (HR: 1.8, 95%CI: 1.1–3.1).

Conclusions: Stroke patients with comorbid SDB and AF have a significantly higher risk of long-term cardio-cerebrovascular morbidity and mortality compared to SDB or AF alone. We are now establishing the whole database and further investigating this association with the entire patient group.

Disclosure: No

P073 | The change of surface tension by salivary phosphatidylcholines induced by oxidative stress affect upper airway patency in osa patients

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Objectives/Introduction: Saliva is a useful biological fluid with various metabolites as well as possibly associates with the upper airway patency by affecting the surface tension on it.

We investigate the metabolomics signature in OSA saliva and evaluate the association between these identified metabolites and salivary surface tension.

Methods: 68 subjects diagnosed with OSA by full-night in-lab polysomnography (PSG) were included.

Their saliva samples were collected before and after sleep, and analyzed by liquid chromatography with high-resolution mass spectrometry (UPLC-MS/MS) after protein precipitation. Surface tension of the saliva samples was determined by the pendent drop method.

Result: Three human-derived metabolites: PHOOA-PC, KPOO-PC, and 9-nitrooreate, were significantly upregulated in the "after sleep" salivary samples from OSA patients compared to the control group samples and were correlated with AHI. The post-pre differences of surface tensions were negatively correlated with the PHOOA-PC and 9-Nitrooleate concentrations.

Conclusion: Salivary metabolite, especially the salivary PHOOA-PC and 9-Nitrooleate, correlate positively with AHI and negatively with salivary surface tension in OSA patients. Our understanding of upper airway dynamics may be improved by simple salivary metabolite analysis

Disclosure: No

P074 | Sleep-disordered breathing is associated with the absence of an ischemic penumbra in acute wake-up strokes

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Objectives/introduction: In Wake-up strokes (WUS) the presence of an ischemic penumbra (critically hypoperfused but potentially salvageable brain tissue) is decisive for the indication of acute reperfusion therapy. The evolution of the penumbra mainly depends on the duration of ischemia and the effectiveness of collateralisation, whereas possible adverse effects of sleep disordered breathing (SDB) on the penumbra progression remain unknown. The aim of this study was to investigate a potential impact of SDB on the penumbra in WUS in the actual night of stroke.

Methods: This is a cross-sectional analysis of acute ischemic stroke patients included in the two-center prospective observational Sleep Deficiency and Stroke Outcome study. SDB was assessed acutely in the first days after stroke. The presence of an imaging mismatch indicating the penumbra was assessed as a dichotomous variable using acute imaging data in acute WUS and a matched cohort of acute non-WUS that received perfusion-imaging on the day of stroke onset. We analyzed the relationship between SDB and the absence of penumbra using multivariable logistic regression models including interaction terms adjusting for potential confounders.

Results: Among 338 stroke patients, 74 (22%) had WUS. WUS and non-WUS showed no difference in SDB severity (respiratory-event-index (REI) 7.4/h in WUS vs. 8.9/h in non-WUS, $p = 0.61$). In the subset of acute WUS ($n = 48$), patients with an absent penumbra ($n = 31$) had a higher REI compared to patients with a present penumbra (median REI 7.4/h vs 2.9/h, $p = 0.004$), whereas in patients with non-WUS, REI were similar in both groups (median REI 6.7/h (absent penumbra) vs 8.4/h, $p = 0.63$). In interaction analyses, a higher REI was associated with the absence of penumbra only in patients presenting with WUS (p value for interaction between WUS and REI = 0.048).

Conclusions: Although the severity of SDB in WUS and non-WUS was similar, our results suggest a detrimental effect of SDB on the ischemic penumbra of WUS in the actual night of stroke.

Disclosure: No

P075 | Excluding item *t* (Tired) from stop-bang questionnaire in different nations: the role of age and sex

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Objectives/Introduction: Our group previously reported that excluding item assessing tiredness (T) might improve the overall predictive value of STOP-Bang in one population. The current research is aimed to investigate the role of the aforementioned item *T* of the STOP-Bang questionnaire among populations in different European geographic regions, while considering the possible moderating role of age and gender.

Methods: A study has been conducted in 3 European Sleep medicine centers - in Split, Croatia; Thessaloniki, Greece; and Izmir, Turkey. A total of 9154 respondents were included, of whom 2364 in Greece, 3638 in Turkey and 3152 in Croatia. Among them, 6345 respondents (69.4%) were men. 1351 respondents were younger than 40 years, with 6684 respondents aged 40 to 69 years, and 1014 respondents were older than 70 years of age. All patients in Greece were assessed with the use of polygraphy, all patients in Turkey were assessed with full-night polysomnography, and Croatian patients were assessed with polysomnography ($n = 1043$) or polygraphy ($n = 2109$).

Results: Specifically, among Greek patients, the exclusion of item *T* resulted in a decrease of STOP-Bang sensitivity from 97.6% to 94.2%, and an increase in specificity from 20.6% to 34.7%. Among patients in Turkey, the exclusion of the item *T* resulted in decreased sensitivity from 98.2% to 93.4%, while increasing specificity from 12.9% to 32.3%. In Croatian respondents, the exclusion of item *T* resulted in decreased sensitivity from 92.4% to 86.7% and increased specificity from 46.6% to 63.7%.

Change in sensitivity and specificity was recognized in respondents below 40 years of age, 40–69 years of age and in groups of respondents older than 70 years. In all three investigated populations, a larger decrease in the sensitivity of the STOP-Bang questionnaire was recognized among female respondents when item *T* was excluded from the final sum, whereas the specificity increased.

Conclusions: The exclusion of item *T* in the final sum of the STOP-Bang questionnaire decreased the sensitivity of questionnaire in the recognition of OSA in all three investigated populations, but enabled an overall larger increase in the specificity. The change in sensitivity was more pronounced in female respondents.

Disclosure: No

P076 | Impaired erectile function in patients with obstructive sleep apnea

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Objectives/Introduction: As the prevalence of obesity increases, obstructive sleep apnea (OSA) is a continuous rising problem of modern societies, with important implications for public health. In the last decades, there is a steady decline in semen quantity, known as "male infertility crisis". Environmental and lifestyle factors have been suggested as the major contributing factors. Recent evidence has revealed a link between OSA and reduced male infertility as well as impaired erectile function. Through a global approach, we investigated the relationship between OSA and erectile function.

Methods: A total of 41 male subjects, who underwent polysomnography for suspected OSA, participated in the study. Erectile function was assessed by the 15-item International Index of Erectile Function (IIEF-15) questionnaire, testosterone levels, and sperm analysis.

Results: Thirty-two patients were diagnosed with OSA, and 9 subjects without OSA were used as a control group. Erectile function, according to IIEF-15 score, was significantly impaired in OSA patients compared to control subjects (25 (22–28) vs 30 (30-30), $p = 0.001$). OSA patients had significantly reduced levels of testosterone (352.3 ± 169.8 ng/dl vs 524.4 ± 170.3 ng/dl, $p < 0.05$), compared to controls. In regards to motile sperm, it was found to be reduced (30.9 ± 23.2% vs 53.6 ± 11.1%, $p < 0.05$) compared to controls. Multivariable regression analysis showed that BMI and IIEF score were independent determinants of AHI.

Conclusion: Our study provides further evidence regarding the association between OSA and erectile function impairment, as well as semen quality.

Disclosure: No

P077 | Evaluating the effect of an educational intervention on the adherence rate to sleep study: a multi-centered stratified randomized controlled trial

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An appropriate diagnosis and effective treatment of sleep apnea can improve the associated quality of care and reduce morbidities. The study aims to develop and evaluate an educational intervention tailored to patients' needs in order to increase the rate of patients' adherence to physician's prescription for a sleep test. A multi-center, stratified, 2 parallel-arm, randomized controlled trial was conducted. The patients in the intervention group received the educational booklets on sleep apnea and sleep test which was designed based on the extracted factors through an in-depth interview with patients. All participants were contacted after two months to ask whether they completed an assessment for OSA. A total number of 1650 individuals were screened. Finally, 104 participants were randomized to the control group ($n = 50$) or intervention group ($n = 45$) that did not differ significantly in baseline characteristics. The results of the intention to treat analysis indicate that patients in the intervention group were significantly more adherent to attend a sleep assessment for their OSA risk (30%; $n = 15/50$) than the patients in the control group (11.1%; $n = 5/45$, $p < 0.05$). Age, history of diabetes, and the educational intervention were effective in performing the sleep test. Time limitations, Condition improvement, and high cost of diagnostic test were the most barriers, respectively. The intervention was successful in improving the adherence rate of patients to prescribed sleep test. However, the adherence rate to sleep study testing is still far from desirable and requires more complex interventions.

Disclosure: No

P078 | In-lab and home respiratory polygraphy versus polysmonography for detecting obstructive sleep apnea in children

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Objective/Introduction: Due to low accessibility, only few children undergo gold standard polysomnography (PSG) prior to surgical treatment for obstructive sleep apnea (OSA). Respiratory home polygraphy

(PG) is used as an alternative to PSG, but controversy remains about PG validity in children. The main objective of this study was to compare the performance and diagnostic value of PG versus gold standard PSG.

Methods: Children aged 2–10 years with clinical suspicion of OSA underwent three recording modalities: overnight in-lab PSG with same-night in-lab PG (PG-lab), and a PG performed at home (PG-home) on another night. Recordings were conducted before and three months post-surgery. Recordings were scored blinded, and all respiratory scoring was conducted by one scorer.

Performance of PG was assessed by comparing PG and PSG obstructive apnea hypopnea indexes (oAHI) by Bland Altman plots and receiver operating curves (ROC).

Results: Fifty-three children were included. Baseline PG ROC produced an area under the curve (AUC) of 0.82–0.88 (PG-lab, PG-home) at cut-off oAHI ≥ 2, and 0.92–0.95 (PG-home, PG-lab) at cut-off oAHI ≥ 5. Baseline PG oAHI were significantly lower than PSG oAHI but the obstructive apnea indexes were not different. Systematic underestimation of PG oAHI (ratio: PG-lab 1.5; PG-home 1.7), due to missed hypopneas, caused underestimation of mild and moderate OSA severity.

Follow-up PG AUC were 0.55–0.67 (PG-home, PG-lab) at oAHI ≥ 2.

Conclusions: Baseline PG home and PG lab performed well compared to PSG. However, a systematic oAHI underestimation encumbered classification of OSA severity, suggesting a lower PG cut-off accounting for the difference ratio should be considered

Disclosure: No

P079 | Changes on sleep quality after treatment of mandibular advance device for sleep apnea: 24 h holter-based cardiopulmonary coupling analysis

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Background: The purpose of this study is to report the treatment effects of mandibular advance device (MAD) on patients with sleep apnea based on cardiopulmonary coupling (CPC) analysis.

Method: Patients with mild to moderate obstructive sleep apnea were enrolled in a prospective, single-center study. All patients were diagnosed with obstructive sleep apnea (OSA) after full-night polysomnography and underwent 24 h Holter monitoring before and after 6-month treatment of MAD. We evaluated sleep quality using cardiopulmonary coupling analysis based on Holter monitoring. Change from baseline was analyzed using Wilcoxon signed rank test.

Results: Of 23 patients, total 12 subjects were included (8 refused to Holter monitoring and 3 diagnosed with atrial fibrillation). Mean age and apnea-hypopnea index were 55.2 ± 8.19 years and 18.9 ± 4.6/h, respectively. In CPC analysis, no significant changes were observed after MAD treatment in the high-frequency coupling ratio (marker of stable sleep; 33.7%–29.9%, p 0.37), the low-frequency coupling ratio (marker of unstable sleep; 38.3%–39.8%, p 0.75), narrow band ratio (marker of sleep-disordered breathing; 1.9%–2.5%, p 0.51) ratio and the very-low-frequency coupling ratio (marker of rapid eye movement/waker; 27.6%–29.6%, p 0.48).

Conclusion: In this study for short-term period, we could not determine beneficious effect of MAD in CPC parameters among patients with sleep apnea.

Disclosure: No

P080 | Differences in sleep apnea diagnosis by patient race and ethnicity

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Objectives/Introduction: Studies have shown that racial bias may exist in our healthcare system when it comes to the diagnosis and management of specific diseases. This study examines differences of sleep apnea diagnosis by patient race and ethnicity.

Methods: We used data from the National Ambulatory Medical Care Survey (NAMCS) for the years 2010–2018. We calculated the proportion of patient visits that had a sleep apnea diagnosis and the differences in this proportion among racial and ethnic groups. We used the NAMCS-provided collapsed categories of race/ethnicity which were: White (non-Hispanic), Black (non-Hispanic), Hispanic and Asian/Other. We used the NAMCS-imputed race/ethnicity data for non-responders. We then fit a multivariable logistic regression model to measure the association of patient race/ethnicity and a sleep apnea diagnosis controlling for other patient characteristics.

Results: We included 240,902 outpatient visits over the 9 year study period. A total of 3,133 (1.30%) of these visits had a sleep apnea diagnosis (1,881 visits coded as obstructive sleep apnea, 938 unspecified, 314 other). White patients' visits had a sleep apnea diagnosis 1.36% in the time period compared to 1.22% for Black patients, and 0.95% for Hispanic patients ($p < 0.0001$). After adjusting for patient gender, age, BMI, payer type, survey year, and systolic blood pressure, we found that patient race/ethnicity had a significant association with the likelihood of a sleep apnea diagnosis. Compared to White patients, the adjusted odds ratio for a sleep apnea diagnosis was 0.81 (0.71–0.92) for Black patients and 0.74 (0.64–0.86) for Hispanic patients. The diagnosis of sleep apnea increased over time (0.76% were diagnosed in 2010 vs 1.40% in 2018). The increase in sleep apnea diagnosis over time was similar for different racial/ethnic groups (p value for interaction of race/ethnicity and year = 0.65).

Conclusion: The likelihood that an outpatient visit results in a sleep apnea diagnosis differs significantly across patient race and ethnicity, even when adjusting for other patient characteristics. Further work should be done to examine factors that may account for these differences.

Disclosure: No

P081 | Berlin questionnaire and subjective symptoms of obstructive sleep apnoea before and after testosterone administration in female-to-male transition - a pilot study

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Introduction: Obstructive sleep apnoea (OSA) is more common and more severe in men. Some studies suggested that exogenous testosterone may worsen OSA. The aim of this study was to test whether female-to-male transition with testosterone administration would accentuate subjective symptoms of OSA.

Methods: The study involved 104 people starting female-to-male transition. Study participants received intramuscular testosterone with a target testosterone plasma level of 10–30 nmol/L. The mean duration of the observation was 20 months (±SD = 0.6). Participant's weight, height, and clothing size were collected at the study entry and at the end of the study. Participants completed Berlin Questionnaire (BQ = OSA screening tool), and answered individual questions on snoring, fatigue, respiratory arrests, and hypertension. Quantitative data were compared by paired *t*-test, binary data by chi-squared test. Pearson's correlation coefficient was used to evaluate the dependence of concerned parameters on BMI.

Results: Participant's mean age was 20.0 (± 6.3) years at the entry and 21.4 (± 6.0) years at the end of observation. BMI was 24.1 (± 6.3), and 24.8 (± 5.1) respectively. BMI and clothing size did not change significantly during the observation.

Snoring was reported by 1.9% of participants at the beginning of the observation and 4.8% at the end (non-significant- NS), fatigue by 45.2% and then by 34.6% (NS), and respiratory arrests by 5.8% and then 6.7% (NS). Hypertension was reported at the entry by 6.7% and then by 5.8% (NS).

Category 1 of BQ was positive at the beginning in 11.5% and at the end in 16.4% (NS), category 2 of BQ in 22.1% and in 16.4% respectively (NS), and category 3 of BQ in 15.4% and in 14.4% respectively (NS). The number of participants with high risk (8.7%) and low risk (91.3%) BQ outcome did not change during the observation. The correlation of BQ score and BMI did not change significantly during the observation.

Conclusion: The twenty-month-long observation of participants undergoing female-to-male transition accompanied by testosterone administration did not change the subjectively reported snoring, respiratory arrests, fatigue, and BQ outcome, which does not support the hypothesis that exogenous testosterone administration may induce OSA.

Disclosure: No

P082 | Prediction of significant obstructive sleep apneas with a wrist-worn reflectance pulse oximeter during sleep

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Objective: This study aimed to evaluate the performance of SpO2 during sleep, as obtained by a wrist-worn reflectance pulse oximeter, which permits continuous measurement every second and to assess its oxygen desaturation index for screening significant OSA.

Methods: A total of 97 adults with sleep disturbances (age 44.4 ± 13.0 years; 74 men) who visited the sleep laboratory for PSG at Samsung Medical Center, Seoul, South Korea, were enrolled. All participants underwent overnight polysomnography (Embla N7000) wearing the GW4. Oxygen saturation was measured with the Samsung Galaxy Watch 4 series (SM-R860N, SM-R890N, Samsung Electronics Co.; GW4). Simultaneously, measurement using transmittance pulse oximetry from polysomnography was done as a reference. The performance of the device was assessed by the root mean squared error (RMSE) and coverage rate. Analysis of the receiver operating characteristic (ROC) curve was performed to compare the diagnostic performance among different ODI thresholds. Moderate to severe OSA (AHI ^{3} 15/h) was estimated using the GW4-ODI.

Results: The coverage rate of the target device was 73.5%, and the data rejection rate was 26.5%. An overall RMSE was 2.3%. The Bland-Altman density plot showed a good agreement between the two measurements with a mean bias of -0.16%.

RMSEs were 1.65 ± 0.57%, 1.76 ± 0.65%, 1.93 ± 0.54%, and 2.93 ± 1.71% for normal,

mild, moderate, and severe OSA, respectively ($p > 0.05$). The highest sensitivity was observed at a cut-off value of GW4-ODI ≥ 5/h. Its predictive ability for moderate to severe OSA with a sensitivity, specificity, accuracy of 89.7%, 64.1%, 79.4%, respectively and area under the curve was 0.908 (95% confidence interval, 0.852–0.963). GW4-ODI ≥ 15/h and 20/h provided 100% specificity in the prediction of moderate to severe OSA.

Conclusions: This is the first study which has validated the performance of the ODI from wrist-worn reflectance pulse oximetry during sleep. It reveals that GW4 with reflectance pulse oximetry is a feasible method for measuring oxygen saturation during sleep and for predicting moderate to severe OSA. This device may help identify individuals vulnerable to OSA and consequently alert them to seek medical attention.

Disclosure: Yes

Conflict of Interest statement: This study was granted by Samsung Electronics, but Samsung Medical Center is an independent institution from

Samsung Electronics. Open access to the data was provided, and the research was monitored independently by
the two institutions. The authors declare no potential conflicts of interest with respect to the research, authorship,
or publication of this article.

P083 | Mandibular advancement device adherence in patients with intolerance to CPAP after 3 years of follow-up

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Introduction: Obstructive Sleep Apnea (OSA) is a major health problem. An adequate treatment in order to obtain a good control of the disease and an improvement of the quality of life, supposes a challenge for its good management. In 30-60% of cases there is intolerance to CPAP. The mandibular advancement device (MAD) is a therapeutic alternative.
Objective: This study was to assess the efficacy of MAD measured by the Apnea Hypoapnea Index (AHI) at 3 months and the patient´s comfort, the Epworth scale score and adherence to treatment after 3 years of follow-up.
Materials and Methods: Descriptive study of those patients diagnosed of OSA by the sleep unit of a tertiary hospital in Spain who have refused or have not tolerated CPAP and MAD (SomnoDent) has been proposed as an alternative treatment. The inclusion period began in 2018 and ended in January 2022. A respiratory polygraphy was performed at the beginning and after 3 months of MAD treatment and a telephone questionnaire was performed after 3 years of follow-up.
Results: 62 patients were followed for an average of 695 days. The participants included were 45 men (72.6%). The mean age of the sample was 55 years. 24 patients (38.7%) were hypertensive. The average Body Mass Index (BMI) was 26.7. 16 patients (32.65%) had been diagnosed with mild OSA, 22 patients (44.89%) with moderate OSA and finally, 11 patients (22.44%) with severe OSA. The mean AHI prior to the start of treatment was 24/h while the mean AHI in the subsequent respiratory polygraphy control was 11.9/h, with an improvement in AHI of 50.65%. 49 patients (79%) continued treatment with MAD. One patient died and another lost follow-up. 5 patients didn't require further treatment due to weight loss. 6 patients (10%) didn't continue the treatment with MAD (4 due to intolerance and 2 due to lack of response).
Conclusion: MAD is an adequate alternative therapy in patients with OSA who refuse the use of CPAP, observing good compliance and adherence in the long term, along with adequate clinical control of the disease.
Disclosure: No

P084 | Positive airway pressure device telemonitoring in clinical practice – how reliable is the screening tool?

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Introduction: New positive airway pressure (PAP) devices provide a telemonitoring option. A special screening site allows fast screening for non-adherent patients. In practice, the screening data are not always reliable. ResMed AirView allows fast identification of non-adherent patients on the screening site and a more detailed, but time-consuming view of individual patient data. Our study aimed to assess how reliable Resmed software is in screening for non-adherent patients.
Methods: In this retrospective analysis we analysed the data from ResMed AirView for patients who were prescribed ResMed PAP machine at University Clinic Golnik. All patients who used the telemonitoring option for at least a year and were currently active users were included. We collected demographic data from our medical database and data on adherence, apnea-hypopnea index (AHI) on PAP device and mean usage time from ResMed Airview software. We compared data on adherence and mean usage time from the screening site with generated reports from the same software for the past 30, 90 and 365 days. When comparing mean usage time, we considered a variance of 20% acceptable.
Results: Final sample included514 patients, 374 male (73%) and 62.4 ± 11.9 years old. 341 (66%) patients were reportedly adherent on the screening site, with a mean PAP usage of 5.0 ± 2.3h. On detailed reports, good adherence (>4h for >70% of nights) for 30, 90 and 365 days was 71%, 68% and 52%, and data on adherence matched the screening site data in 86%, 85% and 71%, respectively. The sensitivity of screening data for adherence was 93%, 87% and 68%, and specificity was 72%, 78%, and 77%, respectively. Mean usage was 5.6 ± 2.4, 5.5 ± 2.4 and 4.8 ± 2.4 h, respectively, and differed from mean usage on screening site ($p < 0.001$ for all). In 76%, 61%, and 54%, the mean usage time on detailed report matched screening usage time.
Conclusion: Thescreening tool of ResMed Airview shows good sensitivity for adherence for the last three months of usage and moderate specificity across all periods. The discrepancies in screening and detail-reported mean device usage are often too large to rely on screening data alone.
Disclosure: No

P085 | Oral health-related situations among patients with experience of continuous positive airway pressure treatment- a critical incident analysis of experiences and actions

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Objectives: The usual treatment for obstructive sleep apnea [OSA], continuous positive airway pressure [CPAP] treatment, is effective but adherence remains an issue partly due to problems with oral dryness. Oral dryness can contribute to dental caries and reduced oral health-related quality of life. Despite the link between OSA and oral diseases and their association with cardiovascular disease, interdisciplinary collaboration between various disciplines in CPAP treatment is lacking. Thus, oral health can be important for this patient group, and could benefit from increased collaborations. The purpose was therefore to explore how patients with CPAP-treated OSA experience situations linked to their oral health, and what measures they take to manage them.

Methods: A descriptive and explorative design was adopted, using the critical incident technique. A total of 18 adults with experience of CPAP treatment (>1 year) were purposefully selected and individually interviewed using a semi-structured interview guide. A modified thematic analysis was performed, and data was divided into two parts (experiences and actions), whit 129 experiences and 123 actions forming the basis of a category system.

Findings: Negative and positive situations linked to oral health were experienced at night or during day, both before and during CPAP treatment, and when not using it. The positive situations included experiences of reduced oral dryness and mouth-breathing during sleep, and improved dietary and oral hygiene habits. The negative situations included experiences of increased night- and daytime oral dryness described in various ways (e.g., increased mouth-breathing or causing breathing challenges), but also changes in the saliva composition and concerns about deteriorating oral health. The negative situations were often successfully managed by using a humidifier, drinking water, mimicking daytime movements of the mouth, increased oral hygiene efforts, or contacting their oral healthcare clinic.

Conclusions: The situations described by the patients' concerned experiences from their everyday life. Successful management may contribute to increased CPAP adherence and might decrease negative effects on the oral health during long-term CPAP treatment. Increased interdisciplinary collaborations between CPAP practitioners and oral healthcare professionals could enable early identification of oral health-related challenges and a possibility to provide adequate recommendations for patients when needed.

Disclosure: No

P086 | Beyond AHI: Sleep apnea in atrial fibrillation patients

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Background: Evidence supports an association between obstructive sleep apnea (OSA) and atrial fibrillation (AF).

The apnea hypopnea index (AHI), the most common OSA-defining metric to grade severity, has been shown to predict the risk for mortality but is insufficient to characterize this complex disease.

Objective: We aimed to study the prevalence and severity of OSA in AF patients and assess sleep apnea markers, others than AHI, that could be associated with AF prognosis.

Methods: We conducted a prospective study in AF patients (paroxysmal or persistent). Anthropometric measurements and respiratory polygraph parameters were collected and assessed.

Results: Twenty-two AF patients were included (mean age 64 years old; 68% male; mean body mass index – 30.1 Kg/m^2). All were submitted to clinical evaluation and polysomnography. Mean Epworth Sleepiness Scale (ESS) was 6.5 (range 4–14). The mean AHI was 37/h (range 12–76/h), mean oxygen desaturation index was 25/h (range 4/h – 60.5/h). The group with AHI> 30/h, had statistically significant higher levels of hypoxic burden ($p = 0.017$), arousal index ($p = 0.003$) and collapsibility ($p = 0.002$) but with no difference regarding ESS when compared to AHI < 30/h group of patients. There was no correlation between ESS and arousal index ($p = 0.2$) between the 2 groups. No meaningful relationship was seen between ESS and AHI, arousal index, collapsibility, or hypoxic burden.

Conclusions: Hypoxic burden, arousal threshold and collapsibility may be useful in OSA-AF patient stratification. Further prospective studies with larger population are needed to stablish the relationship between these sleep markers and arrythmia prognosis.

Disclosure: No

P087 | Validation of the nosas score for obstructive sleep apnea screening in the Greek population and comparison with Epworth Sleepiness Scale, Berlin- and the STOP-Bang questionnaire

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Objectives/Introduction: Obstructive sleep apnea (OSA) is the most common sleep-related breathing disorder (SBD) characterized by the repetitive collapse of the upper airway during sleep. The increased cost and the reduced availability of full-night polysomnography (PSG), which is the golden standard for diagnosis, make the use of screening methods in high-risk patients, necessary. Aim of the study was to validate the NoSAS (Neck, Obesity, Snoring, Age, Sex) score in a sample of Greek population and to compare its validity for OSA screening,

with that of Berlin questionnaire (BQ), STOP-Bang questionnaire, and Epworth Sleepiness Scale (ESS) score.

Methods: A retrospective analysis was conducted of all individuals, aged 18–80 years who reported symptoms indicating SBD and examined with full-night PSG at the sleep center of Sismanogleio General Hospital, Athens, Greece from October 2018 to November 2021. All of them had answered the following questionnaires: NoSAS, BQ, STOP-Bang, and ESS. Patients who had incomplete or unanswered questionnaires were excluded.

Results: A total of 347 participants were enrolled in this study. The NoSAS scores, which ranged from 0 to 17 and allocated a threshold of 8 points, identified individuals with OSA (defined as an apnea-hypopnea index>5 events/h), with an area under the curve (AUC) of 0.774. The NoSAS score performed significantly better than the BQ (AUC 0.617) and the ESS (AUC 0.642) and similarly to STOP-Bang questionnaire (AUC 0.777) for OSA screening.

Using NoSAS score>8 to predict OSA, the sensitivity and specificity were 0.831 and 0.520, respectively; using the STOP-Bang questionnaire, for score>3 the values were 0.912 and 0.440 respectively; using the BQ for >2 positive categories the values were 0.542 and 0.640, and using the ESS, for score>10 the values were 0.763 and 0.399, respectively.

Conclusions: The NoSAS is a simple, efficient, and easy method for screening OSA in the clinical setting in Greek population. The NoSAS score performs significantly better than BQ and ESS and similarly to STOP-Bang questionnaire for OSA screening.

Disclosure: No

P088 | Active detection of sleep apnea patients in stroke unit

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Objectives/Introduction: Sleep apnea syndrome is known to be associated with cerebrovascular disease, but are often overlooked. The stroke unit (SU) is a semi-intensive care ward where trained nurses can easily detect patients with suspected sleep apnea at night. The purpose of this study is to find patients who need CPAP treatment by screening with symptoms of snoring and sleep apnea for stroke patients in the SU.

Methods: Among stroke patients admitted to the SU in 2021, trained night shift nurses selected patients with snoring and sleep apnea, and among them, two sleep-certified doctors selected patients with a modified mallampati score of 3 or higher. Cases under intracranial pressure (ICP) control or other interventions were excluded. Level 1 polysomnography (PSG) was performed on the selected patients. The result of PSG was read by two sleep certified doctors.

Results: A total of 259 stroke patients were admitted to the SU from April 20, 2021 to December 31, 2021. Among them, 28 patients met the screening criteria, but 3 patients refused PSG testing, 7 patients were unable to perform PSG due to laboratory problems, and 2 patients failed during PSG. Finally, 16 patients underwent Level 1 PSG during their hospital stay. The median age of 16 subjects was 63.5 years old and the median BMI was 27.40, and 15 subjects (94%) were male. The median NIHSS score was 3 points, the median ESS score was 9 points, and the median period from hospitalization to PSG examination was 4.5 days. As a result of PSG, none of the patients had an AHI of less than 10, and 12 patients (75%) had an AHI of 15 or higher. During the same period, there were 116 suspected sleep apnea patients who voluntarily visited the outpatient clinic due to snoring/sleep apnea symptoms, and among them, 82 patients (71%) had an AHI of 15 or higher.

Conclusion: When a stroke patient with snoring/sleep apnea is admitted to SU, a simple check-up can find sleep apnea patients who need CPAP treatment, so attention from health care providers is needed.

Disclosure: No

P089 | Comparison between auto-CPAP and manual titration of fixed pressure CPAP in patients with obstructive sleep apnoea

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Introduction: The aim of this study is to comparethe auto-CPAP use versus manual titration of fixed pressure CPAP during an attended PSG study in patients with obstructive sleep apnoea.

Materials and Methods: 50 patients with OSA participated in our study. Participants were randomly divided in two groups of 25 patients. The group A underwent a manual titration of fixed pressure CPAP and for the group *B* an auto-CPAP was used. For patients in group A the mean age was 50,31 ± 14, 6 years, mean BMI:30,5 ± 6.,1 kg/m^{2}and mean Apnea Hypopnea Index (AHI) was 65.74 ±21,-2 per h. For patients in group *B* the mean age was 50, 9 ± 13,1 years, mean BMI:32,9±5,9kg/m^2 and mean Apnea Hypopnea Index (AHI) 68,9 ± 20,5 per h.

Results: Wilcoxon signed-rank test was used. A comparison of Total Sleep Time between groups A and Brevealed no significant difference (215,4 ± 78,5vs 233,1 ± 81,6, $p > 0.742$).A comparison of sleep efficiency (%) between groups A and Brevealed no significant difference (97,7 ± 53,0 vs. 99,2 ± 46,3, $p > 0,884$).A comparison of AHI between groups A and Brevealed no significant difference (14,2 ± 78,5 vs. 13,3 ± 4,9, $p > 0.884$).The CPAP pressure for group A was 8,2 ± 2,7 and *P* mean for group *B* was 8,6 ± 2,1. The P95 CPAP pressure was increased in auto-CPAP titration compare to the manual titration ($p < 0,001$).

Conclusions: Although our study showed that both auto CPAP and manual titration are effective in treating obstructive sleep apnoea, the P95 pressure is significantly increased during the auto-CPAP titration but more studies are required to clarify it.

Disclosure: No

P090 | Nasal symptoms and continuous positive airway pressure (CPAP) tolerance in patients using an oro-nasal mask

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The role of nasal symptoms in CPAP tolerance in patients using an oro-nasal mask is not very clear.

Our study aimed to investigate the association between CPAP usage and nasal symptoms either prior or developing CPAP use in patients with obstructive sleep apnoea (OSA) using an oro-nasal mask.

230 patients were studied and divided into high, low and non-CPAP users. Patients aged over 18 years old with anew diagnosis of OSA. Nasal symptoms and related quality of life parameters were evaluated prior to CPAP initiation and after three months. Daytime sleepiness was assessed using the Epworth Sleepiness Scale. Nasal breathing was evaluated with a visual analogue scale (VAS), assessment for the presence of allergic rhinitis was via the "score for allergic rhinitis questionnaire" (SFAR). Nasal side effects and related quality of life were assessed by using the validated Mini Rhinocojunctivitis Quality of Life Questionnaire. (Mini RQLQ).

Non-CPAP users had significantly worse baseline scores for runny nose compared with high and low users (1.34 vs. 0.68 and 0.75 respectively, $p = 0.006$). There were no other significant differences between the groups. Runny nose was an independent predictive factor for lower CPAP usage ($p = 0.036$). An evaluation after three months showed worsening in runny nose score in high CPAP-users ($p+0.025$) but not in low and non-users. There were no significant changes in other nasal symptoms. All patients were using an oro-nasal mask.

Our study showed that nasal symptoms were very common in this population but rhinorrhea was the only symptom associated with poorer CPAP adherence in patients using an 0ro-nasal mask. Moreover rhinorrhea worsened after three month trial of high CPAP use.

Disclosure: No

P091 | CPAP adherence in adult and elderly patients with moderate-to-severe OSAS: Predictive factors. An observational study

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Introduction: CPAP is the first line treatment for Obstructive Sleep Apnea Syndrome (OSAS). OSAS is a common breathing disorder caused by repeated episodes of upper airway collapse and obstruction during sleep that lead patients to temporarily stop or decrease their breathing. OSAS has serious adverse health effects, resulting from impaired breathing, snoring, poor quality of sleep, and cardio-cerebrovascular sequelae. CPAP treatment improves quality of life, and is highly effective in normalizing breathing and sleep, improving symptoms and reducing the risk of adverse events. However, adherence to CPAP therapy is often poor.

Aim: To evaluate which anthropometric parameter, anamnestic data and tests could be predictive of adherence to therapy.

Methods: 247 patients from 19 to 91 years old with moderate to severe OSAS who were eligible for therapy with CPAP. 6 patients were not eligible for some data missing; 241 were eligibile: 108 adherent and 133 non-adherent to the therapy, used as a control group.

The complete medical history was collected for all patients, questionnaires were administered to investigate daytime sleepiness, snoring and sleep quality and anthropometric parameters such as weight, height and body mass index (BMI) were measured.

Results: our study identify age and alcohol and smoking habit as the only characteristics capable of predicting CPAP compliance. In contrast to other studies, other parameters, such as the patient's subjective symptoms, are not significant, did not lead to the same result in our work.

The only test that has been found to be useful in predicting the patient's predisposition to CPAP is ESS, but in patients over 65, indicating that daytime sleepiness is a good predictor of CPAP acceptance.

Conclusion: The results of this study suggest that interventions on psychological and behavioral factors increase adherence to treatment.

Disclosure: No

P092 | Patient adherence to orofacial myofunctional therapy of obstructive sleep apnea: Experiences and influencing factors in the patient-therapist relationship

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Introduction: Obstructive sleep apnea (OSA) is a common health problem in the adult population. The prevalence in Norway is estimated to be 8% in adults. Treatment with positive airway pressure

(PAP) is very effective, but adherence is poor. New treatment options are warranted for those with mild or moderate sleep apnea. Orofacial myofunctional therapy (OMT) is a promising, new treatment based on focused exercises. Further, trust in the patient - therapist relationship is an important factor for adherence and satisfaction.

We aim to study experiences and adherence to OMT and the trust relationship between a therapist and motivated patients with OSA.

Material and method: Twelve patients with mild or moderate OSA will be instructed to follow an OMT exercise protocol for 12 weeks. The patients will be recruited based on their interest in OMT treatment and are thus regarded as highly motivated. They will be assessed for eligibility based on inclusion and exclusion criteria and provided informed consent prior to participation. The OMT protocol comprises of a revised version of the exercises described by Guimarães (2009). The exercises will focus on the tongue, soft palate and facial muscles. Online exercise videos will be available for all patients. Participants will be evaluated at baseline and after 12 weeks with the expanded orofacial myofunctional evaluation with scores (OMES-E) protocol, the Friedman classification and tongue range of motion ratio (TRMR). In addition, participants will have weekly telemedicine consultations for 10 weeks. They will also complete a digital sleep and exercise diary.

Participants will be interviewed post OMT treatment with exploratory semi-structured interviews.

These in-depth qualitative interviews with the participants, and data from self-reported exercise entries will provide new knowledge of facilitators and barriers to OMT adherence. Further, this will allow us to better understand the patients' perspectives on interplay of self-reported and automatically collected data for self-management, engagement, adherence and relationships with healthcare professionals, specifically trust relationships.

Results: Quantitative data from the digital sleep and exercise diary and qualitative data will be presented at the Sleep Europe 2022.

Disclosure: No

P093 | Mandibular advance device a therapy option for severe obstructive sleep apnoea: two cases report

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Objectives/ introduction: Obstructive Sleep Apnoea is a chronic disease characterized by the collapse of the upper airway during the passage of air. Although CPAP is the first line of treatment for severe OSA, many patients refused this option or haven't good compliance to it. Remaining the mandibular advance device, as a second line of option for this grade of OSA severity.

Methods: Two male patients with a diagnosis of severe AHI, both refusing CPAP, were submitted to MAD. A PSG type II was done to each one of the patients, and a full clinical examination was performed by an Internal Medicine Physician and sleep specialist. A complete nasal observation and respiratory flux permeability was under the ENT examination as well. And an intra-oral evaluation of the oral health condition, TMJ and muscle palpation was made by a qualified dentist in dental sleep medicine. Both patients were submitted to dental impressions of both arch, bite registration with a George Gauge and a MAD totally individualized and personalized, respecting the mandibular movements and TMJ, allowing mouth opening without losing the advancement and controlling the vertical dimension and posterior rotation of the mandibular, was prescribe.

Results: To control the outcomes of the MAD a second PSG type II was made. After comparing the results, both clinical cases showed greatest improvements on several parameters of comparing. We achieved improvements on basal AHI, ODI, positional AHI, REM and NREM AHI and snoring. One of the cases showed no OSA criteria with AHI below 5/H and the other had a significant improvement.

Conclusions: The authors conclude that MAD could be an excellent therapy option for severe OSA on a very well selected case. Also, that MAD is a better therapy than no therapy.

Disclosure: No

P094 | Supine and no-supine obstructive sleep apnoea treatment with a mandibular advance device

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Objectives/ introduction: Obstructive Sleep Apnea (OSA) is a chronic disease characterized by the total collapse of the upper airway during the passage of air. This intermittent episode of breathing can cause intermittent hypoxia and arousal. This condition has a negative impact not only in the human body leading to hormonal changes (diabetes, insulin resistance and obesity), cardiovascular disease (arterial high blood pressure, atrial fibrillation, cardiac disease) and cognitive functions, behaviour and performance but also a huge impact on the quality of life. Continuous positive air pressure (CPAP), is the first line of treatment for moderate and severe OSA with comorbidities, although, many patients refused this option or haven't good compliance to it. Remaining the mandibular advance device (MAD), as a second line of option.

Methods: A female patient with difficult of adherence to continuous positive air pressure (CPAP) and with a severe supine and no-supine AHI, was submitted to MAD therapy. A PSG type II was performed, and a diagnosis stablished by the pulmonologist and sleep specialist. After an intra-oral evaluation of the oral health condition, TMJ and muscle palpation made by a qualified dentist in dental sleep medicine, was prescribe a MAD. A MAD totally individualized and personalized, allowing mouth opening without losing the advancement and controlling the vertical dimension and posterior rotation of the mandibular, avoiding the compression of the lateral walls of the pharynx, was prescribe.

Results: After a MAD titration control with a second PSG type II, the result shown no signs of supine and no-supine AHI and improvements of ODI, as well as optimal control of all subjective complaints of the patient (including sleepiness and non-restorative sleep complaints).

Conclusions: The authors conclude that a personalized and individualized MAD as well an excellent connection between the trays can be a therapy option for severe supine and no-supine OSA.

Disclosure: No

P392 | At-home versus in-hospital initiation of non-invasive ventilation in obstructive sleep apnea patients

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Introduction: The COVID-19 pandemic led to the development of numerous adaptations in the healthcare systems in order to minimize the risk of infection for patients and healthcare professionals. One of the main difficulties related to Sleep-related breathing disorders, namely Obstructive Sleep Apnea (OSA), was the initiation of non-invasive ventilation (NIV), as this procedure carries a high risk of transmission through aerosol generation. In our hospital, patients previously initiated NIV at the Sleep Disorders Clinic. However, due to the pandemic, this had to be suspended and NIV initiation began to take place at the patient's home. Our objective was to evaluate the difference in adherence to NIV when this therapy was initiated in-hospital or at home.

Methods: Retrospective study, evaluating the differences in NIV adherence between patients with OSA that initiated NIV in-hospital (previously to the pandemic) or at home (post-pandemic). Statistical analysis was performed using an independent samples t-test on SPSS Statistics version 27.

Results: From the patients that had OSA diagnosed through polysomnography level 3, we selected 114, of which 60 initiated NIV in-hospital and 54 initiated NIV at home.

In both groups, the majority of patients were male (76,7% in the in-hospital NIV initiation group and 70,4% in the home NIV initiation group), with a mean age of 60,9 ± 10,4 years and 61,3 ± 10,6 years, respectively. Most patients had severe OSAS (78,3% and 75,9%, respectively) and had a body mass index (BMI) ≥ 30 (76,6% and 81,5%, respectively).

In the first-month post NIV initiation, mean adherence was 88,3% in patients that had in-hospital initiation and 85,0% in patients with home NIV initiation. In the sixth month was 89,2% and 85,9%, respectively, and after 1 year was 96,7% and 82,50%, respectively. No statistical difference was found between adherence in all periods (p > 0,05).

Conclusions: Our work suggests that home initiation of NIV in OSAS patients has non-inferior results in terms of patients' adherence and is a possibility to maintain in the future. This will allow reallocation of human resources to other areas in Sleep Disorders that are understaffed.

Disclosure: No

P393 | Defining the profile of obstructive sleep apnea in women: analysis in a Spanish cohort

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Introduction: The importance of understanding the presentation of obstructive sleep apnea (OSA) in women has been increasingly recognized. Although there is some insight that there are significant differences in presentation between women and men, the consequences of such differences, particularly for treatment have not yet been fully identified. Thus, the objective of this study is to determine the phenotype of OSA in women.

Methods: Study of a population-based clinical cohort of 2,022 patients with OSA confirmed by polygraphy or polysomnography (apnea-hypopnea index -AHI -> 5/h).Comorbidities, symptoms, physical examination, current medical treatments, and sleep parameters were recorded. The results are presented as mean ± standard deviation or percentage, according to the type of variable. The fit of quantitative variables to the normal distribution was assessed by the Kolmogorov-Smirnov test. For comparisons between groups, chi-square or t-student tests were used. Comparison of sleep characteristics between sexes was adjusted for age, BMI, smoking habits, treatment, sleep hygiene, and presence of morphological alterations by univariate analysis of variance with general linear models. In turn, the risk of presenting with sleep symptoms or comorbidities in women with respect to men was evaluated by multiple logistic regression.

Results: 709 women and 1,313 men were included in this study. After adjustment for anthropometric characteristics, morphological alterations and previous treatment, women were found to have lower AHI values (25.3 ± 1.2 vs. 35.0 ± 0.9; p < 0.001),desaturation index (24.4 ± 1.2 vs. 33.2 ± 0.9; p < 0.001) and saturation time < 90% (18.8 ± 1.3 vs. 24.1 ± 1.0; p < 0.001) compared to men. Further, women had a lower risk of witnessed apnea (odds ratio adjusted for baseline characteristics and sleep parameters), ([ORa] 0.53, 95% CI [0.40–0.71]), reduced sensation of restful sleep ([ORa] 0.50, 95% CI [0.38-0.66]), greater fatigue ([ORa] 2.68, 95% CI [1.86–3.86]), headache ([ORa] 3.00, 95% CI [2.26–3.97]), memory disorders ([ORa] 1.836, 95% CI [1.40–2.41]),insomnia ([ORa] 2.09, 95% CI [1.50–2.93]) and excessive

daytime sleepiness ([ORa] 1.41, 95% CI [1.03–1.92]),with interference in their daily activities ([ORa] 1.54, 95% CI [1.17–2.03]).Likewise, after adjustment for anthropometric characteristics and sleep parameters, women also showed higher risk of depression ([ORa] 4.31, 95% CI [3.15–5.89]) and anxiety ([ORa] 3.18, 95% CI [2.38–4.26]).

Conclusions: Our findings suggest that women present a specific OSA phenotype, with a probable implication for clinical, diagnostic, and therapeutic management.

Disclosure: No

P394 | Association between obstructive sleep apnea severity, Diabetes mellitus type 2 and circadian clock protein levels

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Introduction: Circadian clocks are endogenous coordinators of 24-h behavioral and molecular rhythms, which disruption may be caused by obstructive sleep apnea (OSA). It is composed of a set of genes, function as activators (CLOCK, BMAL) or repressors (PER, CRY). Neuronal PAS Domain Protein 2 (NPAS2) can substitute CLOCK in its function. Orphan nuclear receptor (Rev-Erb-α) is another protein supporting the CLOCK-BMAL1 complex, forming the loop which helps to regulate their expression. There are studies suggesting the significant influence of circadian disruption mediated via NPAS2 and Rev-Erb-αon Diabetes Mellitus type 2 (DM2) development. The aim of the study was to determine the role of NPAS2 and Rev- Erb-αin DM2 for OSA patients.

Methods: All participants underwent polysomnography (PSG) examination. Based on apnea-hypopnea index accompanied by clinical data the recruited individuals ($n = 80$) were assigned to one from 3 groups: OSA (severe OSA, no DM2; $n = 34$), DM2 (severe OSA + DM2; $n = 15$) and control group (no OSA, no DM2; $n = 31$). Serum protein levels of Rev-Erb-$\alpha$and NPAS2 were assessed with ELISA immunoassay. Founded by National Science Centre, Poland grants no. 2018/31/N/NZ5/03931 and 2021/41/N/NZ5/00486.

Results: Analysis between the groups revealed the statistically significant difference only in NPAS2 protein level ($p = 0.022$). Further post-hoc analysis revealed significant differences between OSA and the control group ($p = 0.012$) as well as DM2 and control group ($p = 0.039$). Furthermore, a statistically significant correlation between NPAS2 serum protein level and AHI ($r = -0.272$, $p = 0.014$), and lowest oxygen saturation ($r = 0.243$, $p = 0.030$) was observed. Additionally, a strong association between NPAS2 and Rev-Erb-αprotein level was achieved ($r = 0.475$, $p < 0{,}005$).

Conclusions: NPAS2 protein level is associated with severity of OSA and oxygen desaturation, suggesting it might be involved in development of OSA complications. Yet, as presence of DM2 was not a differentiating factor regarding NPAS2 protein level, further studies into mechanism of abnormal glucose metabolism in OSA patients are needed.

Disclosure: No

P395 | Effects of daylight savings time transition on compliance and effectiveness of positive airway pressure therapy

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Objectives/ Introduction: Arguments for elimination of daylight saving time (DST) are rooted in evidence of detrimental effects of DST transitions on behavior, physiology, disease, and treatment compliance. Spring transitions into DTS result in sleep structure changes that include increase of sleep latency and fragmentation, and decrease of sleep time and efficiency, with the adjustment period lasting almost two weeks.

Objective of this study was to evaluate the effects of DTS on patterns of PAP use and PAP effectiveness utilizing continuous tracking of PAP therapy available with cloud-based sleep care management systems.

Methods: 62 adult OSA patients living in Jacksonville Florida, on stable CPAP/autoPAP therapy, and with ≥93% treatment compliance were enrolled. Durations of PAP usage and residual AHI were collected for "pre-DST-period" (Sun-Mon-Tue, 7-9/03/2021) and "DST-period" (Sun-Mon-Tue, 14-16/03/2021) from reports generated via cloud-based sleep care management systems, either Philips Respironics Care Orchestratoror ResMed AirView. Demographic variables of gender, race, age and average compliance and effectiveness of PAP during 2 weeks that included time intervals of interest (i.e., 3-17/3/2021) were also collected. Analyses included repeated measures ANOVA, non-parametric Wilcoxson's Rank Sum Tests, independent and paired *T* tests, and Chi-Square test.

Results: Majority of patients were Caucasian (73%); average age for the group was 57.5 ± 11 y,average 2-week sleep duration was 443.1 ± 124 mainland compliance to therapy was 0.97 ± 0.06%. 73% of patients were male, with no significant difference in race, age, sleep duration and compliance variables between genders. Sleep durations during the three pre-DST and three DST days were normalized to 0-1 scale. We found significant decrease in sleep duration between pre-DST and DST Mondays (D normalized_sleep_duration = −0.18, $p = 0.0027$). AHI demonstrated significant decrease on the DST Monday followed by significant increase on DST Tuesday (DAHI = −0.54, 0.47, $p = 0.01$, 0.04 respectively).

Conclusions: Effects of DST on sleep duration and sleep distruption (as reflected by AHI) of compliant CPAP users are seen days after Saturday's DST transition, even in the zones with relatively stable light-dark exposure such as is Florida, USA. Larger study is currently

under way for CPAP users living in higher latitude Burlington, Vermont area.

Disclosure: No

P396 | Effect of compliance to continuous positive airway pressure on exacerbations, pulmonary function and symptoms in patients with overlap syndrome

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Objectives: Patients with overlap syndrome (OS), that is, obstructive sleep apnea (OSA) and chronic obstructive pulmonary disease (COPD), are exposed at increased risk of acute exacerbations related to COPD (AECOPD). We assessed the effect of continuous positive airway pressure (CPAP) compliance on AECOPD, pulmonary function and symptoms in patients with OS.

Methods: Between November 2017 and June 2020, consecutive OS patients underwent assessment at baseline and at 12 months with CPAP of: AECOPD and hospitalizations, pulmonary function testing and 6-min walking test (6MWT), COPD Assessment Test (CAT) and modified British Medical Research Council (mMRC) questionnaires. Comparisons were carried out with the paired student *t*-test or the Wilcoxon signed-rank test. Multivariate regression analysis was applied, after adjustment for known risk factors of COPD exacerbation, to examine the association between CPAP compliance and AECOPD.

Results: In total, 59 participants (54 males) with OS were followed for 12 months and divided post hoc according to CPAP compliance into: group A with good (≥4 h CPAP use/night, $n = 29$) and group *B* with poor (< 4 h CPAP use/night, $n = 30$) CPAP compliance. COPD exacerbations were decreased in patients with good CPAP compliance from baseline to 12 months (5 vs. 17, $p = 0.001$), but not in those with poor compliance (15 vs. 15, $p = 1$). A negative association between h of CPAP use ($r = -0.259$, $p = 0.047$) and COPD exacerbations was noted. At multivariate regression analysis, COPD exacerbations were associated with poor CPAP compliance ($\beta = 0.362$, 95% CI: 0.075–0.649, $p = 0.015$).

At 12-months, only group A showed improvements in partial oxygen pressure [78 (72–83.5) after vs. 68 (64.5–79) mmHg before treatment, $p < 0.001$], Forced expiratory volume in 1 s [77 (69.6%–86%) after vs. 73.6 (65.3%–79.9%) of predicted before treatment, $p = 0.024$], CAT [3 (2–5) after vs. 7 (5–11) before treatment, $p < 0.001$] and 6MWT [99 (90.5–116.5) after vs. 93 (85–107.5%) of predicted distance before treatment, $p < 0.001$].

Conclusions: In patients with OS, good compliance to CPAP treatment reduced the number of AECOPD, improved lung function and COPD-related symptoms compared with poor CPAP compliance.

Disclosures: Nothing to disclose

Disclosure: No

P397 | Polysomnographic determinants of nocturnal hypercapnia in obese patients with obstructive sleep apnea

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Introduction: As obesity increases, the frequency of obstructive sleep apnea and obesity hypoventilation syndrome increases also. However, there are only limited publications that include patients known to have obesity-related sleep hypoventilation is present. The study aimed to compare characteristics of in obese patients with obstructive sleep apnea (OSA), and to identify determinants of hypercapnia in OSA patients.

Methods: We investigated 143 untreated patients who were diagnosed with obese patients with OSA (Body mass index >30 kg/m^2). All patients underwent standard polysomnography (PSG) with nocturnal end-tidal CO_2($ETCO_2$) and sleep related questionnaires.

Results: Of 143 obese subjects with OSA (49 females/94 males, mean age of 45.97 ± 13.71 years old, BMI of 34.18 ± 3.87 kg/m^2). Hypercapnia group ($n = 74$, $ETCO_2$ > 55 mmHg) had higher neck circumference (40.68 ± 3.30 VS 42.01 ± 3.62 cm, $p = 0.023$), Epworth Sleepiness Scale scores (7.81 ± 4.49 VS 10.65 ± 5.52, $p = 0.001$), apnea-hypopnea index (39.21 ± 27.96 VS 63.77 ± 29.11, $p < 0.001$), oxygen desaturation index (29.58 ± 24.04 VS 56.03 ± 28.89, $p < 0.001$), maximum apnea length(35.81 ± 18.78 VS51.68 ± 24.48, $p < 0.001$) compared with subjects with pure OSA ($n = 68$, $ETCO_2$≤55 mmHg). Hypercapnia group also had lower waking PaO2 (93.91 ± 1.71VS91.37 ± 4.02, $p < 0.001$), and nadir SpO2(82.53 ± 6.34VS 7.49 ± 10.92, $p < 0.001$). Maximum Co2 retention correlated with BMI and length of apnea($r = 0.338$, $p = 0.008$).

Conclusion: Nocturnal hypercapnea reflects pathophysiologic features of sleep apnea, which are not captured by the apnea-hypopnea index. This study expands the indications of capnometry beyond apnea detection and ability to early detect patients who may be at risk of the development of obesity hypoventilation syndrome.

Disclosure: No

P398 | Erythroblasts as markers of hypoxaemia in patients with sleep-related breathing disorders

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Introduction: Erythroblasts are nucleated precursors of red blood cells, that are normally not present in peripheral blood. Their finding in peripheral blood might be related to disorders of bone marrow, but also chronic hypoxaemia. There are no data on erythroblasts as a potential marker for chronic intermittent hypoxaemia in patients with sleep-related breathing disorders (SRBD).This study aimed to evaluate the presence of erythroblasts in patients with SRBD and nocturnal hypoxaemia.

Methods: For this retrospective analysis, we collected data from all patients who were admitted for their first diagnostic polysomnography for SRBD in the year 2020. All of the patients underwent whole blood count (WBC) and erythroblast count. Medical data and polysomnography reports were collected from the hospital database.

Results: Final sample included 279 patients, 157 (56%) men, 57.1 ± 12.5 years old, body mass index (BMI) 32 ± 6.2 kg/m^2, 260 (93%) were diagnosed with SRBD, 106 (38%) with severe sleep apnoea (apnoea hypopnea index (AHI) >30/h), mean AHI across group was 29.3/h ± 21.2/h. The most common comorbidities were arterial hypertension 133 (48%), diabetes mellitus 39 (14%), ischaemic heart diseases 32 (12%), chronic heart failure (CHF) 32 (12%), atrial fibrillation 25 (9%), asthma 36 (13%) and chronic obstructive pulmonary disease (COPD) 13 (5%), 15 (6%) of patients were previously diagnosed with cancer, and 6 (2%) have been previously diagnosed with polycythaemia. 35 (13%) patients had anaemia, 13 (5%) had polycythaemia and in 18 (6.5%) erythroblasts were present. In univariate logistic regression testing for BMI, AHI, oxygen desaturation index >30/h, AHI>30/h, time with oxygen saturation below 90%, anaemia, COPD, asthma, CHF, previous malignancy, only CHF (OR 3.08, CI 1.02–9.30) predicted the presence of erythroblasts in peripheral blood count.

Conclusions: Erythroblasts are seldom present in peripheral blood of patients with SRBD and do not predict nor are they marker of severe sleep apnoea. In our cohort of patients, their presence only predicted CHF.

Disclosure: No

P399 | Towards personalized medicine in obesity hypoventilation syndrome: Is obstructive sleep apnea overlap predicting a specific phenotype?

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Introduction: The majority of obesity hypoventilation syndrome (OHS) patients have concomitant obstructive sleep apnea (OSA). The burden of cardiovascular mortality and morbidity in OHS patients with or without OSA has also been studied and it seems that OSA has a protective effect. Thus, we hypothesized that the presence of OSA also impacts respiratory and ventilatory parameters in patients with OHS, conferring a specific respiratory phenotype.

Objectives: Characterize OHS patients and compare those with and without OSA regarding lung function, arterial blood gas parameters, and ventilatory settings.

Methods: Retrospective analysis of OHS patients under non-invasive ventilation (NIV) followed in respiratory failure consultations during a period of 2 years in a central university hospital.

Results: A valid sample of 100 patients with OHS was obtained, mostly female (63%), with a mean age of 69 ± 14 years old and a mean body mass index of 40,8 ± 6,7 kg/m^2. OSA was identified in 85% of the patients. According to the apnea-hypopnea index, OSA was classified as severe in most patients (79,6%), as moderate in 11,1%, and as mild in 9,3%. The mean sleep time with SpO_2 < 90% was 61,2%. All these patients started NIV with bilevel positive airway pressure (73,8% in a spontaneous-timed mode and the remaining in the spontaneous mode). The mean values of IPAP, EPAP, and RR were 18, 8, and 14, respectively, and adjuvant oxygen was used in 17% of the patients. Upon the beginning of NIV (T0), mean lung function parameters were FEV_1 71% and FVC 75%, and mean blood gas parameters were PaO_2 69, $PaCO_2$ 46, and HCO_3 69; after six months of NIV (T6), patients presented mean values of FEV_1 and FVC 65% and 68%, respectively, and of PaO_2, $PaCO_2$ and HCO_3 83, 42 and 26, respectively. OHS patients with OSA and without OSA were grouped and several variables were compared but no statistically significant differences were found.

Conclusion: In this sample, despite an OSA prevalence in OHS patients according to the literature, it appears that OSA does not confer a specific respiratory phenotype. However, larger studies are required in order to understand an eventual role of OSA in OHS.

Disclosure: No

P400 | Catathrenia: presentation and polysomnographic features in patients diagnosed in a sleep laboratory

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Introduction: Catathrenia (or sleep groaning) is an uncommon phenomenon that leads to the production of sounds on expiration during sleep. Its incidence and prevalence are unknown, and likely underestimated as some people are not aware of, or concerned by the phenomenon. In our experience the presentation is in young adults. We aim to study the clinical and sleep laboratory features in a population of patients studied with polysomnography (PSG) and diagnosed with catathrenia in a national reference sleep centre in the United Kingdom. In contrast to previous reports we include incidental cases where the person was not complaining of the condition.

Methods: Retrospective study of cases retrieved from PSG reports where episodes of catathrenia were documented in a sleep laboratory database between 2005 and 2018. Information on the main presenting clinical complaint, PSG parameters and subjective daytime sleepiness (Epworth Sleepiness Score, ESS) were recorded. Additional clinical information was obtained from medical notes.

Results: 73 patients with a PSG diagnosis of catathrenia were included, mean age 35 (minimum 7, maximum 58, SD 11) years. 64% of the patients were male. In 54% of cases, catathrenia had not been the presenting complaint triggering the PSG, and average ESS in that group was 12.4 compared to 8.4 in the group investigated for sleep groaning. Most frequent symptoms were daytime sleepiness (34%), witnessed sleep apnoeas (24%), insomnia (15%) and snoring (9.6%) across both groups. Mean AHI was 8.4/h (SD 8.6/h) and mean PLMI was 5.8/h. Average sleep stage distributions were within normal limits and similar in both groups.

Conclusions: Catathrenia is a rare disorder affecting predominantly young adults and more often men in our sample. In our population, slightly more than half of patients did not present with a complaint of sleep groaning. Daytime sleepiness was more frequently reported in patients where the finding of catathrenia was incidental. We had previously reasoned that the groaning would be disruptive for people sleeping with a partner which might explain young adults presenting for investigation. The lack of older patients in our sample where the finding was incidental raises the possibility that the condition recedes with age.

Disclosure: No

P401 | Assessment of telomerase reverse transcriptase single nucleotide polymorphism in obstructive sleep apnea

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Introduction: Obstructive sleep apnea (OSA) is a widespread sleep breathing disorder defined as an airway collapse at night. At least moderate OSA was reported in 50% of men and 23% of women in the population of Switzerland. TERT is a reverse transcriptase that prevents the shortening of the telomere.

Objective: The research aimed to investigate the relationship between SNP of TERT and the severity of OSA.

Methods: 148 patients with probable OSA were diagnosed by performing full-night polysomnography based on the American Academy of Sleep Medicine guidelines. A single nucleotide of TERT polymorphism was assessed using real-time quantitative polymerase chain reaction (qPCR).

Results: The statistical analysis showed the lack of relationship between the rs2853669 and the rs2736100polymorphism of TERT and the severity of OSA (p[u1][PM2] > 0.05). However, the study showed that patients with allele C in rs2853669 (30% of subgroup without allele C vs. 50% of a subgroup with allele C; $p < 0.05$) and allele G in rs2736100 (24% of subgroup without allele G vs. 46 % of the subgroup with allele G; $p < 0.05$) polymorphism of TERT have a significantly higher probability of diagnosing arterial hypertension[u3]. Moreover, the patients with homozygotic of rs2736100 polymorphism of TERT less frequently have diabetes mellitus[u4].

Conclusion: The polymorphism of the TERT gene does not influence the severity of OSA. Moreover, the SNP of TERT affects diagnosing arterial hypertension and diabetes mellitus.

Disclosure: No

P402 | Comparison between non-sleepy patients diagnosed with obstructive sleep apnea by polysomnography versus non-sleepy patients who underwent home sleep apnea test

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Objectives/introduction: According to American Academy of Sleep Medicine Clinical Practice Guidelines (2017) Home Sleep Apnea Test (HSAT) is recommended in case of increased risk of moderate to severe Obstructive Sleep Apnea(OSA), indicated by the presence of excessive daytime sleepiness (EDS) and at least two of the following three criteria: loud snoring; witnessed apnea or gasping; or diagnosed hypertension. EDS is absent in many individuals with significant sleep-disordered breathing. The aim of this study was to evaluate OSA patients diagnosed by HSAT, despite the absence of EDS and to compare with patients diagnosed by polysomnography(PSG). Statistical analysis performed by SPSS v 20.0, *p* value 0.05.

Methods: A total of 187 patients who did not suffer from EDS and diagnosed with 0SA (Apnea-Hypopnea Index (AHI) ≥5 events/h) participated in this study. 156 patients underwent an attended PSG whereas 31 underwent a type III HSAT. Sleepiness was assessed with the Epworth Sleepiness Scale (ESS). Patients without EDS were defined as they had an ESS score < 10.

Results: The non-sleepy patients who diagnosed after an attended PSG did not differ on mean age (55.42 ± 13.34 years vs 54.10 ± 14.50, $p = 0.62$), on ESS score [ESS median (interquartile range)= 6(4–7) vs 5 (4-8), $p = 0.93$)] or on BMI [BMI median(interquartile range) = 29.2 (27–33.48) vs 29.2(27–34.3) kg/m^2, $p = 0.79$] compared to non-sleepy OSA patients who diagnosed by HSAT. Interestingly, two groups did not differ on AHI [AHI median (interquartile range) = 28(11–48.75) vs 21 (6–59) events/h, $p = 0.41$], on minimum O_2saturation level [saturationmedian(interquartile range)= 84 (80–88) vs 85(73–90)%, $p = 0.88$] or on their comorbidities. Non-sleepy HSAT group presented with increased percentage of nocturnal jerks (12% vs 1.28%, $p = 0.007$) compared to PSG group. On the contrary, patients diagnosed by PSG reported higher percentage of the daytime symptoms: attention difficulties (50.6% vs 12.9%, $p = 0.00$) and concentration difficulties (50.6% vs 19.35%, $p = 0.001$) compared to HSAT group.

Conclusions: OSA patients without EDS diagnosed by HSAT did not differ on AHI or on minimum O_2Saturation level compared to non-sleepy patients diagnosed by PSG. Non-sleepy OSA patients diagnosed by PSG presented with increased percentage of attention and concentration difficulties compared to the HSAT group.
Disclosure: No

P403 | The influence of COVID-19 pandemic on CPAP effectiveness and adherence in obstructive sleep apnea

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CPAP (Continuous Positive Airway Pressure) therapy of obstructive sleep apnea (OSA) in the pandemic times of new coronavirus SARS-CoV-2 became an emerging problem. The most challenging issues involve rising concerns about CPAP safety, difficulties in CPAP tolerance because of symptoms of viral infection and low therapy adherence. We decided to investigate how demographic and clinical factors have influenced CPAP therapy during COVID-19 pandemic. Therefore, we have examined *n*149 adults ($n = 109$ male and $n = 40$ female) with OSA in the period from March 4, 2019 to March 3, 2021 (before and after pandemic breakout). Data on CPAP therapy were collected via telemetric system. Statistical analyzes were performed using the Dell Statistica 13.1 application. We have calculated arithmetic means and standard deviations for quantitative variables, for qualitative variables - percentages. The Shapiro-Wilk test was performed to check the distribution of variables. The hypotheses were tested with t-tests dedicated to unrelated and related variables, respectively. The differences between the mean values at p value < 0.05, < 0.01 and < 0.001 were considered significant. The mean age of study group estimated 62.26 ± 10.82 years. Together, results showed that COVID-19 pandemic had no significant impact on CPAP therapy. However, detailed analysis showed that age, gender and clinical features (co- existing diabetes and hypertension) influenced CPAP usage. The difference between average median usage of CPAP in individuals below or equal to 65 years and more than 65 years were statistically significant before (364.83 ± 100.43 and 398.24 ± 94.50, $p < 0.05$) and after pandemic outbreak (362.35 ± 129.97 and 403.73 ± 139.13, $p < 0.05$). The differences between average set pressure in normotensives and hypertensives before (8.73 ± 1.59 and 9.88 ± 2.16, $p < 0.05$) and after pandemic outbreak (8.87 ± 1.60 and 10.05 ± 2.21, $p < 0.05$) were also statistically relevant. Overall, results suggest that COVID-19 pandemic had no impact on CPAP therapy in obstructive sleep apnea. However, detailed results showed that age, gender, co-existing diabetes or hypertension seemed to affect CPAP effectiveness during COVID-19 pandemic. Our results provide a good starting point for discussion on CPAP therapy recommendations.
Disclosure: No

P404 | Patients' reported problems with Philips Positive Airway Pressure devices after recall notification

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Introduction: After Philips announced that there might be health issues regarding isolation foam degradation in their positive airway pressure (PAP) devices, the extent of the problem was not known. This study aimed to evaluate issues patients reported after getting the notification from the provider and other clinical consequences that followed.
Methods: Our national Philips provider has been requested to send a questionnaire addressing possible device problems to all Philips PAP users. We contacted patients who sent back questionnaires by phone regarding the issue and their problems. During the phone conversation, we determined whether additional diagnostics were needed and arranged them.
Results: Out of 2887 patients on Philips PAP devices prescribed by physicians at University Clinic Golnik, 242 (8.3%) responded and 212 (7.3%) reported some problems. The mean age of responders was 64.4 ± 11.1 years, average usage 6.2 ± 1.7 per night, mean usage 5.2 ± 8.9 years, mean apnoea-hypopnea index 43.5 ± 21.2/h, mean ESS 10.8 ± 5.8, 193 (76.3%) patients were adherent to PAP therapy (>4h per night on 70% of night). Compared to those who did not return the questionnaire, women on PAP devices more often responded (38.8% vs 25.4%, $p < 0.001$).
Patients mainly reported problems with upper airway irritation 147 (58%), cough 119 (47%), headache 99 (39%), chest discomfort 81 (32%), and sinusitis 52 (21%). In 73 (30%) we concluded health issues could potentially be related to the PAP device and in 37 (15%) we suggested a priority change of device, while others had fewer problems after using a bacterial filter. In 48 (19%) patients, we believed the issues were related to other parts of the machine (humidifier, mask, etc.). In 53 (21%) patients, we provided additional diagnostic tests and in 45 (18%) we concluded the issues were related to other disorders. In 85 (35%) patients no real health issues existed and no additional measures were necessary.
Conclusion: Minority of patients responded to the questionnaire and reported some problems. Of the patients reporting issues with Philips devices, less than a third potentially had issues related to the isolation foam degradation. Women reported problems more often.
Disclosure: No

P405 | Determinants of treatment-emergent central sleep apnea

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Objectives/Introduction: Treatment-emergent central sleep apnea (TE-CSA) has been observed in approximately 3,5%-20% of patients treated with CPAP for obstructive sleep apnea. The aim of this study was to identify factors that influence the appearance of treatment – emergent central sleep apnea, in patients diagnosed according to the third edition of the International Classification of Sleep Disorders (ICSD-3) by the American Academy of Sleep Medicine (AASM).

Methods: Among 1059 patients with newly diagnosed OSA, who were referred to the Sleep Disorders Center of Evangelismos Hospital of Athens over a 18 month period, and performed a laboratory polysomnography (PSG), 51 patients were diagnosed with TE-CSA. From the remaining patients, 30 patients were used as a control group.

Results: There were no differences in age, BMI, and Epworth sleepiness scale among the two groups. Total sleep time in patients with TE-CSA was marginally reduced183.10 (156.8-210.0) min compared to patients without TE-CSA 224.0 (165.5–276.50) min, $p = 0.07$. Obstructive sleep apneas were increased in patients with TE-CSA 30.2 (9.9–63.7)/h, compared to patients without TE-CSA 40 (23–81)/h, $p = 0.05$. Patients with TE-CSA had also lower oxygen saturations 79 (73.5–85.25)% compared to patients without TE-CSA 86 (78–98)%, $p = 0.003$.

Conclusions: Patients diagnosed with TE-CSA, according to the new criteria of ICSD-3, had more severe OSA compared to the rest OSA patients without TE-CSA. The severity of OSA might be a risk factor for CPAP-persistent central apneas.

Disclosure: No

P406 | Catathrenia – different treatment for all or no treatment at all?

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Introduction: Catathrenia (night-time groaning) is an uncommon sleep-related disorder that consists of a deep inspiration followed by a protracted expiration, during which a monotonous, groaning sound is produced. As a central apnea mimicker, it usually occurs during REM sleep. Despite its poorly understood clinical impact, a propension to ventilatory instability and high arousal index has been observed.

Methods: We present a series of clinical cases that illustrate the different aspects of presentation of catathrenia and the impact of distinct treatment attitudes.

A 21-year-old woman, with a medical history of asthma and nasal sept deviation sought an otorhinolaryngologist due to nocturnal complaints of snoring, morning headaches and a loud nocturnal groaning. Her Epworth Scale Score was 7/24. Level 1 polysomnography (PSG) showed mild obstructive sleep apnea with a respiratory disturbance index (RDI) of 9.4/h and 9 cluster periods (CP) of catathrenia, that occurred predominantly in REM stage. Auto CPAP (APAP) treatment was started, but due to lack of disturbing symptoms she suspended the treatment.

A 39-year-old man, night shift worker, with medical history of atrial fibrillation, was sent by his cardiologist to the Sleep Medicine Department for exclusion of obstructive sleep apnea. He did not refer any nocturnal complaints or consequent daytime symptoms. Level I PSG showed diminished sleep efficiency, due to two periods of insomnia and two periods of catathrenia. No therapy was instituted.

A 29-year-old woman with no medical history, sought a neurologist due to non-restoring sleep, excessive daytime sleepiness and problematic marital status due to nocturnal groaning. Level 2 PSG showed an elevated arousal index (25.1/h), a normal RDI (3.4/h), no periodic limb movement and 9 catathrenia CP.

Treatment with APAP resulted in complete remission of symptoms.

Conclusions: Classified as an isolated symptom of a sleep related breathing disorder, clinical practice proves us wrong, as catathrenia never comes alone. Not only do we need to shift this paradigm, as the precision medical era that we are living in implies personalized attitudes for every patient. This leads us to push the boundaries of the inconvenient of not knowing - do we treat, whom we treat and how we treat?

Disclosure: No

P407 | Synchronizing stimulation and breathing in bilateral Hypoglossal Nerve Stimulation (HGNS): a case series

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Introduction: It has been hypothesized that the therapeutic effect of bilateral hypoglossal nerve stimulation (HGNS) can be maximized by adjusting the stimulation to synchronize with the inspiratory phase of the breathing cycle[1,2]. This retrospective analysis provides early evidence in support of the use of programming strategies, focusing on duty cycle (DC) and stimulation length, in order for the stimulation to overlap with the patient's inspiratory phase.

Methods: Breathing airflow with and without stimulation was analyzed utilizing polysomnography (PSG) data in four obstructive sleep apnea patients implanted with bilateral HGNS (Genio™ System). Therapy response was quantified per stimulation setting, sleep posture and stage by averaging and analyzing segments of 100 breaths. Stimulation length and DC were varied while other stimulation parameters were kept constant across two or three testing segments in which subjects had identical sleeping position.

Results: Four independent cases were analyzed, with variable breathing rates ranging from 12.2 to 16.5 bpm. In the first segment a DC of 50%, utilizing a stimulation cycle length of 4.0 s, was tested, and in the second segment a DC of approximately 69%, utilizing a stimulation cycle length of either 4.0, 4.9 or 5.0 s, was tested. Results showed that the two DC settings resulted in mean stimulation overlap with the patient's inspiratory phase 58 ± 3% and 85 ± 3% of the time, respectively.

Conclusions: This case series demonstrates that customized patient programming strategies to maximize the therapeutic effect of bilateral HGNS can be achieved by adjusting stimulation parameters without the need for a sensing lead.

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Disclosure: Yes

Conflict of Interest statement: The following authors are employees of Nyxoah S.A.: Toberman D, Katzir D, Subbaroyan J, Santos A and Kohn S.

P408 | The amplitude of oscillations in oxygen saturation is related to the apnoea-hypopnoea index in obstructive sleep apnoea syndrome

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Introduction: Obstructive sleep apnoeas usually occur in a periodic breathing pattern. This is possibly caused by the action of the peripheral chemo reflexes. The severity of a periodic breathing pattern comes to expression in the amplitudes of the oscillations in ventilatory and gas-exchange parameters. We tested the hypothesis that the amplitude of oscillations in the pulse oximetry signal (SpO_2) is related to the apnoea-hypopnoea index (AHI).

Methods: We studied polysomnographic recordings of 42 consecutive patients suspected of OSA in four groups: AHI < 5/h, 5–15/h, 15–30/h and > 30/h (10 patients in the first three groups and 12 patients in the last group). Time-frequency spectra of the SpO_2 amplitude and the double loop gain were obtained with wavelet analysis. The "amplitude of saturation index" (ASI) was defined as the mean peak-to-peak amplitude of SpO_2 above a threshold of 2%, multiplied by the relative area of the time-frequency domain where the threshold was exceeded. The relation between the ASI and AHI was studied by linear regression after bilogarithmic transformation. We also determined the mean cycle time of the SpO_2 oscillations.

Results: The ASI was higher in patients with AHI ^{3} 5/hr than in patients with AHI < 5/h (1.24 ± 0.78 vs −0.49 ± 1.1, logarithmic mean ± SD, $p < 0.05$). For patients with AHI ^{3} 5/h, the ASI was significantly related to the AHI ($r^2 = 0.56$, $p < 0.001$, $y = 1.65x–1.02$, after bilogarithmic transformation). For oscillations with amplitude > 2%, the cycle time was 61.0 ± 20.9 s.

Conclusions: In a sample of patients with OSA, the ASI, a measure of the amplitude of SpO_2 oscillations as a function of time and frequency, was significantly related to the AHI. This confirms the periodic nature of the breathing pattern in OSA. The underlying time-frequency analysis makes it possible to relate the severity of the oscillations to other variables that change during the night. Such automatic analysis of oscillatory patterns may also contribute to more specific phenotyping of the disease.

Disclosure: No

P409 | A case of temporomandibular joint disorder induced by nasal CPAP use: Improved by botox injection

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Introduction: Jaw pain and bruxism are often associated with obstructive sleep apnea (OSA). Sometimes they can be the main presenting symptoms of OSA in certain populations. Treatment of OSA with nasal continuous positive airway pressure (CPAP) is believed to resolve bruxism and jaw pain significantly, most if not all. However, we saw a case of a patient with severe OSA who developed a severe temporomandibular joint problem with CPAP use that required intervention.

Results: A 53-year-old patient was diagnosed with severe OSA on night polysomnography with AHI 61.5/h and severe oxygen desaturation down to 79%. His physical examination revealed a high and narrow hard palate with retrognathia and Mallampati classification III. Body mass index was 28.5 kg/m^2. He started using autoPAP with a pressure range of 5-18 cm H_2O.

He developed both temporomandibular joint pains, worse on the left side after 1 month of using nasal CPAP. He had a difficulty in opening and closing his mouth as well as chewing. In addition, he complained of pressure from the mask and hose and the pain from the mask against his philtrum, which made him take off the mask intermittently during the night. Despite that, he was satisfied to use CPAP as he felt

more refreshed in the morning and slept better without choking sense. Replacing a nasal standard mask with a nasal pillow with decreased pressure improve jaw pain slightly. However, he eventually paid a visit to the dentist and received the Botox injection.

Conclusion: Our case suggests nasal CPAP could induce jaw pain and a more serious TMJ problem, although it is rare, and CPAP often helps alleviate jaw pain associated with bruxism and OSA. Being mindful of this side effect would help take care of patients with OSA struggling from CPAP use.

Disclosure: No

P410 | Obstructive sleep apnea treatment beyond positive airway pressure - the contribution of stomatology

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Obstructive sleep apnea (OSA) is one of the most common sleep-related breathing disorders. Positive airway pressure (PAP) is the first-line therapy for most patients with OSA. Oral appliances may be an option in certain patients and are increasingly being used especially due to non-adherence to PAP, being mandibular advancement devices (MAD) the most used. Oral appliances are used in less severe cases or in patients that couldn't adapt to PAP. Oral appliances are generally less effective than PAP at improving the apnea-hypopnea index (AIH), although there is no difference in the impact on symptoms.

We assessed OSA patients with MAD followed in an outpatient stomatology clinic at an university hospital from 2014 to December 2021. 58 patients, 73% males with a mean age of 53.1 years were evaluated. Concerning OSA severity, 58% patients had mild OSA ($n = 34$), 35% moderate ($n = 20$) and 7% had severe OSA ($n = 4$). 36% of patients ($n = 21$) had excessive daytime somnolence. 40 patients (69%) started using MAD due to PAP intolerance, while the remainder started using it as a first line therapy. All cases of severe OSA were referred to stomatology due to PAP intolerance.

Two patients didn't tolerate therapy with MAD. Among those who adhered to this treatment, 71% patients ($n = 41$) maintained a regular use of MAD being tolerance superior to PAP. Only 4 patients had mild adverse effects. Revaluation polysomnography with MAD was performed and OSA correction was observed in 61% of patients. 20 patients out of 21 with excessive daytime somnolence had this symptom resolved.

This study showed very positive results of using MAD in patients with mild and moderate OSA in our centre, with a significant improvement in symptoms but also in the correction of apnea-hypopnea index. Further research should help clarify the phenotypes of an oral device responder compared with a non-responder.

Disclosure: No

P411 | Sleep apnea screening in community pharmacies. Proof of concept

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Introduction: Obstructive sleep apnea (OSA) is a chronic, life-threatening, prevalent and undiagnosed sleep disorder, with a high economic impact. More than 25 thousand people from our area (Araba, Spain) are unaware that they suffer from treatable OSA.

Apnea Virtual Lab is our community-based management program to improve undiagnosed OSA, based on lean thinking and learning by doing methodologies, eHealth and networking with Araba doctors.

This year we intend to implement an innovative networking partnership with new healthcare professionals such as community pharmacies (CPs), to increase OSA screenings (Araba OSA network program). In our country we have one of the closest and most accessible pharmacy in Europe, with 47 pharmacies per 100 000 population.

We present a proof of concept (PoC) in order to demonstrate its feasibility in real clinical practice.

Methods: Participants: adults 18+ Araba residents, without previous OSA diagnosis.

Observational study carried out in 4 CPs (115 potential CPs), in a month period (start date February 17, 2022), simplifying STOPBANG OSA screening, using electronic forms (eForms) with QR link access. Data are instantly available and the information can be exported to our database for further analysis. Our diagnostic process begins if the score is 3+.

We compare screening data in the same period with our regular doctor partners. Statistics: *t*-test for quantitative variables and Pearson's chi-squared test for the qualitative ones, significance level 0.05.

Results: A total of 53 pharmacy OSA screenings (global 237) were obtained: 49% women, aged 60.2, BMI 28.7 kg/m2, STOPBANG scoring average 3.7 (87% begins diagnostic process). There are significant differences between groups in terms of age, BMI, STOPBANG score and % OSA pre-test probability groups. These differences are to be expected because patients come to their doctor specifically for a sleep problem and pharmacy customers typically come in for other reasons and OSA screening was random at the pharmacist's discretion.

Conclusion: CPs are the first-line health professional advisors, helping undiagnosed OSA patients at the earliest possible opportunity.

This PoC suggests that OSA screening networking using eForms can be fast and easy helping to address the hidden pandemic of undiagnosed OSA.

Disclosure: No

P412 | Feasibility of Mandibular Reposition Appliance (MRA) on REM-sleep burden in patients with OSA

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Introduction: Mandibular repositioning appliance (MRA) has become an established treatment for snoring and sleep-disordered breathing. REM-sleep period is one of the respiratory variables which we include for making the diagnosis and treatment options in patients with sleep apnea.

Methods: In a retrospective study (the Netherlands) data from sixty eight patients ($n = 68$) were collected. Patients with OSA (AHI >5/h) underwent a polysomnography (PSG) before MRA treatment. At least six weeks later patients underwent a second PSG to evaluate the effect on AHI. As a primary outcome we compared the response of MRA on de REM-sleep bound AHI. We used de Epworth sleepiness scale as a secondary outcome.

Results: Results are under investigation. We will discuss the effect of MRA on REM-sleep bound AHI.

Conclusion: In general MRA has an excellent effect on mild sleep apnea. Sub analyses are under investigation if the efficiency of MRA on REM-sleep OSA is as effective in the total group.

Disclosure: No

P686 | Increasing adherence to CPAP in mild OSA using remote monitoring: the merge randomised controlled trial

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Introduction: The MERGE study (NCT02699463) was a randomised controlled treatment trial in patients with mild obstructive sleep apnoea (OSA) which utilised technology for monitoring and follow-up of continuous positive airway pressure (CPAP). Here we report the improved adherence to CPAP, relative to other UK randomised studies: MOSAIC (ISRCTN34164388) and PREDICT (ISRCTN90464927).

Methods: The MERGE study, enrolled patients with mild OSA (apnoea-hypopnoea index [AHI] ≥5 to ≤15 events/h; AASM 2012) from 11 UK sleep centres. Patients received auto-titrating CPAP (Autoset; ResMed) with individualised interface, and multifactorial support package, including a 1-hr CPAP run-in and education Ongoing care was managed by centralised therapists who remotely monitored CPAP usage (AirView; ResMed). Interventions occurred as required for low adherence (< 4 h/night); high leak (>24 L/min); and suboptimal treatment (residual AHI ≥ 5). Troubleshooting was provided, alongside individualised psycho-social support and goal-setting. Participants were encouraged to download an engagement tool (myAir; ResMed). The MOSAIC and PREDICT trials, randomised patients with mild to moderate OSA (oxygen desaturation index ≥ 4%, >7.5 events/h) to CPAP or usual care, for 6 or 12 months respectively. Whilst both trials included educational packages, neither utilised technology for monitoring.

Results: 233 of the 301 patients recruited had mild OSA and were included in the intention-to-treat analysis. 115 participants were randomised to receive CPAP and 118 to standard care. 209 (90%) of participants completed the trial. All participants received a three-day phone call, or email. 99 (86%) participants in the CPAP group had additional contacts. The median number of contacts was 5 (IQR 2–8) for each participant. The median CPAP use over 3 months was 4:00 (IQR 1:36–5:44)h/night. In the MOSAIC trial the median CPAP use over 6 months was 2:27 (IQR 0:28–4 :55)h/night. In the PREDICT trial the median CPAP use over 3 months was 1:33 (IQR 0:13–5:00)h/night and over 12 months it was 1:26 (IQR 0:04 to 4:45)h/night.

Conclusions: CPAP adherence was increased in the MERGE trial using a multifactorial approach, including remote monitoring and motivational-based follow-up. Remote monitoring allowed more timely intervention, which could be individualised to support patient health. Future work will evaluate whether improvements in CPAP adherence are maintained.

Disclosure: Yes

Conflict of Interest statement: The MERGE study was funded by ResMed Ltd.

P688 | Role of cephalometric parameters in pediatric obstructive sleep apnea

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Introduction: Obstructive sleep apnea (OSA) is frequently encountered in children. Various risk factors including maxillofacial anomalies play a role in pediatric OSA (POSA). Our aim was to study the relationship between cephalometric parameters and POSA measures in pediatric population.

Methods: Pediatric patients were referred to a tertiary sleep disorders center for a sleep diagnostic study - portable respiratory polygraphy (PG) or overnight polysomnography (PSG), and underwent orthodontic evaluation. Apnea-hypopnea (AHI) and oxygen desaturation (ODI) indices were derived. Orthodontic evaluation consisted of a preliminary onsite assessment of maxillofacial features, and referral for a cephalometric x-ray examination. The cephalometric analysis was performed manually and included linear and angular parameters (SNB, SNPg, MnPlSN, ANB, CoGn, etc.). Spearman's correlation test was used for statistical analysis.

Results: Eighty-six patients with suspicion of POSA underwent the above-mentioned assessments (mean age – 8.9, SD = 4.8, range 3-18, females – 27.9%). Their mean AHI and ODI were 10.6/h and 10.6/h respectively. Among angular measurements noticeable negative/positive correlations with AHI index were seen for anterior posterior position of the mandible (SNB) - $r = -0.311$ ($p < 0.05$) and mandibular angle relative to cranial base (MnPlSN) - $r = 0.450$ ($p < 0.05$). Cranial base angle (BaSN) showed significant positive correlations with AHI ($r = 0.310$) and ODI ($r = 0.361$) ($p < 0.05$). ANB angle which measures the position of the maxilla with the mandible correlated weakly with AHI ($r = 0.22$, $p < 0.05$) and ODI ($r = 0.246$, $p < 0.05$), the length of the Maxillary plane (palatal) Mxpl showed high negative correlation with AHI – $r = -0.364$ ($p < 0.05$), whereas the SNPP angle (palatal plane) did not show any correlation. AHI correlated with linear measurements relative to the mandible body length: MnPl $r = -0.328$, SnpEB $r = -0.275$ AHI, EbTt $r = -0.256$ ($p < 0.05$). The posterior and anterior cranial base ratio also correlated with AHI ($r = -0.402$, $p < 0.05$).

Conclusions: Obtained data showed high correlation of main POSA parameters with many cephalometric measures like vertical airway length and distance between epiglottis and highest point of the tongue dorsum. Significant role of dentofacial measures showing the distal position of mandible found to have clinically useful correlations in POSA. We can assume highly important role of different craniofacial measures in connection to POSA.

Disclosure: No

P689 | Proposed cut-off points for optimal BMI, age and neck circumference value in the stop-bang: comparison of Greece, Turkey and Croatia

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Objectives/Introduction: A high performance of the STOP-Bang questionnaire as a screening tool in different populations and patients in sleep clinics has been reported. Considering anthropometric specificities of populations in different European geographic regions, it is relevant to assess the role of body mass index (BMI), age and neck circumference (NC) in different populations and assess its optimal value in the prediction of risk for OSA.

Methods: A study has been conducted in 3 European Sleep medicine centers - Sleep Medicine Centre, University of Split School of Medicine in Split, Croatia; Aristotle University G Papanikolaou Hospital Exohi in Thessaloniki, Greece; and Ege University Faculty of Medicine Department of Respiratory Medicine in Izmir, Turkey. A total of 9154 respondents were included in the study, of whom 2364 in Greece (assessed with polygraphy), 3638 in Turkey (assessed with full-night polysomnography) and 3152 in Croatia [assessed with either polysomnography ($n = 1043$) or polygraphy ($n = 2109$)].

Results: Patients from Greece were older (57.1 ± 13.2 years) and had higher BMI (33.4 ± 7.1 kg/m^2) compared to patients in Croatia (54.0 ± 13.8 years and 29.8 ± 5.9 kg/m^2, respectively) and Turkey (51.2 ± 12 years and 32.6 ± 6.8 kg/m^2, respectively). ROC curve analysis revealed that among the STOP-Bang items, both BMI and age may differ in their optimal cut-off value based on the Youden index among three included European countries. Specifically, BMI as providing optimal predictability of OSA diagnosis was set at higher values in Greece (30.8 kg/m^2; $p < 0.001$) compared to Turkey and Croatia (29.8 kg/m^2 and 26.6 kg/m^2; $p < 0.001$; respectively). Optimal age cut-off point was highest in Turkey (54.5 years, $p < 0.001$) compared to Greece (47.2 years; $p < 0.001$) and Croatia (45.5 years; $p < 0.001$), whereas NC was found to be similar in all three European countries (Greece 40.5 cm $p < 0.001$; Turkey 40.8 cm $p < 0.001$; Croatia 40.8 cm $p < 0.001$).

Conclusions: Even though STOP-Bang is widely used instrument in the assessment of OSA risk, findings on its interpretability with regard to population differences have been scarce. Current findings suggest that cut-off points for STOP-Bang may be more useful if adjusted to specific populations.

Disclosure: No

P690 | definition of the snoring episode index based on the analyses of snoring parameters and the apnea hypopnea index

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Objective: Although snoring is the most common subjective symptom in obstructive sleep apnea (OSA), an international consensus on the definition of snoring is lacking. This study aimed to define snoring by

analyzing correlations between snoring parameters and the apnea hypopnea index (AHI).

Methods: We retrospectively analyzed the polysomnography data of patients with OSA. A snoring event was defined when airflow pressure was >200 microbar. We included four snoring parameters. Snoring percentage was defined as the cumulative time of snoring events divided by total sleep time. A snoring episode was defined as the occurrence of ≥3 consecutive snoring events, and the snoring episode index was defined as the number of snoring episodes per h. The average and longest durations of snoring episodes were also investigated.

Results: The study enrolled 5035 patients. Their mean AHI was 26.5/h and the mean snoring episode index was 19.2/h. Although the four snoring parameters showed significant correlations with the AHI, the snoring episode index showed the strongest positive correlation with the AHI ($r = 0.741$, $p < 0.001$).

Conclusion: The snoring episode index may be used as a definition of snoring from the perspective of a highly positive correlation with the AHI.

Disclosure: No

P692 | Validation of the goal questionnaire in a cohort of obstructive sleep apnea portuguese patients

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Introduction: Obstructive Sleep Apnea (OSA) is a highly prevalent disorder, but still largely underdiagnosed. The gold standard for its diagnosis is polysomnography, a method not readily available to a large number of patients. To overcome this issue, several screening tools have been developed, namely the GOAL questionnaire, consisting of 4-items (gender, obesity, age and loud snoring), with a score ≥ 2 points indicating a high risk for OSA. We aimed to evaluate the use of GOAL in our population and assess its relation to Apnea-Hypopnea Index (AHI) and OSA diagnosis.

Methods: A total of 153 patients who were referred to our Sleep Disorders Clinic and evaluated consecutively underwent home respiratory polysomnography. We collected and further analyzed their clinical and polysomnographic data using IBM SPSS Statistics® version 27 with Mann-Whitney U test for non-normally distributed variables and Spearman's rank-order correlation.

Results: Most patients were male (70.6%), with a mean age of 60.3 ± 10.9 years. Two thirds were obese, with a mean body mass index of 32.4 ± 5.6 kg/m^2. From the whole sample, 13.1% didn't have OSA, 11.8% had mild, 17.6% moderate and 57.5% severe OSA. Almost every patient reported loud snoring (94.1%). Regarding the GOAL questionnaire, most patients (95.4%) had a high risk for OSA: score 2 (15%), score 3 (43.8%), score 4 (36.6%). A Spearman's correlation showed a moderate, positive correlation between AHI and GOAL, which was statistically significant ($r_s = 0.401$; $p < 0.001$). The difference of the mean AHI between patients classified as low and high for OSA according to the GOAL questionnaire was statistically significant ($p < 0.001$). GOAL questionnaire has shown a sensitivity of 99.2% for the diagnosis of OSA in our sample, with a positive predictive value (PPV) of 90.4% and negative predictive value of 85.7%.

Conclusions: The results from our retrospective analysis corroborate the existing evidence that the GOAL questionnaire might be useful for OSA screening, with a good sensitivity and PPV. It also correlates significantly with the AHI, possibly allowing for the identification of most severe cases. This is a simpler questionnaire compared to other know tools, therefore it may have a great applicability in clinical practice.

Disclosure: No

P693 | What is the role of the nose in patients with obstructive sleep apnoea using CPAP?

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Objectives/introduction: Many studies have investigated the relation between continuous positive airway pressure (CPAP) use in patients with obstructive sleep apnoea (OSA) and nasal pathology and symptoms, but the exact role of the nose remains unclear. The aim of this systematic review was to answer the following questions: "Does nasal pathology affect CPAP use?", "What is the effect of CPAP on the nose?", and "Does treatment of nasal pathology affect CPAP use?".

Methods: Pubmed and Scopus databases were searched up to October 2020.

Results: Sixty-three articles were selected. Most studies identified a correlation between larger nasal cross-sectional area or lower nasal resistance and higher CPAP compliance or lower CPAP pressures; however, baseline nasal symptoms did not appear to affect CPAP use. The effect of CPAP on the nose remains uncertain: while most studies suggested increased mucosal inflammation with CPAP, those investigating symptoms presented contradictory results. Nasal surgery leads to improved CPAP compliance and decreased CPAP pressures, whereas there is little evidence available for the use of topical nasal steroids.

Conclusions: There appears to be a link between smaller nasal volumes or higher nasal resistance and lower CPAP compliance, an increase in nasal inflammation caused by CPAP, and a beneficial effect of nasal surgery on CPAP usage, but no significant effect of CPAP on nasal patency or effect of topical steroids on CPAP compliance. Results are more mitigated with regards to the effect of nasal symptoms on CPAP use and vice-versa.

Disclosure: No

P694 | Impact of the use of a self-regulating humidifier heater on compliance with continuous positive airway pressure

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Introduction: Adherence to continuous positive airway pressure (CPAP) therapy may be interfered by side effects, primarily nasopharyngeal.

Published randomized studies about the benefit of CPAP humidifiers have been carried out on small samples (<50 patients) and/or on short follow up period (3–6 weeks). The results are discordant.

The aim of this randomized, multicenter study was to determine, on a larger population, the effect of adding a self-regulating humidifier-heater to CPAP on 3 months compliance.

Materials/Methods: Between April 2018 and September 2020, 215 adults with obstruct sleep apnea patients and apnea-hypopnea index ((AHI) >15/h, were included. 109 in the humidified group (HG) and 106 patients in the non-humidified group (NHG). The CPAP used was Resmed S10 with or without a humidifier in climate control mode (relative humidity 85% - adjustable temperature).

Patients were evaluated initially and after 3 months of treatment. Clinical data, visual analogue scale (VAS) for nasopharyngeal symptoms and CPAP data were collected.

Results: The 2 groups were comparable at inclusion: 66.5% of men ($p = 1.175$), average age = 55.0 ± 14.7 years ($p = 0.920$), average BMI = 30 ± 5.9 kg/m^2 ($p = 1.101$), and average AHI = 44.7 ± 17.6 per h ($p = 0.814$). AutoCPAP were set generally between 5 and 12 cmH_2O. 92% of patients had a nasal mask.

The 3-month compliance, the primary endpoint of the study, showed a higher median use in the HG (5.5h) compared to the NHG (4.4h), but was not statistically significant ($p = 0.597$). However, 24.5% of patients in NHG were excluded because they had a humidifier added prior to the 3-month visit for dry nose/mouth problems that led to discontinuation of treatment.

Nasal and oral dryness were statistically significantly higher in the NHG at 3 months on VAS: Average 1.0 ± 1.9 for HG, 3.3 ± 3.5 for NHG ($p = 0.007$), particularly when the beginning of the CPAP treatment occurred in spring: Average 0.5 ± 1.5 for HG, 2.8 ± 2.8 for NHG ($p = 0.0059$).

Conclusions: These results confirm the interest of adding a self-regulating humidifier as a first-line treatment for patient comfort, but not for compliance. However, nearly ¼ of NHG patients hadn't tolerated the absence of humidifier during 3 months.

Disclosure: No

P695 | Retrospective study on the prevalence of chronic open angle glaucoma in patients suffering from moderate to severe sleep apnea

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Introduction: Primary open-angle glaucoma (POAG) and normal tension glaucoma (NTG) are chronic progressive optic neuropathies with characteristic morphological changes at the optic nerve head and retinal nerve fiber layer in the absence of other ocular disease or congenital anomalies. Glaucoma is insidious and still a leading cause of blindness. Sleep apnea syndrome (SAS) being a well-known risk factor for developing numerous cardiovascular and metabolic comorbidities, could also be associated to POAG and NTG. Suggested pathophysiological mechanisms linking SAS and glaucoma are the impact of nocturnal hypoxemia and alterations of the autoregulation of the perfusion of the optic nerve. Other mechanical hypotheses linking intraocular hypertension to nocturnal supine position or obesity have also been suggested.

Methods: After being diagnosed with moderate to severe SAS by a full polysomnographic recording (PSG) at the sleep lab, 58 patients (74.1% male; mean age 55 years; mean body mass index 33.1 kg/m^2; mean apnea/hypopnea index 39.7/h) underwent a voluntary screening for glaucoma at the department of ophthalmology. Patients suffering from known ophthalmologic disorders were excluded. Ophthalmologic examinations consisted of best corrected visual acuity, pachymetry, intraocular pressure, biomicroscopy of the anterior segment, gonioscopy, non-dilated fundus exam, visual field (VF) and optical coherence tomography (OTC).

Results: The ophthalmologic examination highlighted floppy eyelid syndrome (60.34%), dry eyes (63.79%), diabetic retinopathy (8.62%), and retinal vascular tortuosity (15.51%). NTG was suspected in 23 patients and confirmed in 2 patients. POAG was confirmed in 1 patient. Between the glaucoma-suspect and non-glaucoma groups, significant differences in PSG measures could only be observed in the time spend below 90% oxygen saturation (67.3 min versus 17 min, *p*0.019) and wake time after sleep onset (WASO, 91.3 min versus 61.1 min, *p*0.03). No significant differences could be observed in demographic and descriptive parameters between both groups.

Conclusions: The high prevalence of different ophthalmologic disorders supports the importance of maintaining a systematic and full ophthalmologic examination as standard of care in patients being diagnosed with moderate to severe SAS. The time spend below 90% oxygen saturation appears to be the single respiratory PSG parameter predicting a suspicion of chronic open angle glaucoma.

Disclosure: No

P696 | Sleep on it: probing emotional memory in obstructive sleep apnea

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Clinical sleep conditions, such as Obstructive Sleep Apnea (OSA), have been shown to impact not only memory functions, but other cognitive domains as well (e.g., executive functions). OSA is also thought to feed a negative-bias in emotional memory systems, acting as a trigger/enhancer of mood disorders. The most used treatment for this pathology is *continuous positive airway pressure therapy* (CPAP), which has been associated with benefits on cognition and mood. Nevertheless, the phenomenology of emotional memory in OSA and the effects of CPAP treatment on cognitive functioning remain poorly understood. Through a longitudinal approach (i.e., pre-, after 4–6 weeks, and 12 months post-CPAP), this study aims to investigate emotional memory in OSA patients, and to outline the general neuropsychological functioning before and after CPAP.

Fourteen OSA patients completed 2 distinct sessions of neuropsychological assessment (pre- and 4–6 weeks post-CPAP). In both sessions, the following instruments were administered: Montreal Cognitive Assessment, Trail Making Test, Verbal Fluency Test, and Hospital Anxiety and Depression Scale. We adapted the English version of the Cognitive Affective Verbal Learning Test for European Portuguese in order to assess emotional memory. Two recall measures were used: an Emotionality Factor (EF) and Valence Factor (VF). Student's *t*-tests were conducted to examine whether there were any improvements from the first to the second session.

Our preliminary results revealed no significant differences between the first and second session in depressive and anxious symptomatology, as well as in all the cognitive domains assessed, including emotional memory (all *p*'s > 0.05). However, OSA patients showed a bias for neutral (vs. emotional) words in the short-term recall phase (EFs < 0), no emotionality effects in the long-term recall (EFs≃0), and a bias towards negative (vs. positive) words in both recall phases (VFs< 0).

These preliminary findings could suggest that more time on CPAP treatment is needed for its beneficial effects to emerge, which could be evident in the third session (project is ongoing). They additionally indicate that OSA patients did not exhibit the commonly observed emotional salience effect on memory, thus pointing to alterations in the functioning of these systems.

Disclosure: No

P697 | Effects of OSA on a fast-paced working memory task considering demographics and depression

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Research on working memory (WM) in obstructive sleep apnea (OSA) is highly inconclusive and mainly based on short-term span and dual-task measures. This study aimed to assess the performance on a more complex and faster-paced WM task in individuals with and without OSA in the context of the individuals' age, gender, and depression.

61 individuals (31 women) aged 20 to 80 participated in the Computerized Paced Auditory Serial Addition Test (PASAT-C). The participants were presented with three blocks with interstimulus intervals of 3000, 2000, and 1500 ms consisting of 60, 150, and a maximum of 400 items, respectively. In the fastest condition, participants could terminate the block early. Further, we assessed depression severity with the DASS-21. We analysed task performance based on the percentage of correct answers in each block, performance strategy based on the percentage of correctly answered items by dyads for each block, and tendency and time of quitting based on item count. The independent variables considered in each analysis were gender, age, apnea-hypopnea-index (AHI), depression.

A hierarchical linear model (HLM), controlled for block, showed that task performance could successfully be predicted by younger age, lower depression severity, and their interaction, explaining 51.73% of the variance. Another HLM, controlled for block, revealed a negative effect of age on performance strategy accounting for 40.89% of the variance. Similarly, AHI had a negative effect on performance strategy in a separate HLM ($R^2 = 40.39\%$). The tendency to quit was analysed with logistic regression, showing that women were more likely to quit than men. Linear regression showed that in those participants who quit early, item count varied with depression.

Although underpowered, this study is one of the first to investigate the performance of a fast-paced WM task in OSA. We show that the effects of OSA on PASAT-C performance are complex and influenced by demographic factors, depression, and the variable's multicollinearity. While we did not find an effect of OSA on task performance, OSA was linked to poorer performance strategies. Further research is required and should examine different performance parameters considering a range of influencing demographic factors, and depression.

Disclosure: Yes

Conflict of Interest statement: This research was carried out as a part of the sleep revolution project, which has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 965417.

P698 | Using hilbert-huang transform to extract the dynamics of OSA-related heart rate oscillation for monitoring CPAP treatment effect

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Objectives/Introduction: Repetitive episodes of apnea-hypopnea coincident with abrupt changes in hemodynamic parameters and

frequent arousals are thought to cause several pathological alterations in physiological mechanisms. Entrainments of low-frequency oscillations, especially in respiratory and heart rate signals, by OSA events were recognized as one of the prominent features of patients during sleep apnea. We hypothesized that the entrainment of low-frequency heart rate oscillations by OSA can be better derived and quantified by Hilbert-Huang Transform (HHT).

Methods: The protocol of this study was approved by the Institutional Review Board of Shin-Kong Memorial Hospital, Taipei, Taiwan. The recruited patients underwent a two-day overnight polysomnogram (PSG) examination. Following the first baseline diagnostic day, the CPAP titration was administered the following day if the severity of apnea-hypopnea index (AHI) was over 5 per h and if the patient was willing to try the CPAP treatment after explanation. The normalized standard deviation of OSA-related oscillations (STD_{OSA}) and the kurtosis of the instantaneous amplitude variations of OSA-related oscillations ($Kurt_{amp}$) were calculated from the decomposed oscillations by HHT.

Results: The normalized STDOSA was significantly higher in patients with severe OSA, while no differences between patients with mild and moderate OSA were noted. (Left In comparison with Kurtamp of patients with mild OSA, Kurtamp was significantly lower in patients with moderate OSA and further decreased in patients with severe OSA. The AHI was positively correlated with STD_{OSA}($r = 0.63$, $p < 0.05$) and negatively correlated with $Kurt_{amp}$ ($r = -0.57$, $p < 0.05$). The AHI, STD_{OSA}, and $Kurt_{amp}$ were markedly improved after successful CPAP treatment, and the changes of AHI between baseline and CPAP treatments are moderately correlated with STD_{OSA} ($r = 0.67$) and $Kurt_{amp}$ ($r = -0.57$).

Conclusions: In this study, we used a novel method to extract the OSA-related oscillations in heart rate signals and quantified the dynamical characteristics of the elicited oscillations. The indices derived from OSA-related oscillation provide helpful information on OSA but also be a potential alternative in developing an inexpensive home-based monitor tool dependent on only ECG signals.

Disclosure: No

P699 | The clinical significance of the no-apnea score: a comparison study of three tools for screening obstructive sleep apnea

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Introduction: Obstructive sleep apnea (OSA) is a common sleep breathing disorder. Although polysomnography (PSG) is the gold standard diagnostic method for OSA, it is an expensive method, not reimbursed in many developing countries. Moreover, the increased number of patients suspected of OSA highlights the importance of screening tools for OSA. In this study, we aimed to compare the diagnostic ability of three screening tools for OSA, including the No-apnea (age and neck circumference), NoSAS (neck, obesity, snoring, age, sex), and STOP-Bang (snoring, tiredness, observed apnea, blood pressure, body mass index, age, neck circumference, and gender).

Methods: This cross-sectional study was performed on health records of 2078 patients from 2017 to 2019 who were referred to a sleep center affiliated with Tehran University of Medical Sciences, Tehran, Iran. The following variables were recorded and subsequently analyzed: (a) demographic characteristics, (b) three screening tools for OSA (No-Apnea, NoSAS, and STOP-Bang), and (c) the respiratory disturbance index (RDI) derived from PSG parameters. RDI≥ 5 was defined as OSA.

Results: The diagnostic characteristics of the screening tools were calculated, using receiver operating characteristic (ROC) curve analysis. Of the 2078 participants, 1478 (70.8%) were male. The mean age of participants was 45.92 years. OSA was found in 1883 patients (90.6%). The No-apnea score showed the most sensitivity (96.9% compared to 83.5% and 47.3% for STOP-Bang and NoSAS, respectively) and accuracy (90.36% compared to 80.68% and 51.12% for STOP-Bang and NoSAS, respectively). However, the specificity of No-apnea (27.6%) was lower in comparison to STOP-Bang (53.6%) and NoSAS (87.8%). The highest positive and negative predictive values were for NoSAS (92.8%) and No-apnea score (47.8%), respectively. Additionally, NoSAS had the highest positive (3.87) and negative (0.6) likelihood ratios.

Conclusion: According to our findings No-apnea could be used as an objective, sensitive, and easy tool for OSA screening, compared to STOP-BANG and NoSAS questionnaires. As the parameters of this questionnaire are not self-reported, it could be appropriate, especially for screening OSA among safety-sensitive professions such as commercial drivers, in whom providing an accurate medical history might be difficult. Further investigations among the general population and safety-sensitive jobs are recommended.

Disclosure: No

P700 | Gender differences in subjective sleepiness and objective nocturnal sleep propensity in patients with sleep apnea syndrome: a pilot monocenter retrospective study

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Objectives/Introduction: Gender difference exists in patients with sleep apnea syndromes (SAS). There is limited data about gender difference in sleepiness in SAS. Previous studies found that women

reporting similar levels of daytime sleepiness to men are less likely to have an Epworth Sleepiness Scale (ESS) score larger than 10. Therefore, women may have a different threshold or understanding of sleepiness compared with men. In this study we aim to check whether subjective sleepiness and objective nocturnal sleep propensity are different between males and females with SAS.

Methods: We selected 126 moderate and severe obstructive SAS patients (34 females, 92 males) who underwent polysomnography (PSG) between 2018 and 2021. Age, BMI, ESS, Fatigue Severity Scale (FSS), PSG sleep latency (SL), apnea-hypopnea index (AHI), REM latency, total sleep time (TST), sleep efficiency (SE), oxygen desaturation index (ODI), arousal index (AI) and leg movement index (LMI) were compared between males and females using Wilcoxon rank sum test. Stepwise linear regression was applied to select the best variables predicting ESS and PSG-SL.

Results: There are no significant differences in BMI ($p = 0.47$) and age ($p = 0.17$) between women and men. Women have higher ESS than men (median 12 vs. 9, $p = 0.032$). The odd ratio of ESS>10/ESS≤10 tends to be 2.4 times higher ($p = 0.055$) in females than in males. Women tend to have higher FSS (median 5.55 vs. 4.5, $p = 0.09$) and lower AHI (median 24.4 vs. 30.3, $p = 0.08$) than men. There are no significant differences in PSG-SL ($p = 0.62$) and the other PSG parameters between women and men, except that women have longer REM latency ($p = 0.014$) and lower ODI ($p = 0.0039$) than men. Gender is a significant predictor (i.e., female-male: 2.73, $p = 0.0115$) of ESS after controlling for BMI, age, AHI and other PSG parameters, but it is not a predictor of PSG-SL. There is weak correlation between ESS and FSS in males ($p = 0.008$, $r = 0.28$) but strong correlation in females ($p < 0.0001$, $r = 0.69$).

Conclusions: Female patients are subjectively sleepier than males, although there is no difference in their objective nocturnal sleep propensity. Females may complain differently about sleepiness compared with males, as their sleepiness highly correlates to fatigue.

Disclosure: No

P701 | Assessment of autonomic activations in sleep studies as a severity marker in patients with obstructive sleep apnea

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Obstructive Sleep Apnea (OSA) is one of the most prevalent sleep disorders worldwide, with high rates of underdiagnoses. Polysomnography (type I) is considered the gold standard for assessing its severity, however, cardiorespiratory studies (type III), despite having some limitations, appear as an alternative diagnostic test. Autonomic arousals (Aa) can be considered indirect markers of cortical arousals in type III sleep studies. Thus, the present investigation intends to identify the correlation between Aa and the real severity of OSA.

Observational study with a sample of 33 individuals with suspected OSA undergoing a type I sleep study in the sleep unit of Hospital da Luz Setúbal - Portugal. Studies were independently evaluated as type I and type III. The guidelines of the American Academy of Sleep Medicine (AASM), version 2.4, were followed to assess the apnea and hypopnea index (AHI), oxygen desaturation index (ODI) and arousals index (AI). Respiratory disorder index (RDI) was obtained through the AHI + flow limitations and the autonomic arousals index (AaI) was calculated through plethysmography obtained by an internal algorithm of the software and heart rate acceleration (HRa) was considering with 10% HR variation in the pulse signal.

Comparing the AHI result of the type III and type I analysis, 52% (17/33) migrated from category to a greater severity, and 48% remained in the same category, of which 36% had severe OSA in the type III analysis. Comparing the mean value of AHI_type III, with the mean value of RDI and AaI, in the 17 cases that increased their severity in the assessment of AHI_type I, there was an increase at least 2 times greater than that of AHI_type III and this increase being in agreement with the increase of the severity of OSA.

The assessment of other parameters in type III sleep studies, such as the AaI, can be a useful tool in the diagnosis of OSA, especially when the gold standard is not available, and can be considered an indicator of severity in addition to the AHI.

Disclosure: No

P702 | Predictors of cognitive complaints in patients with obstructive sleep apnea

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Introduction: Patients with Obstructive Sleep Apnea (OSA) often report cognitive complaints as an interfering daytime symptom. However, severity of cognitive complaints may differ widely, and little is known about contributing or determining factors.This study aims to explore the relation between patient characteristics and severity of cognitive complaints in a sleep center sample of OSA.

Methods: We included 63 OSA patients (AHI > 10). Cognitive complaints were assessed using the three subscales of the Cognitive Failure Questionnaire (CFQ; forgetfulness, distractibility and false triggering). For all three CFQ subscales we performed separate stepwise multiple linear regression analyses. As predictors Apnea

Hypopnea Index (AHI) and subjective sleepiness (Epworth Sleepiness Scale, ESS) were put in first, age, sex and educational level second, fatigue (Fatigue, Assessment Scale, FAS), anxiety and depression (Hospital Anxiety and Depression Scale, HADS) third and objective cognitive functioning (neuropsychological tests for processing speed, reaction time, complex attention and cognitive flexibility) last.

Results: The severity of the three cognitive complaints under study (forgetfulness, distractibility and false-triggering) were all related to subjective sleepiness. In addition, forgetfulness was related to reported fatigue. We did not find relationships between cognitive complaints and age, sex, educational level, AHI, anxiety, depression and objective cognitive functioning.

Discussion: Sleep center OSA patients with high subjective sleepiness are more likely to report cognitive complaints. Patients with high levels of fatigue are more likely to report memory complaints. Cognitive complaints are unrelated to OSA severity and may not be a sign of objective cognitive disorders in OSA.

Disclosure: No

P703 | Characterization of risk criteria for obstructive sleep apnea and its association with absenteeism among nursing staff

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Objectives/introduction: The relationship between risk factors associated with sleep disorders with absence from work among nursing staff has not been well understood. In the present study, an attempt was made to investigate the prevalence rate of obstructive sleep apnea (OSA) and its main determinants among nurses along with determine the role of sleep disorder and related risk factors affecting absenteeism among nurses.

Methods: Overall, 304 consecutive nurses working at Imam-Khomeini hospital in Tehran between 2018 and 2020 were included into our survey. The likelihood of OSA among nurses was assessed by the "STOP-Bang questionnaire.

Results: In total, 27 out of 304 participants were at risk for OSA according to STOP-BANG score. In multivariable logistic regression analysis, the main predictors for OSA among nurses were male gender (OR = 11.701, $p = 0.006$), neck circumference (OR = 1.450, $p = 0.030$), and diastolic blood pressure (OR = 1.143, $p = 0.025$). We could show a direct association between h of vacation and two indicators of advanced age and body mass index. The presence of night shifting was found to be the major determinant for overall time for personnel absenteeism.

Conclusions: OSA is prevalent in about 8.7% of our nursing staff especially among men, overweight nurses, those with night shifting condition and those suffering from diastolic hypertension. However, occurring OSA may not be a major indicator for absenteeism among nurses.

Disclosure: No

P704 | The role of anthropometry, body composition, and physical activity on obstructive sleep apnea severity

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Introduction: Obstructive sleep apnea (OSA) is characterized by repeated episodes of partial or complete airway collapse during sleep. Obesity is considered the primary risk factor for the development, maintenance, and severity of OSA.

Objectives: The objectives of this study were to (i) evaluate the difference in characteristics of anthropometric and body composition parameters, and daily physical activity of subjects with different OSA severity and (ii) to assess the relationship between OSA severity and the parameters studied.

Method: Fifty-nine subjects (49% males, 46.7 ± 15.0 years old) were categorized into four groups, according to OSA severity using the apnea-hypopnea index (AHI): no (AHI < 5), mild (AHI 5-14.9), moderate (AHI 15-29.9), and severe OSA (AHI≥30). All subjects had a three-night self-applied somnography (SAS), were evaluated with anthropometric (height, weight, body mass index (BMI), and neck circumference) and body composition (fat percentage and visceral fat) measurements, as well as answered the International Physical Activity Questionnaire (IPAQ). A one-way ANOVA was used to establish the differences between OSA severity using the Bonferroni post hoc test. Pearson's correlation coefficients were calculated between the studied variables and AHI.

Results: Subjects with moderate and severe OSA were heavier and had greater BMI than subjects with no OSA ($p < 0.01$). In the same way, subjects with severe OSA had more visceral fat compared to subjects with no- and mild OSA ($p < 0.01$). Subjects with severe OSA also had greater neck circumference than subjects with mild OSA ($p < 0.01$). No difference was found in height, fat percentage, and daily physical activity between the groups. A significant correlation was found between AHI and age, height, weight, BMI, neck circumference, and visceral fat ($0.277 \geq r \leq 0.566$; $p < 0.01$).

Conclusion: These findings suggest that overweight and obesity are important risk factors for OSA severity, with visceral fat being a significant risk factor. Furthermore, age, height, weight, BMI, neck

circumference, and visceral fat are the dominant determinants of OSA severity. However, physical activity does not have a clear relationship with OSA in this group.

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Disclosure: No

P705 | Mandibular advance device: Therapy evaluation outcomes on a pre-study clinical sample

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Objectives/ introduction: Obstructive Sleep Apnoea is a chronic disease characterized by the collapse of the upper airway during the passage of air. Continue Positive air pressure has more efficacy but less compliance than mandibular advance device. On the other hand, mandibular advance has less efficacy but more compliance. Whatever the effectiveness of both therapies is comparable.

Methods: A sample of ten individuals where select, 4 women and 6 men, with the average of age of 45 years old, BMI > 25 Kgm^2, AHI between 5,6/h and 41,9/h, ODI between 2/h and 36,8/h. All individuals have a severe snore index.

A PSG type II was done to each one of the patients, and a full clinical examination was performed by an Internal Medicine Physician and sleep specialist. A complete nasal observation and respiratory flux permeability was under the ENT examination as well. And an intra-oral evaluation of the oral health condition, TMJ and muscle palpation was made by a qualified dentist in dental sleep medicine. No other therapies (surgery or ventilatory) were performed before. All individuals were submitted a MAD therapy, taking in consideration 50% of the maximum protrusion, for starting point on the lower tray.

Results: After a MAD control PSG type II, the authors evaluated the results: all individuals decrease or eliminated snore index; 60% of sample decrease AHI < 5/h, 40% of the individual's improved AHI by decreasing at least 50% AHI of the baseline; all individuals shown decrease on positional AHI (taking in consideration the supine position). Also, ODI improve in all sample.

Conclusions: The authors conclude that MAD therapy shown better results on the men's gender than on the women gender. Individuals with severe AHI had a better therapeutic response than others.

Disclosure: No

15: SLEEP DISORDERS - CIRCADIAN RHYTHMS

P105 | Patients with delayed sleep-wake phase disorder sleep less during daylight saving time

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Objectives/Introduction: Circadian clocks entrain to light and darkness. During Standard Time (ST), local and sun time are identical only at the central time-zone meridian, during Daylight Saving Time (DST), the two time scales differ everywhere (difference between Local And Sun Time; ΔLAST). We hypothesized that during DST, patients with Delayed Sleep-Wake Phase Disorder (DSWPD) chronically suffer from sleep deficits.

Methods: We analysed 5-years of clinical records of 162 DSWPD patients (52.5% male; median [Q_1,Q_3] age: 35.5 [26.0,50.3]; age range: 16–92) from a sleep medicine clinic in Lisbon, Portugal (GMT zone).

Variables collected during ST and DST were compared using Wilcoxon-Mann-Whitney tests. We used generalised estimating equation models adjusted for age and sex to assess the association between (i) *local time*(ST *vs*. DST), (ii) *work* (work days *vs*. work-free days) and (iii) *local time* × *work*interaction and the dependent variables: (i)SO_w, (ii)$SE_w$and (iii)SD_w.The association between ΔLAST and $SO_w$was tested using Spearman's correlation. ΔLAST was computed using the *R* package"*solartime*".Analyses were performed with SPSS v.27 and R, using a confidence level of 5%.

Results: 36.4% of the patients had their first appointment during ST and 63.6% during DST. Dim Light Melatonin Onset (DLMO) was measured as a marker for circadian phase in 82 patients (58 from DST and 28 in ST).

On a weekly average, patients slept significantly shorter during DST than under ST (62 min. $p < 0.01$), mainly due to sleep on workdays ($SD_{w,}p < 0.01$). SD_walso correlated with ΔLAST ($r_{sp} = 0.35$, $p < 0.01$).

Under a local-time-centric view, people go to work at the same time in ST and DST but dawn and dusk occur an h later during DST; while dawn and dusk only change with natural photoperiod under a sun-time-centric view, but people go to work an h earlier during Dustbin sun-time centric analyses, sleep-wake behaviour of DSWPD patients

is significantly advanced, while DLMO occurs essentially at the same sun time.

Conclusions: Our results favour perennial ST and suggest assigning time-zones closest to sun time, thereby supporting public health, beyond reducing DSWPD incidence.

Disclosure: No

P106 | Sleep quality and eating disorder-related psychopathologies in patients with night eating syndrome

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Introduction: Night Eating Syndrome (NES) is an eating disorder (ED) characterized by nocturnal ingestion (NI), evening hyperphagia, morning anorexia, as well as mood and sleep disturbances. This study compared subjective and objective sleep quality and ED-related psychopathologies in three groups of patients seeking treatment for ED.

Method: The sample included 170 women, aged 18–68, all referred for an ED assessment between 2011 and 2020. The participants were divided into three subgroups: NES-only ($n = 30$), NES+ binge eating (BE) (including Binge Eating Disorders (BED) or Bulimia Nervosa (BN) ($n = 52$), and BE-only ($n = 88$). The measures consisted of a psychiatric evaluation, one-week objective sleep monitoring measured by an actigraph, a subjective sleep self-report (PSQI), and ED-related psychopathology questionnaires (BSI).

Results: Objective sleep monitoring revealed significant group differences, with higher sleep efficiency in BE-only (95 ± 6.0%) than NES-only and NES-only (90.6 ± 8.8%; 90 ± 8.0%) and longer sleep durations for the NES-only (470 ± 65min) than BE-only and NES-BE (441 ± 61; 434 ± 59min) groups. Subjectively (PSQI-total), the BE-only group described a significantly lower sleep quality (8.6 ± 2.9) than either the NES- only or the NES+BE groups (10.1 ± 2.9; 10.6 ± 3.1). ED-related psychopathology was lower in the NES-NI-only group. A stepwise linear regression revealed that general psychopathology (the brief symptom inventory total score) was a significant predictor of PSQI-total.

Conclusion: The current study assessed objective and subjective sleep quality and level of ED-related psychopathology in patients seeking treatment for ED (BN or BED with and without NES and NES-only). The NES groups (NES+BE and NES-only) showed significantly poorer sleep quality and had significantly worse sleep efficiency than the BE-only group. In terms of psychopathology, body image, and social phobia were significantly lower in the NES-only group. Subjective sleep quality was predicted by the level of psychopathology (BSI) and the ED group, in that subjective (vs. objective) sleep quality was associated with an increased level of psychopathology, mainly in the NES+BE and NES-NI groups.

Disclosure: No

P107 | Does online-delivered cognitive behavioural therapy for insomnia improve insomnia severity in nurses working shifts? Preliminary results of an ongoing randomised-controlled study

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Introduction: Approximately 10-30% of shift workers suffer from shift work sleep disorder (SWSD) that is characterised by insomnia and/or sleepiness related to the shift schedule. In this context, a small number of studies explored the efficacy of face-to-face Cognitive Behavioural Therapy for Insomnia (CBT-I) and reported promising results. Due to irregular working hour, it is particularly challenging for shift workers to attend fixed appointments, so online-delivered treatment could be an attractive alternative to face-to-face treatment. Therefore, we developed the online-delivered training "SleepCare" for nurses working shifts that is tested for efficacy in the current study. It is hypothesised that the treatment with SleepCare reduces insomnia severity compared to a waiting-list control condition.

Method: SleepCare is based on CBT-I and was adapted to the situation of nurses working shifts. It consists of six modules which participants can complete independently and after which they receive individualised feedback. A total of $N = 46$ unmedicated nurses who suffer from SWSD will be randomised to either the treatment group (SleepCare) or the waiting-list control group. Individuals who suffer from any comorbid sleep or psychiatric disorder or report any serious physical illness that affects sleep, who are undergoing psychotherapy or are on a waiting list for it, will be excluded. Based on these criteria, 15 nurses (73.3 %female, $m_{age} = 39.6$ years, $m_{Isl} = 17.5$) have already been included by the time this abstract is submitted. The primary outcome variable of the study is the Insomnia Severity Index (ISI). In addition, other sleep-related questionnaires, sleep diary data and actigraphy data before and after treatment as well as 6 months after treatment completion will be analysed.

Results: Currently, complete data are available from 10 participants ($n = 4$ in the SleepCare group, $n = 6$ in the control group). Pre-to-post-treatment reduction of 5.5 points on the ISI score for the SleepCare group and of 0.3 points for the control group was observed. Preliminary ANOVA revealed no significant group difference ($F = 4.484$, df = 1, $p = 0.067$). However,

results from approximately 25 participants will be presented at the congress.

Discussion: This study is one of the first studies examining the effect of an online-delivered treatment based on CBT-I adapted to shift work.

Disclosure: No

P108 | The pathophysiological impact of circadian rhythms' disruption on neurodegenerative disorders onset

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Objective/Introduction: Modern society is characterized by a higher human development index than our ancestors. As a result, there is a longer life expectancy, lower mortality rates and an ageing population. Consequently, the amount of time exposed to mutagens and noxious factors that could lead to neurodegenerative disorders (ND) increases. Among those, circadian rhythms disruptions (CRD) should be taken into consideration as they became common disorders of the hectic lifestyle of modern society characterized by continuous light exposure (smartphones), jet lag travels, night-shift jobs and high anxiety levels. Hence the interest in understanding how from a pathophysiological aspect CRD could promote cognitive decline and neurodegeneration.

Methods: This research represents a literature review based on 30 articles selected from the databases PUBMED (15 articles) and SCOPUS (15 articles) published in the framework 2019-2022 using the keywords: "Circadian Rhythm and Neurodegenerative Disease".

Results: The analyzed articles emphasized several pathogenetic mechanisms through which CRD contributed to neurodegeneration. A critical relevance was given to protein dyshomeostasis mainly due to amyloid overproduction, hypercatabolic processes promoted by hypercortisolemia or hypersympathicotonia, and loss of autophagy mechanisms and low excretion rates of proteic by-products through the glymphatic system or blood-brain barrier. Other incriminated pathways were neuroinflammation promoted by glial clocks' disruptions, oxidative stress or synaptic malfunction. On the other hand, various benefits of steady circadian rhythms on neuronal metabolism were depicted. These are as follows: stress granules degradation, BDNF-induced neurogenesis, ROS scavenge, calcium voltage-gated or NMDA channels inactivation, daily adequate melatonin concentrations provided by regulated sleep-wake cycles, as well as controlled levels of stress hormones, physical activity and h-based diets.

Conclusions: The peculiarities of the role of CRD in neurodegenerative disorders' development are still to be studied as they are various and poorly understood. However, based on the current knowledge, it is necessary to stress the need for prophylactic measures by promoting lifestyles that correspond to the circadian rhythms.

Disclosure: No

P428 | Circadian misalignment is associated with COVID-19 infection

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Background: Circadian system contributes to the regulation of inflammatory processes, but the role of circadian misalignment as a risk factor for contracting Covid-19 has up to now been poorly studied. The aim of this study was to explore the relationship between circadian misalignment (chronic disturbance of the circadian system) and the risk of Covid-19 infection in a population of subjects suspected of contact or infection with SARS-CoV-2.

Methods: Cross-sectional single-center study conducted during a period without lockdown in winter 2021. Recruitment took place in a Covid-19 outpatient testing center. Subjects between 18 and 45 years old were included whether they were symptomatic or not, healthcare workers or not, in contact with a Covid-19 case or not. To determine social jetlag, a proxy of circadian misalignment, they were asked about their usual sleep-wake behaviors. Usual sleep duration and sleep-wake timing were explored on workdays and free days. Social jetlag was defined as at least 2 h shift of circadian alignment (defined as the difference between mid-sleep on workdays and mid-sleep on free days, mid-sleep as the median between bedtime and rise time).

Results: One thousand fourteen subjects were included (sampling rate: 10.8%, 39% men, mean age 28 ± 8) with 56 subjects positive for Covid-19 (positivity rate: 5.5%). Usual mean sleep duration was equivalent in both groups (7 h47 versus 7 h49, $p = 0.733$). Social jetlag greater than 2 h comprised 33.3% of subjects in the Covid-19 group versus 20.6% in the control group ($p = 0.026$). After adjustment on age, gender, BMI and work schedules, subjects presenting with social jetlag greater than 2 h had a 2.07-fold higher likelihood to test positive than subjects who had identical sleep-wake timing on workdays and free days (OR = 2.07, 95%CI = [1.12e3.80], $p = 0.024$).

Conclusion: Circadian misalignment not only is present in subjects infected by Covid-19 but could also be responsible for a higher likelihood of being infected. The chronobiological impact on the immune system or a higher likelihood of being exposed to social contacts during nocturnal activities could explain our findings, which need to be confirmed in a future large cohort study. Regular sleep-wake timing could ultimately become a target for preventing Covid-19 infection.

Disclosure: No

P429 | Irritabel bowel disease among norwegian nurses – associations with insomnia, excessive sleepiness, shift work disorder and shift schedule

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Objectives/Introduction: Both shift work and poor sleep have been associated with high prevalence of gastrointestinal symptoms and irritable bowel syndrome (IBS). This study aimed to investigate the prevalence of IBS among nurses, and its associations with shift work, sleep- and sleepiness problems.

Methods: Data were collected among 1335 Norwegian nurses (90.4% females, mean age 41.5 years) participating in the longitudinal cohort "SUrvey of Shift work, Sleep and Health (SUSSH)". The present study reports findings based on data collected in 2018.The questionnaire included measures of working hours, shift work disorder (SWD) according to the International Classification of Sleep Disorder 3ed. (ICSD-3) diagnostic criteria, IBS based on the Rome IV diagnostic criteria, insomnia measured by the Bergen Insomnia Scale (BIS), and excessive sleepiness based on a cut-off above 10 on the Epworth Sleepiness Scale (ESS). Chi-square tests were used to compare categorical variables and crude and adjusted (for sex and age) logistic regression analyses were conducted with IBS (not IBS = 0 and IBS = 1) as dependent variable.

Results: A total of 6.3% of the nurses reported IBS, 30.9% insomnia, 25.6% excessive sleepiness and 33.6% reported SWD. Of the total sample, 40.2% had a work schedule that included night work. IBS was more prevalent among nurses with insomnia(no/yes) (4.8% vs. 9.7%, $p < 0.001$), excessive sleepiness (no/yes) (4.9% vs. 10.7%, $p < 0.001$), and SWD (no/yes) (5.0%vs. 9.1%, $p = 0.004$), but not among nurses having a work schedule including night shifts (5.9% vs. 7.2%, $p = .351$). The adjusted logistic regression analyses showed that insomnia (OR 2.14, 95%CI 1.36–3.67), excessive sleepiness (OR 2.36, 95%CI 1.48–3.75) and shift work disorder (OR 1.95, 95%CI 1.24–3.06)remained significantly associated with IBS when adjusting for sex and age.

Conclusion: The prevalence of IBS in this population of nurses was quite low. However, IBS was more prevalent among nurses having sleep problems like insomnia, excessive sleepiness and shift work disorder. When adjusted for sex and age, insomnia, excessive sleepiness and shift work disorder remained significantly associated with IBS among these Norwegian nurses.

Disclosure: No

P430 | Association between Sleep Regularity Index with sleep quality in various sleep disorders

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Sleep Regularity Index (SRI) is an emerging new parameter of sleep disturbances. Greater sleep irregularity has been shown to be associated with increased cardiovascular risk and psychiatric morbidity. This study conducted analysis of SRI and other sleep indices, from the collective actigraphy (AW) data ($N = 577$; mean age 46.3 ± 18.1) and polysomnography (PSG) data ($N = 354$, among patients with AW data; mean age 51.0 ± 16.2) from the sleep disorder patients in a single center, per methods on previous study.

SRI of sleep disorder patients ranged from −19.7 to 99.5 (mean 36.9 ± 16.0), showing lower SRI than previous study reported. Compared with patients with higher SRI, patients with lower SRI had delayed sleep timing (median "sleep median time" among regular sleepers: 3:06 a.m., irregular sleepers: 5:15a.m., $p = 0.003$) and slept more during daytime (regular sleepers: median 69.9 min, irregular sleepers: 237.5 min, $p < 10^{-12}$) Total sleep time at night was indifferent. There were no significant difference between patient groups who received only actigraphy, or actigraphy and PSG. When compared with PSG data, sleep regularity was independent from various PSG sleep indices, including total PSG sleep time, sleep efficacy, daytime sleepiness, depression index, and apnea-hypopnea index. Lastly, the distribution of SRI did not differ between patients with different diagnoses, which is established based on PSG sleep indices.

Since PSG gathers data on sleep quality and SRI gathers regularity of sleep among extended timespan, this result implies that SRI and PSG is independent from the each other. Yet our study suggest that SRI plays an important role in terms of sleep quality and morbidity of sleep disorder patients. So that physicians would take account of SRI into assessing patient's problems, in complementary manner with PSG, therefore leading to appropriate intervention tailored to the patient.

Disclosure: No

P431 | Validation of the scale for symptom severity of circadian rhythm sleep-wake disorders – the second stage study

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Objectives: We are developing a severity scale for circadian rhythm sleep-wake disorders (CRSWD; including delayed sleep-wake phase disorder [DSWPD] and non-24-h sleep-wake rhythm disorder [N24SWD]) and examined the reliability and validity of the draft version of the scale.

Methods: The draft of the questionnaire (version 10.9) is described in Japanese and consists of 12 items with 4 or 6 anchor points, and the

range of the total score is 0 to 40. The items include the difficulty of sleep onset and awakening, the differences between the desired and actual sleep onset and awakening, social adaptation, daytime sleepiness, physical symptoms, depressive symptoms, performance after awakening, sleep fragmentation, free-running of sleep phase, and the difference between the earliest and latest awakening within a week. Patients with DSWPD or N24SWD were rated with the scale by two independent raters. Clinical Global Impression – Severity (CGI-S) was rated by the physicians in charge of the patients, and Morningness – Eveningness Questionnaire (MEQ) and Munich Chronotype Questionnaire were scored by the patients. This study was approved by the Ethics Committee of the Fujita Health University, and the patients provided prior verbal and written informed consent.

Results: Thirty patients with DSWPD were included. Intraclass Correlation Coefficient (ICC) was 0.91 as inter-rater reliability, and Cronbach's alpha was 0.75 as internal consistency. As criterion validity, the Spearman's rank correlation coefficient was 0.75 for CGI-S, 0.52 for MEQ, and 0.60 for MSF_{SC}(corrected midpoint of sleep in free days) against the total score of the scale.

Conclusions: This study suggested relatively good reliability and validity of this version of the scale. Nonetheless we should revise it to eliminate the ambiguity of the items, and then further validate regarding with the circadian phase determined by melatonin and the response to the symptom changes.

Disclosure: No

P714 | Negative mood and frequent dysphoric dreams show associations with insomnia symptoms, regardless of the effect of chronotype

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Introduction: Psychological differences between chronotypes have been widely studied. From the perspective of poorer sleep quality and mental health complaints, the vulnerability of eveningness has emerged. Taking subjective sleep quality into account, beside the symptoms of insomnia, frequency of bad dreams and nightmares may also indicate negative mood. This cross-sectional study aimed to investigate the associations between eveningness, poorer mental health, subjective sleep quality and frequency of dysphoric dreams. Our first hypothesis was whether eveningness is associated with poorer mental health, regardless the effect of sleep quality. The second hypothesis was whether eveningness is associated with frequent nightmares and bad dreams and this association is independent from sleep quality and mental health complaints.

Methods: We collected data with an online survey that included Morningness-Eveningness Questionnaire (MEQ), Athens Insomnia Scale (AIS), frequency of dyshoric dreams (frequency of nightmares = NMF and bad dreams = BDF) and General Mental Health (GHQ). Data of 2077 healthy participants were analysed with regression models and a mediation analysis.

Results: First, we built hierarchical regression models with continous variables, where GHQ was the outcome variable, and MEQ was the predictor, but it only explained a small proportion of the variance (3%). As a next step, we added AIS to the model, which explained a large proportion of GHQ (22%).A mediation analysis on the direct effect of eveningness on GHQ and through AIS showed weak, but independent association. Additional logistic regression analyses were performed on binary variables of dysphoric dream frequencies. No significant associations were found between either eveningness and NMF, nor eveningness and BDF. BDF was associated with AIS and GHQ, while NMF was only linked to AIS, but not to GHQ.

Conclusions: AIS showed more relevant contribution to GHQ than eveningness, whereas eveningness was not associated with dysphoric dreaming. Decreasing insomnia symptoms appears to be essential in individuals at risk for mental health complaints.

Disclosure: No

P715 | A retrospective study of the efficacy of inpatient treatment for CRSWD

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Objectives: Circadian Rhythm Sleep-Wake Disorder (CRSWD) is a sleep disorder that is essentially a disturbance in the synchronization of internal circadian rhythm to the desired social schedule and often causes significant problems in social life. Inpatient treatment for refractory CRSWD, which includes light therapy and resetting the daily activity schedule, has been considered empirically effective. However, symptoms often relapse after discharge. In this study, we retrospectively examined whether inpatient treatment for patients with CRSWD improved their symptoms, especially after discharge.

Methods: Patients with CRSWD based on ICSD-3 who visited the Department of Psychiatry, Fujita Health University Hospital, and were hospitalized to improve their refractory sleep-wake rhythm disturbance were included in the study. The medical records were retrospectively examined for diagnosis, duration of hospitalization, treatment, relapse after discharge, and comorbid psychiatric disorders. The Severity Level Criteria for DSPS, a categorical assessment of the delay of sleep phase, was used for judging improvement. Relapse was judged by difficulty in social adaptation due to sleep-wake disturbance. Survival analysis was conducted regarding relapse and psychiatric comorbidity.

Results: A total of 71 patients with CRSWD (mean age 23 ± 12 years, 39 male, Delayed Sleep-Wake Phase Disorder 57, Non-24-H Sleep-Wake Rhythm Disorder 11, Irregular Sleep-Wake Rhythm Disorder 2, Circadian Sleep-Wake Disorder Not Otherwise Specified 2) were

included for analysis, Length of stay in hospital ranged from 13 to 77 days (mean 36.6 ± 12.6 days). In all cases, sleep-wake rhythm improved during hospitalization. Of the 61 patients, excluding the 10 who were transferred after discharge, 56 patients relapsed during follow-up, the time to relapse ranged from 4 to 635 days (mean 76.6 ± 122.6 days). However, the sleep phase delay was significantly milder than before hospitalization even at its worst after the discharge among patients with relapse. The relapse was significantly faster for patients with psychiatric comorbidity than without.

Conclusions: It was suggested that inpatient treatment for CRSWD may be effective in temporarily correcting the rhythm, but most patients may experience relapse within a year. However, they might still have some benefits even after a relapse.

Disclosure: No

P716 | Sleep-wake rhythm characteristics and their relations to stress among shift-working nurses

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Introduction: Long-lasting shift work might negatively affect sleep-wake rhythm, sleep quality and emotional health. However, there is a lack of sleep and stress-related data about the shift-working nurses in Lithuanian population.

Objectives: To evaluate the relations between the characteristics of sleep – wake rhythm and stress among shift-working nurses.

Methods: The study was performed at the Hospital of Lithuanian University of Health Sciences Kaunas Clinics. 187 general practice nurses working in shifts were interviewed using standardized questionnaires: Munich Chronotype Questionnaire for Shift-Workers (MCTQ Shift), Pittsburgh Sleep Quality Index (PSQI), Epworth Sleepiness Scale (ESS), Insomnia Severity Index (ISI), The Nursing Stress Scale.

Results: All 187 respondents were females, with age of 41.83 ± 12.0 years. MCTQ Shift revealed that nurses had the longest period of sleep (8:34 ± 1:27 h) within two days off after the night shift and the shortest period of sleep (4:07 ± 1:17 h) - between two night shifts. According to the (PSQI), 132 (70.6%) nurses reported poor quality of sleep. 32 (22.5%) respondents had pathological sleepiness with ESS score > 10. According to the ISI, 52 (27.8%) subjects had possible insomnia, 9 (5.3%) moderate insomnia and 5 (2.7%) severe insomnia. A shorter sleep period between the two morning shifts was related with the stress experienced more often due to conflicts with doctors and nurses, work environment problems and concerns about further actions ($p < 0.05$). Sleep quality was found to be worse in shift nurses, who experienced stress due to a patient's death and distress and unsatisfactory working environment, conflicts with doctors and lack of support ($p < 0.001$). Nurses were more likely to experience insomnia – related symptoms, if they had experienced frequent stress due to the patient‘s death and distress, conflicts with doctors ($p < 0.05$), insufficient professional training and unsatisfactory working environment ($p < 0.001$).

Conclusions: The majority of our shift–working nurses reported poor sleep quality, almost a third of them suffered from insomnia–related symptoms and a third from sleepiness problems. Characteristics of the sleep-wake rhythm and sleep quality were related to the stress experienced in the work environment due to the care of seriously ill patients and relationships with colleagues.

Disclosure: No

16: SLEEP DISORDERS - INSOMNIA

P109 | Effects of closed-loop auditory stimulation (CLAS) on sleep in chronic insomnia

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Introduction: Closed-loop auditory stimulation (CLAS) during sleep has been mostly used to manipulate brain oscillations that regulate sleep-dependent memory processes in good sleepers. It has been shown to promote trains of slow oscillations (SO), increase delta and spindle activity and improve memory performance. The aim of this study was to investigate the effects of CLAS during sleep in individuals with chronic insomnia.

Methods: We studied 27 individuals with chronic insomnia (mean age = 35 ± 15 y.o, 18F), that is, with difficulties to fall asleep and/or maintain sleep and daytime dysfunctioning in the last 3 months. We used a within-subject design where participants underwent a habituation night followed by two experimental nights: one with CLAS stimulation (STIM) and one without stimulation (SHAM) in counterbalanced order.

PSG recordings included 9-channel EEG sampled at 512 Hz, EOG and EMG (Brain Products, Germany), which were scored according to AASM guidelines. We also automatically detected spindles and SOs, and analyzed power spectral activity. ANCOVAs with age and sex as covariates were used to test the effect of Condition on sleep variables and Pearson correlations were performed to assess whether changes in SO activity were associated with changes in sleep.

Results: We found no effect of Condition on sleep quantity or quality (e.g., sleep stages, sleep fragmentation index, arousal density; all $p > 0.05$). Moreover, we did not observe any change in SO or spindle

activity (all $p > 0.05$). While there were no overall differences in delta and sigma power, CLAS decreased EEG power within the high beta band (19–35 Hz) during NREM ($p = 0.02$), suggesting reduced cortical arousal.

We found that individuals who exhibited an increase in SO density during NREM sleep ($N = 15/27$) with CLAS displayed less arousal density ($r = -0.44$, $p = 0.02$) and an increase in spindle density ($r = 0.39$, $p = 0.04$), suggesting inter-individual differences in CLAS effects on sleep in insomnia.

Conclusions: The present findings suggest that CLAS stimulation applied during NREM sleep dampens neurophysiological signatures of hyperarousal that characterize patients with chronic insomnia without consistent effects on other EEG markers of sleep regulation. A subgroup of individuals with insomnia may be more responsive to the effects of CLAS on sleep.

Disclosure: No

P110 | Sustained attention performance during sleep deprivation and following nap: associated with trait-like vulnerability

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Introduction: Sleep deprivation(SD) is known to be associated with cognitive performance deficit. Especially, vigilant attention is consistently and robustly affected by total SD. We tried to identify patterns of sustained attention performance degradation during total SD and whether napping opportunity following SD could improve psychomotor performance. In addition, we examined individual differences in vulnerability to SD using psychomotor vigilance task(PVT).

Methods: Thirty healthy adults(19–25y; 16 females) participated in a 2-day laboratory study. Participants underwent 24-h(6:00 a.m.–6:00 p.m.) total SD under constant environmental conditions and performed the 3-min PVT(PVT-B) for objective vigilant attention, the Stanford Sleepiness Scale(SSS) and visual analogue scale(VAS) for subjective sleepiness at 3-h intervals. After 24-h SD, subjects were randomly assigned to one of three conditions: no nap(No-NAP; $n = 10$), a 30-min nap(30-NAP; $n = 10$) and a 90-min nap(90-NAP; $n = 10$). After taking a nap, the PVT-B, SSS and VAS were undertaken at 1-h intervals. Stress-related hormonal responses (blood concentrations of cortisol, epinephrine, and norepinephrine) were also measured at baseline, pre- and post-nap.

Results: Taking a nap, irrespective of nap length, improved the subjective sleepiness(SSS: $p = 0.035$, VAS: $p = 0.003$), but, did not affect the sustained attention performance task assessed using mRT(mean reaction time) and lapse(number of reaction time>500ms) by the PVT-B. Subsequently, we categorized all subjects as vulnerable or resilient, based on median split of averaged PVT lapse during 24-h sleep deprivation. In both vulnerable and resilient groups, mRT and lapse increased near habitual bedtime, and there were marked differences between two groups in the magnitude of sustained attention performance(mRT: $p = 0.006$, lapse: $p = 0.038$). However, there were no differences between vulnerable and resilient groups in self-related sleepiness assessed using SSS and VAS for sleepiness. There was also no significant difference in blood concentrations of cortisol, epinephrine, and norepinephrine.

Conclusion: Total SD led to worsening in subjective sleepiness and sustained attention performance. Taking a nap after SD cannot mitigate an impairment of vigilant attention performance, but subjective sleepiness. Degraded sustained attention performance showed marked trait-like individual differences in vulnerability to SD. Small individual differences in sustained attention at baseline are amplified during prolonged wakefulness, especially in habitual bed time.

Disclosure: No

P111 | Efficacy of gamma-aminobutyric acid from lactic acid bacteria on insomnia: a randomized, double-blind trial

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Introduction: This study aimed to determine the subjective and objective improvements in sleep quality after treatment with natural gamma-aminobutyric acid (GABA) derived from lactic acid bacteria (LAB).

Methods: In a randomized, double-blind, placebo-controlled trial, 51 subjects consumed either a placebo or LAB-GABA (375 mg/day) for 2 week, 30 min before bedtime. Polysomnography was performed, and sleep questionnaires were administered before treatment and after 2 weeks of treatment.

Results: After 2 weeks of treatment, LAB-GABA treatment group decreased score of Pittsburgh Sleep Quality Index (10.80 ± 2.50 at pre-treatment to 8.20 ± 2.71 at posttreatment, (mean ± SD) $p < 0.001$), Insomnia Severity Index (13.04 ± 3.69 at pre-treatment to 9.36 ± 4.69 at posttreatment, $p < 0.001$), Fatigue severity scale (32.84 ± 12.18at pre-treatment to 26.72 ± 11.08 at posttreatment, $p = 0.006$), and Epworth sleepiness scale (9.04 ± 4.35 at pre-treatment to 7.20 ± 3.98 at posttreatment, $p = 0.003$). Polysomnnography reveal that the sleep latency had decreased (13.86 ± 17.89 at pre-treatment vs. 7.78 ± 7.46 min at posttreatment, $p < 0.031$) and the total sleep time had increased (258.44 ± 45.81 vs. 284.16 ± 46.58, $p = 0.004$) only in the LAB-GABA treatment group. There were no serious adverse effects in either group.

Conclusions: This study shows that treatment with LAB-GABA improved not only the subjective sleep quality but also the objective sleep efficacy without adverse events.

Disclosure: No

P112 | Structural brain phenotyping of insomnia subtypes based on the insomnia typequestionnaire

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Objective: Insomnia disorder is the most common sleep disorder (ID). Improvement of treatment requires a better understanding of brain circuits. Previous neuroimaging findings however were inconsistent, an issue that may indicate heterogeneity within the ID population. Indeed, associations of insomnia severity with brain structure were better revealed within a specific subgroup rather than heterogeneous patients (Leerssen, Transl Psychiatry 2020; 10:425). To address heterogeneity, a bottom-up, data driven approach revealed five robust subtypes of ID based on their profile of personality and mood traits assessed with the insomnia type questionnaire (ITQ, Blanken, Lancet Psychiatry 2019; 6:151). The present study aims to compare structural brain measures of these subtypes, focusing on cortical surface area, cortical thickness, and structural connectivity.

Methods: Structural and diffusion weighted 3-Tesla MRI data of five independent studies were combined. The sample consisted of 87 controls without sleep complaints and 219 participants with insomnia disorder categorized based on the Insomnia Type Questionnaire as highly distressed ($n = 34$), moderately distressed reward sensitive ($n = 96$), moderately distressed reward insensitive ($n = 31$), low distressed high reactivity ($n = 35$) or low distressed low reactivity ($n = 23$).

We used Freesurfer and tractography to compute cortical thickness, cortical surface area and structural connectivity. Regions of interest were determined by mapping subtype-distinguishing traits to associated brain regions according to the Neuro knowledge engine database. Structural brain measures were analyzed using multiple linear regression correcting for age, sex, brain volume and scanner.

Results: Functional mapping of insomnia and subtype-distinguishing traits showed involvement of frontal, orbitofrontal and temporal regions. Focusing on these regions, first results indicate that different insomnia subtypes show different profiles of deviating structural brain measures and their connectivity. For example, the moderately distressed reward insensitive type showed reduced connectivity between frontal cortical regions, whereas other ITQ subtypes showed increased connectivity compared to good sleepers.

Conclusions: First results show that insomnia subtypes can have different structural brain phenotypes with sometimes opposing deviations compared to good sleeping controls. This heterogeneity, if not accounted for, could obscure consistent findings on brain structural correlates of insomnia (Tahmasian, Sleep Med Rev 2018; 42:111), since the ratio of insomnia subtypes represented within a specific study sample affects the outcome.

Disclosure: No

P113 | The relationship between sleep, memory, emotion and mood (The sleepmem study)

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Introduction: Experimental studies have suggested that short or disrupted sleep impairs memory consolidation, mood, and perception of emotional stimuli. However, previous studies have been limited by small sample sizes and the use of in-laboratory designs. Therefore, the aim of this fully-online study was to investigate the association of sleep with overnight emotional and non-emotional memory, emotional perception, and mood in a large self-selected UK sample.

Methods: Within 2 h prior to bedtime, participants provided the following variables: age, sex, overall health, education, the Sleep Condition Indicator (SCI), use of sleep medication, and cognitive status. Thereafter, participants completed a word-pairs memory task, rated their mood (positive and negative affect schedule) and sleepiness (Karolinska Sleepiness Scale), and performed a task assessing perception of emotional stimuli. Here, participants viewed 30 pictures (15 negative and 15 neutral) from the Open Affective Standardized Image Set and rated valence on a VAS scale rated from very unpleasant to very pleasant.

Upon awakening, participants reported on their sleep the previous night (bedtime, risetime, sleep duration and sleep quality) and mood. Thereafter, they completed follow-up parts of the two tasks: cued recall of words presented, valence ratings of previously viewed images, and a surprise recognition task for the images with matched control images.

Results: Preliminary analyses of the first 371 ($f = 292$, age 18–80) participants with complete data, showed that participants scoring ≤ 16 on the SCI (indicative of probable insomnia) ($n = 230$), were not significantly different from participants scoring > 16

($n = 141$) in terms of emotional ($p = 0.99$ or non-emotional ($p = 0.20$) overnight memory consolidation or overnight change in perception of negative images ($p = 0.69$). Positive affect was lower ($p < 0.01$) and negative affect higher ($p < 0.01$) in participants with probable insomnia compared to those without.

Conclusions: This study shows that overnight emotional processing (memory and perception) does not differ between participants with and without probable insomnia. This is in contrast to published findings where methodical constraints differ suggesting that care needs to be taken when extrapolating findings from experimental sleep disruption studies to clinical populations measured at home.

Disclosure: No

P114 | The smile randomized controlled trial: Effectiveness of a multi-component sleep-mood intervention to improve sleep and mental health of university students

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Background: Many university students suffer from sleep problems and are at an age group which has a high risk of developing psychological disorders. It is well known that insomnia is a risk factor for developing depression and anxiety disorders. Previous studies have assessed the effectiveness of cognitive behavioural therapy (CBT) on improving sleep in university students. However, the present study is the first one to incorporate various therapeutic approaches (CBT for insomnia, mindfulness, lifestyle) into one short protocol tailored to university students.

Objectives: The primary objective of this study was to evaluate the effectiveness of a multi-component sleep and mood intervention on insomnia (primary outcome), and on depression, anxiety, and quality of life (QoL) (secondary outcomes) compared to a waitlist control group.

Methods: We randomised 35 participants from Leiden University with significant sleep problems (>10 score on the Insomnia Severity Index (ISI)) into an intervention group and waitlist control group (ratio 2:1). The intervention group consisted of four weekly group therapy sessions. The primary outcome was measured with the ISI, secondary outcomes were the Beck Depression Inventory (BDI), the Hospital Anxiety and Depression Scale (anxiety subscale), and the Quality of Life, Enjoyment, and Satisfaction Questionnaire (Q-LES-Q-sf). Outcomes were measured at baseline and 5 weeks post-intervention. Repeated measures ANOVA was used as statistical analysis in SPSS.

Results: Intention-to-treat analysis showed significant time × treatment interaction on insomnia symptoms ($p = 0.021$, *partial* $\eta^2 = 0.152$); with a significant difference at post-test ($p = 0$ 0.023, $d = 0.82$) wherein the intervention group reported lower insomnia compared to the control group. The analysis showed no significant time x treatment interaction effects on depression, anxiety, and QoL. Higher life satisfaction was associated with less sleep disturbances at post-test.

Conclusions: The findings indicate that CBT-I in condensed form can be combined with mindfulness in 4 sessions and this integrated group intervention is associated with reductions in insomnia symptoms in university students. Since no significant effects were detected on mood and quality of life, future studies with larger sample size may explore the effects of this intervention on these outcomes.

Disclosure: No

P115 | Measuring the benefits of digital cognitive behavioural therapy for insomnia: Estimating gains in quality-adjusted life years from a randomised controlled trial

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Objectives: Economic evaluations of digital cognitive behavioural therapy (dCBT [Sleepio]) are required to determine whether it represents good value for money. Quality-adjusted life years (QALYs), capturing length and quality of life, provide a standard metric by which to judge whether a treatment is worth its cost. The aim of this study was to estimate gains in QALYs associated with dCBT using health-related quality of life data measured in a published large effectiveness trial comparing dCBT to a sleep hygiene education control in 1711 participants (Espie et al., 2019).

Methods: In a secondary analysis of trial data, PROMIS Global Health scores were mapped to the EQ-5D-3L, which were then used to determine the QALY profile for each participant from baseline to 24-weeks, results were extended to 48-weeks under assumptions. The PROMIS-10 was collected in the trial at baseline, 4, 8, and 24 weeks (both groups) and 36 and 48 weeks in the dCBT arm only. Individual participant scores were mapped to EQ-5D-3L scores using methods recommended by Thompson et al. (2017). The QALY profile for each participant was estimated, based on the EQ-5D scores, which range from 0 (dead) to 1 (perfect health), and their time points. Multiple imputation was used to handle missing data.

Results: Mean QALYs to 24-weeks were 0.375 and 0.362 in the dCBT and control groups respectively, a statistically significant mean difference of +0.014, (95% CI +0.008, +0.019), which was maintained over the full 48-week study period (+0.026 [+0.016, +0.036]). The difference of 0.026 QALYs is equivalent to 9.5 days in perfect health.

Conclusions: Fully automated dCBT for insomnia (Sleepio) is associated with statistically significant gains in QALYs over 48-weeks compared with control. Our study appears to be the first to show gains in QALYs, equivalent to 9.5 days in perfect health, after dCBT for insomnia. Improvements in QALYs are likely due to improved HRQoL with improved insomnia. Findings may be used to power future studies and

inform cost-effectiveness analyses of automated dCBT for insomnia scaled to a population level.

Disclosure: Yes

Conflict of Interest statement: CBM is employed by Big Health Inc. and is salaried by the company. CAE is the Co-Founder and Chief Scientist of Big Health Inc. and is a shareholder. ALH is employed by Big Health Inc., is salaried by the company and is a shareholder. RS is a paid consultant for Big Health Inc. The digital self-help intervention, Sleepio, was made available to all participants at no cost and the study was conducted at the University of Oxford, Sir Jules Thorn Sleep & Circadian Neuroscience Institute and Department of Psychiatry.

P116 | Insomnia symptoms are associated with impaired resilience in bipolar disorder: Potential links with early life stressors may affect mood features and suicidal risk

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Introduction: Bipolar disorders are among the most prevalent, likely to be recurrent, chronic and disabling psychiatric conditions leading to global burdens of disease in terms of disability and morbidity. The understanding of the mechanisms involved should thus be considered as a priority to identify potential early markers. In particular, insomnia likely plays a triggering role in the onset and maintenance of BD. Not only circadian sleep alterations are frequent in BD as it has been shown in the last few years but also insomnia symptoms may interest BDs across their entire course. Resilience is a modifiable stress-risk dimension evolving process with low resilience being related to depressive symptoms, BDs severity and higher suicidal risk. Since insomnia may affect resilience we aimed to study their association in BD patients.In addition since early life stressors may affect resilience via sleep alterations, we aimed to study the association among early life stress, resilience and insomnia in BDs

Method: A sample of 188 adult participants with BD of type I or II were assessed during depressed phase with and without mixed features using the Structural Clinical Interview for DSM-5 (SCID-5), the Beck Depression Inventory-II (BDI-II), the Young Mania Rating Scale (YMRS), the Early Trauma Inventory Self Report-Short Form (ETISR-SF), Resilience Scale for Adults (RSA), the Insomnia Severity Index (ISI) and the Scale for Suicide Ideation (SSI). Participants with or without clinically significant insomnia were compared and we carried out correlations, regression and mediation analyses.

Results: Participants with insomnia showed a greater severity of depressive symptoms as well as of suicidal risk, early life stressors and lower level of resilience. Insomnia symptoms mediated the association between early life stress and low resilience, between low resilience in planning future and depressive symptoms ($Z = 2.17$, $p = 0.029$) and low resilience and higher suicidal risk ($Z = 3.05$, $p = 0.0002$)

Conclusion: Insomnia may be related to the severity of BDs, to higher early life stressors and lower level of resilience negatively affecting mood symptoms and suicidal risk in BDs. Assessing and targeting insomnia symptoms may potentially promote resilience in BDs in response to early life stressful events.

Disclosure: No

P117 | Impact of transcranial direct current stimulation (TDCS) On sleep and reaction time among student-athletes

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Introduction: It has previously been demonstrated that student-athletes represent a population at risk of experiencing poor sleep. Notwithstanding its crucial influence on athletic performance, sleep also represents an important protective factor for mental health. Therefore, exploring an alternative intervention that could alleviate sleep difficulties is warranted. This study aimed to explore the impact of tDCS on sleep and reaction time among student-athletes.

Methods: Data were obtained throughout the academic semester from student-athletes engaged in different sport including track & field, swimming, basketball, soccer, crew and volleyball. Each participant completed the Athlete Sleep Screening Questionnaire (ASSQ), the only sleep questionnaire validated for athletes and, the Psychomotor Vigilance Task (PVT), estimating reaction time, commission, and omission errors. Participants underwent five Level-2 PSG nights (Night1 to Night5) with either tDCS or placebo stimulation. Spearman correlation analyses were carried out between PVT and PSG measures on Night1 (pre-treatment) and Night5 (post-treatment). Mixed linear models were used for all PSG variables. To test for differences in ASSQ scores, 2×2 mixed ANOVAs (pre- vs. post-intervention) and Group (placebo vs. tDCS) were carried out. The same design was privileged for PVT measures.

Results: Final sample ($N = 30$) was 50% female, 83.3% white, comprised of young adults (Mean Age = 21.1 y ± 2.1). Significant Group × Time interaction for the ASSQ total score revealed that participants in the tDCS group, compared to those in the placebo group, reported significant improvements in subjective sleep between pre- and post-treatment ($p < 0.007$). Contrary to our hypothesis, no significant improvement on any PSG measures could be detected following tDCS stimulation. However, results showed that there was a significant impact of Time, ($F(1, 26) = 4.46$, $p = 0.044$) on reaction time as measured with the PVT, but no impact of Group, nor any interaction.

Conclusion: Improvements in subjective sleep suggest that tDCS bears interesting possibilities into the enhancement of sleep among student-athletes. Following increased total sleep time, performance (reaction time) was improved regardless of group which greatly matters for this specific population. However, results shall be interpreted with caution considering the small sample size and would warrant replication.

Disclosure: No

P118 | Sleep characteristics and the efficacy of the Insomnia Severity Index in a community of low-income south africans

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Introduction: There are limited data describing the sleep of African-origin adults living in Africa. South Africans from low-income communities report long sleep durations (~9 h). Coupled with reports of high levels of daytime sleepiness and daytime naps, the sleep quality and symptoms of sleep disorders such as insomnia, deserves attention in these individuals. We aimed to compare self-reported measures of insomnia symptom severity to actigraphy-derived measures of sleep characteristics among African-origin adults.

Methods: We recruited 191 African-origin adults (female: 52%, age: 39.4 ± 8.1 y, employed: 23%) living in a low-income South African community. Participants completed the Insomnia Severity Index (ISI) and Epworth Daytime Sleepiness (ESS) questionnaires and wore a wrist-worn accelerometer for one week to measure habitual sleep characteristics.

Results: Nocturnal sleep opportunity was long (actigraphy-derived nocturnal time-in-bed: 9.48 ± 1.33 h), but only converted to 7.04 ± 1.23 h total sleep time. Sleep onset latency was long (37.3 ± 30.7 min, 48% took longer than 30 min to fall asleep), sleep efficiency was poor (74.4 ± 9.0%, 91% had sleep efficiency < 85%), mean arousal index was 7.7 ± 2.4 arousals/h, 76% of participants napped in the daytime and 21% had significant daytime sleepiness. Mean ISI was 3.4 ± 4.6 (4% classified as having symptoms suggestive of clinical insomnia). Ordered logistic regressions adjusting for age, sex, employment status, alcohol use and smoking status found no associations between the ISI question relating to difficulties falling asleep and actigraphy-derived sleep onset latency (odds ratio (OR) with 95%CI: 1.0, 0.99–1.01, $p = 0.891$). Similarly, there were no associations between the ISI question relating to difficulties maintaining sleep and actigraphy-derived sleep efficiency (OR: 0.97, 95%CI: 0.94–1.00, $p = 0.078$), wake after sleep onset time (OR: 1.00, 95%CI: 0.99–1.01), or arousal index (OR: 1.10, 95%CI: 0.96, 1.23, $p = 0.182$).

Conclusions: The actigraphy-derived sleep of these African-origin adults living in a low-income community exhibit hallmark characteristics of difficulties initiating and maintaining sleep. The apparent mismatch between measured and self-reported insomnia symptom severity suggest that the ISI may not be appropriate in this setting. Alternatively, these adults may not view their sleep as problematic. Studies unpacking these observations, especially those relating to community-specific knowledge, attitudes and beliefs around insomnia-type sleep difficulties, are needed.

Disclosure: No

P119 | Neurophysiological characterization of the misperception of sleep duration in individuals with and without chronic insomnia

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Misperception of sleep duration is present on a continuum across individuals, although it tends to be more severe in individuals with chronic insomnia. The present study investigates whether the degree of misperception of sleep duration might be associated with different measures of macro and micro-sleep architecture in a dataset combining individuals with chronic insomnia (INS) and good sleepers (GS).

We studied 100 participants (61 INS, 45 ± 12.9 y.o, 42F; 39 GS, 40.3 ± 14.2 y.o, 25F) who underwent a sleep assessment in the lab, including polysomnographic (PSG) recording along with subjective sleep assessments. The polysomnography (PSG) recording included 17 EEG channels sampled at 512 Hz, EOG, EMG and were scored according to the AASM guidelines. We extracted objective and subjective total sleep time (TST) and calculated the sleep perception index (SPI, subjective TST/objective TST × 100). We extracted sleep macroarchitecture variables from EEG recordings as well as automatically detected spindles and slow oscillations (SO), and analysed power spectral activity along the delta (0.5–4 Hz), alpha (8–11 Hz) and beta (16–35 Hz) frequency bands. Pearson correlations were performed on the combination of both groups to assess relationships between sleep variables and SPI.

We found a group difference in SPI ($F(1, 94) = 11.72$, $p < 0.001$), showing INS underestimating more than GS. Interestingly, we found that SPI was correlated with the proportion of time spent in N1 ($r = -0.29$, $p = 0.004$) suggesting that underestimating TST may be related to the presence of more light sleep. There was no association between SPI and other measures of sleep architecture or spindle activity (all $p > 0.05$). We found no association between SPI and spectral activity in the faster frequency band (i.e., beta) or with the delta/beta ratio (all $p > 0.05$). Finally, we found that SPI correlated with SO amplitude in N3 ($r = 0.24$, $p = 0.015$), where those who underestimated their sleep duration exhibited lower SO amplitude.

These findings, using PSG and subjective sleep assessments, show that the (mis)perception of sleep duration might be related to the lightness of sleep and decreased depth of N3 that often characterize individuals with chronic insomnia.

Disclosure: No

P120 | Network meta-analysis examining the efficacy of components of cognitive behavioural therapy for insomnia

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Introduction: Cognitive Behavioural Therapy for Insomnia (CBT-I) is recommended as first-line treatment for insomnia in clinical guidelines. CBT-I is a multicomponent intervention comprising psychoeducation, relaxation therapy, sleep restriction therapy, stimulus control therapy, and cognitive therapy. The aim of this component network meta-analysis is to combine direct and indirect evidence to quantify the efficacy of individual components of CBT-I in regard to insomnia severity, sleep quality, subjective and objective sleep parameters.

Methods: The electronic databases PubMed, MEDLINE, PsycINFO, PsycARTICLES, and CINAHL were searched to identify potential studies for this systematic review and network meta-analysis. These databases were searched from 1987, which is the publication date of DSM-III-R, until November 2021. For the literature search, terms indicative of insomnia (e.g., insomnia, sleep initiation, sleep maintenance) were combined with those of psychological interventions (e.g., CBT, CBT-I, sleep hygiene, psychoeducation, cognitive therapy, cognitive restructuring, cognitive control, paradoxical intention, problem solving, behavioural therapy, stimulus control, sleep restriction, imagery, relaxation).

Effect sizes (Cohen's d) were calculated for change from baseline to post-treatment assessment. Network meta-analysis allows the comparison of multiple treatments simultaneously in a single model by combining direct and indirect evidence. In the current work, a component network meta-analysis has been used (Rücker et al., 2019).

Results: 8011 studies were identified, of which 69 fulfilled the inclusion criteria. In total 13,480 people with the diagnosis of insomnia were examined in these studies.

Fifty studies including 8,116 insomnia patients were included with insomnia severity as an outcome. Results showed significant positive mean effects for sleep restriction therapy ($d = -0.43$; 95% CI: [−0.77; −0.08]). Waitlist showed a significant negative effect ($d = 0.90$; 95% CI: [0.31; 1.50]). All other components did not show significant effects. Results of all outcomes will be presented at the congress.

Conclusions: Regarding the reduction of insomnia severity, the component sleep restriction therapy seems to be particularly effective. Waitlist as a control group seems to elicit a nocebo effect instead of being a neutral comparator.

Disclosure: No

P121 | False memories production over a retention period spent asleep or awake in insomniacs and good sleepers

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Introduction: It is well known that active memory consolidation processes occurring during sleep induce qualitative changes in memory representations. The formation of false memories (FM) during recall of material acquired before sleep represents a possible by-product of this sleep-dependent memory "reshaping". However, the sleep effect on FM has been addressed only in healthy subjects, neglecting individuals with chronically disturbed sleep such as insomniacs. Here we investigate the effect of a retention period spent asleep or awake on FM production in insomniacs and good sleepers.

Methods: In a mixed design, we administered the Deese-Roediger-McDermott paradigm (DRM) to 17 insomniacs (IN; 13F; age 26.6 ± 6.71) and 15 good sleepers (GS; 10F; age 27.3 ± 6.18). In both groups, the encoding phase was followed by an 8-h retention period spent in PSG-monitored sleep (S) or wake (W).

Results: At free recall, the IN group produced more false recalls in W compared to S ($p = 0.029$), whereas the GS group showed more false recalls in S than in W ($p = 0.015$). Moreover, false recalls were higher in GS than IN participants in S ($p = 0.019$). Both groups produced more veridical recalls in S than W ($p = 0.019$). No differences emerged for intrusions. At recognition, participants correctly recognized more studied words (i.e., hits) in S than in W ($p = 0.036$). No differences between conditions or groups emerged for false recognitions and false alarms. Correlation analysis revealed that the number of false recalls positively correlated with sleep efficiency ($r = 0.43$, $p = 0.01$) and negatively with sleep latency ($r = -0.39$, $p = 0.029$) and N2% ($r = -3.49$, $p = 0.050$), whereas veridical recalls were negatively correlated with awakenings frequency ($r = -0.41$, $p = 0.021$). Moreover, hits correlated with the number of sleep cycles ($r = 0.45$, $p = 0.010$).

Conclusions: This is the first study addressing the sleep effect for FM in insomniacs. Our results confirm the role of sleep in FM production and additionally show that FM are produced at awakening as long as the sleep episode is efficient enough. It is likely that good sleep quality is required for FM formation, which reflects adaptive memory reshaping.

Disclosure: No

P122 | Prediction of sleep from two-day activity and light exposure data using artificial intelligence

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Objectives/Introduction: We have developed sleep prediction models based on physical activity and light exposure data using actigraphy in the previous study. In this study, we aimed to improve the performance of sleep prediction models by increasing the number of data, using heart rate variability (HRV) in addition to physical activity and light exposure, and adjusting the length of data.

Methods: Healthy participants who denied having sleep disturbance were enrolled to the study. We used two wrist-worn devices (Actigraph GT3X+® and Galaxy Watch Active2™). Both devices collected physical activity and light exposure. HRV was collected by Galaxy watch only. Sleep prediction models were developed based on different data sources (wearable device alone, sleep diary alone, or combined data), different data durations (1, 2, or 3 days), and different analysis methods (extreme gradient boosting, convolutional neural network, long short-term memory, and logistic regression). The target outcome, "good sleep", was defined as ≥90% sleep efficiency.

Results: A total of 2,136 days of wearable devices data from 240 participants were gathered and used. The age range was from 20 to 68 years, with a mean of 33.8 years. The performance of sleep prediction models with increased number of data (accuracy = 0.66 ± 0.00, area under the curve; AUC = 0.69 ± 0.00, mean ± SD) improved compared to the previous one (accuracy = 0.61 ± 0.00, AUC = 0.62 ± 0.01). The performance of the model with the addition of HRV data (accuracy = 0.71 ± 0.01, AUC = 0.66 ± 0.01) also improved compared to the previous one. The best performance was found in 2-day model (accuracy = 0.73 ± 0.06, AUC = 0.70 ± 0.08) compared to 1-day model (accuracy = 0.68 ± 0.08, AUC = 0.64 ± 0.08) and 3-day model (accuracy = 0.70 ± 0.07, AUC = 0.67 ± 0.08).

Conclusions: The results showed that the performance of sleep prediction models improved by increasing the amount of data or adding HRV. Although there is a limit to the number of data, 2-day model shows best performance than 1-day or 3-day model.

Disclosure: No

P123 | Monthly and daily variation among korean adolescents' search trends for insomnia: what social big data tell us

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Introduction: Sleep deprivation among adolescents is a common but serious public health issue. Internet search activity related to sleep problems can provide relevant information for understanding the epidemiological characteristics of this population. This study analyzes seasonal and weekly patterns of Internet searches for "insomnia" among adolescent and adult populations in Korea.

Methods: We extracted the daily search volume for "insomnia" by adolescents (13–18 years) and adults (19–60 years) between 2017–2019 using NAVER DataLab (based on the most widely used online platform in Korea). The search volume was divided into slow annual trends and fast weekly patterns using Fast Fourier Transform. Subsequently, the search volume of both groups was compared across days in a week and months in a year.

Results: Adolescents exhibited larger seasonal and weekly variations in search volume than adults. Adolescents' search volumes for "insomnia" increased in January, February, and August, which are academic vacation periods. Weekly patterns of adolescents indicated increased search volume on Sunday and Monday.

Conclusions: Adolescents' subjective sleep problems are more likely to be affected by a later sleep time due to delayed sleep phase caused by a disrupted daily routine.

Disclosure: No

P124 | A qualitative investigation of basic symptoms in young adults with insomnia

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Objectives: Basic symptoms share with insomnia a focus on subjective experiences, and both increase the likelihood of future mental ill-health. Both basic symptoms and insomnia are also focused upon the subjective, phenomenological experiences, rather than objective task deficits. As early intervention efforts are focused on young adulthood,

we spoke to young adults with insomnia to try to ascertain whether the basic symptoms paradigm may be a useful framework for understanding experiences of insomnia.

Methods: Nine young adults who evidenced insomnia disorder ultimately took part in qualitive interviews online. Questions were derived based upon the basic symptoms paradigm. There were 6 females and 3 males, aged 21 to 29 (mean = 25). Data were analyzed in keeping with thematic analysis.

Results: Four key themes were identified, of "How I am with regards to others," "How my insomnia impacts my cognition," "How insomnia impacts what I perceive," and "Situating and understanding insomnia in my life."

Conclusions: The basic symptoms paradigm fits somewhat, as participants were generally able to relate to the questions and provide descriptions. However, accounts different in terms of severity of experiences and their scope. That said, results accord with general experiences of insomnia in other populations, and novel research directions are proposed.

Disclosure: No

P125 | Differences in assessment of total sleep time between sleep diary and actigraphy in patients with insomnia

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Introduction: Sleep misperception is one of the characteristic traits of patients with insomnia. The aim of the study was to assess what factors contribute to the difference in the assessment of total sleep time (TST) between actigraphy and sleep diary in patients with insomnia.

Methods: 126 insomnia patients (mean age 46.03 ± 16.75 year; 75 females) were assessed with sleep diaries and wrist actigraphy (CamNTech, AW64) from non-dominant hand for at least 7 days. They were also asked to fill in: Insomnia Severity Index (ISI), Ford Insomnia Response to Stress Test (FIRST), International Physical Activity Questionnaire (IPAQ), Hyperarousal Scale (HAS) and Beck Depression Inventory (BDI). In 35 patients insomnia was comorbid with another mental disorder (depression, anxiety, adjustment disorders). Sleep misperception was calculated as a difference in TST between actigraphy (aTST) and sleep diary (sTST).

Results: sTST was significantly shorter than aTST: 319.52 ± 117.18 vs 369.31 ± 61.1 min, $p < 0.001$. The difference in aTST and sTST was not only large but also highly variable and amounted to 49.78 ± 108.1 min. Among factors influencing sleep misperception significant result were obtained for age only (rho = 0.498, $p < 0.001$). No correlation with aTST-sTST difference was found for: time in bed, level of physical activity (activity units in actigraphy and Metabolic Equivalent of Task in IPAQ), FIRST, HAS and BDI. It was also not influenced by sex and type of diagnosis (insomnia vs insomnia comorbid with a mental disorder). ISI was found to be correlated (rho = −0.498, $p < 0.001$) with sTST (but not with aTST), FIRST (rho = 0.299, $p < 0.001$), BDI (rho = 0.347, $p < 0.001$ and age (rho = 0.326, $p < 0.001$). ISI was also higher in comorbid insomnia: 21.35 ± 4.75 vs 18.71 ± 4.44 points ($p < 0.001$).

Conclusions: There are large and variable differences in assessment of TST between sleep diaries and actigraphy, which are not strongly related to insomnia severity and other factors usually playing an important role in the treatment of this disorder.

Disclosure: No

P126 | A cross-sectional study on insomnia and excessive daytime sleepiness in the population of thrace, NE Greece

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Objectives/introduction: Insomnia and excessive daytime sleepiness (EDS) are sleep disturbances, associated with various comorbidities, decreased quality of life, and thus, increased socioeconomic burden. Aim of this cross-sectional, epidemiological study was to assess the prevalence of insomnia and EDS in the population of Thrace, Greece, as well as to explore the association with sociodemographic characteristics, anthropometrics, lifestyle, and health-related conditions.

Methods: Individuals, who escorted patients at the Health Centre of Iasmos, in the region of Thrace, NE Greece, were consecutively recruited. Those presenting with acute medical reasons were excluded, as well as those <18 years old.

Sociodemographic and anthropometrics, sleep habits, as well as comorbidities were recorded. Insomnia and EDS were assessed with the Athens Insomnia Scale (AIS) and the Epworth Sleepiness Scale (ESS), respectively. Additionally, each participant filled the Berlin Questionnaire (BQ), for the evaluation of the risk of Obstructive Sleep Apnea (OSA).

Results: In total, 771 adults (43% women- mean age = 58 ± 13 years (range 24–89), participated in the study. The prevalence of insomnia was 18.3% ($n = 141$) and of EDS was 8.2% (n = 63). Of them, 273 individuals (35.4%) were at high risk for OSA. Multiple logistic regression analysis demonstrated that insomnia was associated with female gender (aOR = 1.76, 95% CI = 1.19–2.62, $p = 0.005$) and age over 70 years old (aOR = 1.61, 95% CI = 1.02–2.53, $p = 0.040$). Marital status (divorced/widowed), increased Body Mass Index (BMI), snoring, midday sleep and history of chronic disease were also associated with insomnia.

On the other hand, EDS was associated with male gender (aOR = 1.90. 95% CI = 1.02-3.55, $p = 0.044$). Moreover, low and high (compared to middle) educational level, increased BMI, snoring, midday sleep and increased BQ score predicted the presence of EDS.

Conclusions: Insomnia and EDS are both characterized by increased prevalence in the population of Thrace, Greece, as is the risk of OSA. Due to the association with multiple comorbidities, increased vigilance

is suggested for the diagnosis and treatment of the abovementioned disorders.

Disclosure: No

P127 | Insomnia and skin hunger during the second SARS-CoV-2 wave: a network perspective

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Objectives/Introduction: Touch facilitates physiological regulation and interpersonal trust between individuals, allegedly through C-tactile afferents, which in turn also may moderate a touch-sleep association. Lockdown strategies to reduce the spread of COVID-19 often resulted in reduced touch-based human contact. Since a four-fold increase in the prevalence of insomnia has been observed during the second lockdown, this study aims to investigate if touch deprivation was associated with insomnia severity within a psychological network perspective.

Methods: 3300 individuals (M age = 41.4, SD = 14.4; 1930 females) participated in an online survey in Belgium (October 2020–January 2021) assessing COVID symptoms, sleepiness, fatigue, anxiety, depression, insomnia severity (ISI) and the need for social and physical contacts within and outside the nuclear family, before and during the second wave of Sars-Cov-2. Bayesian Directed Acyclic Graphs (DAGs) were estimated by means of the hybrid Min-Max Hill Climb algorithm using the *R* package BNlearn. Network stability was investigated by bootstrapping 1000 networks and retaining a minimum connection strength of 85% and a minimum connection direction of 50%.

Results: The first DAG shows strong outgoing directed connections from mental to physical fatigue and anxiety, and from insomnia to sleep quantity. Before the COVID outbreak, the need for touch from family members seemed to drive the need for social and physical contacts from friends. Connections between insomnia severity and skin hunger appeared to be almost absent. During the second lockdown, we observe similar connections except that here, it is the need for physical touch from friends that drives the need for physical and social contacts in and outside the family. There is still no direct connection between insomnia and skin hunger. Insomnia severity however, seems to be caused by anxiety symptoms, yet mediated by physical and mental fatigue and depression. Depressive mood on the other hand, seems to drive the need for physical contact from friends.

Conclusions: Despite the lack of a direct relation between the need for physical contact and insomnia severity, feelings of depression seem to drive both the need for physical contact from friends and insomnia severity during the second lockdown.

Disclosure: No

P128 | Long-term outcome evaluation of interdisciplinary multimodal pain therapy (IMPT) on insomnia: a retrospective analysis of patients with chronic pain

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Objectives/introduction: Chronic pain, in contrast to acute pain, has lost his tissue-danger-signalling property and may cause suffering, loss of function and decrease in quality of life (QoL). Patients with chronic pain often suffer from poor sleep quality and comorbid affective symptoms. Increasing data show a pain-enhancing effect of sleep loss/poor sleep (Finan et al., 2013, *Journal of Pain*). Interdisciplinary multimodal pain therapy (IMPT), based on the biopsychosocial model, is a collaborative approach and the gold standard to address the multifaceted dimensions of chronic pain. The aim of this study was both to explore prevalence of sleep disturbance in chronic pain patients and to evaluate sleep-related benefit of an IMPT.

Methods: This retrospective single-arm interdisciplinary study included 151 patients (101 women, 50 men, mean age = 45.2) with chronic pain (CHOP criteria). We assessed the prevalence sleep disturbance using the Insomnia Severity Index (ISI) at T0 (start of 3.5-week IMPT). We furthermore compared pre-post changes in ISI scores of 32 patients (24 women, 8 men) between T0 and T1 (6 months after completion of IMPT) by performing paired *t*-tests (87% statistical power).

Results: The mean ISI score among all patients was 13.7 (SD = 6.2) on a 0–21 scale. This meets the criteria of a subthreshold insomnia whereas a cut-off score of ≥15 indicates clinical relevance. 74 patients resp. 49% of the sample showed clinical relevant ISI scores. The results from the pre-IMPT (M = 12.3, SD = 5.5) and post-IMPT (M = 9.8, SD = 6.1) reflect a statistical significant decrease in insomnia severity, $t(31) = 2.4$, $p = 0.021$, $d = 0.431$. We could not identify any predictors (e.g. sex, age, employment status) with regard to sleep-related benefit of the IMPT.

Conclusion: Although results demonstrate statistically significant pre-post improvement in insomnia, 8 patients resp. 25% of the subsample showed clinically relevant post-intervention ISI scores. As clinical

IMPT programs often lack initial sleep assessment and sleep-specific modules, we suggest to implement such additional offers, for example, cognitive behavioral therapy for insomnia (CBT-I), into existing therapies. This may contribute to prevent sleep disturbance in patients with chronic pain.

Disclosure: No

P129 | Experience with the use of a digital sleep diary in people with chronic insomnia and insomnia symptoms

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Introduction: Insomnia is the most common sleep disorder in the general population. The most effective treatment is cognitive behavioural therapy for insomnia (CBTi). The fundamental tool in CBTi is a sleep diary. Traditionally, sleep diaries are completed on paper, and sleep parameters are calculated manually. Digital sleep diaries with automatically calculations of sleep indices have been developed, but feasibility- and validation studies are lacking.

Aim: Elicit experiences with a newly developed digital sleep diary among participants of two clinical studies.

Methods: The study has a mixed-method design. The participants were recruited from the Akershus Sleep Apnoea (ASAP) cohort. The material consists of semi-structured, individual interviews, and reports from a digital sleep diary made available on the "Capable" self-management platform (www.capable.life). Interview data from 20 participants were thematically analysed, and sleep diary data was analysed with descriptive statistics.

Results: The highest number of entries in the digital sleep diary was 84 days, while the lowest was 4 entries during the twelve weeks. The mean number of entries was 55.4 days. The digital sleep diary provided the participants a better overview of their sleep and increased their awareness of the factors that could affect their sleep quality. The structure and the visualisations of the patient-reported data were perceived as useful. These results indicate that digital features to prepare graphical overviews based on self-reported data are valuable to the participants and also for CBTi and clinical practice. However, the benefit seems to relate to the participants' sensemaking of their observations and it will be important to explore further to ensure broader benefit from the diary.

Conclusion: The digital sleep diary in the CAPABLE platform was perceived as useful among most of the participants. Active use of self-reported data can contribute to higher understanding of the participants' sleep disorders, improve adherence of CBTi, and facilitate new ways to collaborate between patients and health personnel. The digital sleep diary has the potential to strengthen CBTi interventions and expand people with insomnia capabilities to efficiently handle their sleep disorder.

Disclosure: No

P130 | Driving insomnia: a driving simulator study

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Introduction: Sleep-related problems are known risk factors for road accidents. However, few studies have investigated the role played by insomnia and its daytime symptoms including fatigue and sleepiness. Driving, as a part of everyday life, is a complex activity that requires mental and functional abilities such as attention (which helps to quickly perceive the environment and avoid accidents), visual and spatial skills (position of the car on the road, maneuvers of the car in lanes of change, calculation of distance and speed), executive functions (processing of multiple -often simultaneous- environmental stimuli, forecasting of road situations and direct decision-making with accuracy and safety) and memory (route planning, behavior adjustment, recognition and memorization of highway code signals). The aim of this study is to understand the effects of insomnia on driving performance.

Methods: Good sleeper controls and patients with chronic insomnia as defined by the International Classification of Sleep Disorders (ICSD) completed questionnaires and a sleep diary; they were then asked to drive on a driving simulator.

Results: Preliminary results from 12 insomniacs and 18 controls indicated that drivers with insomnia had a higher accident incidents than those without insomnia. Insomniacs maintained a longer distance from the preceding vehicle, while their average driving speed was lower compared to individuals without insomnia. Lastly, a larger standard deviation of lateral position and an increased number of right edge-line crossings in insomnia patients was noted compared to good sleepers.

Conclusions: Patients with chronic insomnia show a lesser ability to maintain a steady lateral position of their car, while they seem to drive more conservatively by keeping a lower speed and a higher safety distance from the preceding vehicle.

Disclosure: No

P131 | Sleep disturbances in patients with cirrhosis of the liver

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Introduction/Objectives: Somatic pathology involves sleep disorders due to many factors that have a negative impact on the quality and quantity of sleep. Sleep disorders are also found in patients with cirrhosis, with a fairly high prevalence. In a study by Xun Zhao and Philip Wong, titled "Managing Sleep Disturbances in Cirrhosis Patients," insomnia in patients with hepatic cirrhosis varies from 26% to 42%, while less than 10% of the control groups of healthy individuals typically experience insomnia. The aim of the study is to assess the quality of sleep in patients with cirrhosis and to determine its correlation with the severity of the Child Pugh Score.

Methods: We evaluated 10 patients aged 38–72 years, with an average age of 60.4 years, 50% of whom were women, diagnosed with cirrhosis etiological B, C, and unknown. All patients underwent a subjective assessment of sleep quality using the Pittsburgh Questionnaire (PSQI): A total score of 5 indicates that you get enough sleep. A total score of 5 or higher is associated with poor sleep quality. Severity was determined using the Child Pugh score in types A, B, and C.

Results: It was determined that 7 out of 10 patients had a total PSQI score of >5, associated with poor sleep quality. One patient had a total score of 3, and two patients had a total score of 5. Out of 10 patients, 2 were classified as having severe Child Pough C cirrhosis, with a total PSQI score of 15 and 16, respectively, being affected by the most parameters: sleep latency, day dysfunction due to sleepiness, and sleep efficiency, with a score of 3 (maximum).

Conclusions: This study showed that sleep disorders are common in patients with cirrhosis, with a high prevalence and the quality of sleep being more affected in patients with a higher severity of cirrhosis.

Disclosure: No

P432 | Sleep characteristics in patients with COMISA compared to OSA and insomnia

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Introduction: Obstructive sleep apnea (OSA) and insomnia frequently co-exist, which complicates treatment, for example resulting in a worse compliance to continuous positive airway pressure (CPAP) therapy. Early recognition of comorbid insomnia and sleep apnea (COMISA) is important since both sleep disorders can aggravate each other and COMISA is associated with increased risk of all-cause mortality. Research is needed to identify characteristics that can be used to recognize patients with COMISA, in order to optimize treatment approach from the start. The aim of this study is to investigate differences in sleep structure between patients with pure OSA, pure insomnia and COMISA.

Methods: We obtained polysomnography data from 326 patients from the SOMNIA database. The group included patients with OSA ($n = 199$), insomnia ($n = 45$) and COMISA ($n = 82$). We compared statistics related to sleep stages, awakenings and sleep disordered breathing (SDB) events between the three patient groups.

Results: Wake after sleep onset (WASO) was significantly longer for the COMISA group compared to OSA (median, 83.2 vs 60.0 min, $p < 0.01$). No significant differences were found in the total number of awakenings and the number of short (up to and including 2 min) and medium-length awakenings (2.5 up to and including 4.5 min). The number of long awakenings (five min or longer) and WASO containing only long awakenings were significantly higher for the COMISA group compared to OSA (median, 3.0 vs 2.0 awakenings, $p < 0.01$, and median, 43.2 vs 25.5 min, $p < 0.001$). The apnea-hypnopnea index (AHI) and the 4% oxygen desaturation index in COMISA were -as expected- higher compared to insomnia (median, 17.8 vs 6.5 events/h, $p < 0.001$, and median, 4.4 vs 0.7 desaturations/h, $p < 0.001$), but lower compared to OSA (median, 17.8 vs 21.6 events/h, $p = 0.0136$, and median, 4.4 vs 8.5 desaturations/h, $p < 0.01$).

Conclusions: Patients with COMISA seem to present with a milder form of OSA, but nevertheless presented a more disturbed sleep structure, mainly characterized by prolonged awakenings. Further research is needed into these sleep characteristics that may lead to a better understanding of the mechanisms involved, earlier diagnosis and better treatment strategies.

Disclosure: Yes

Conflict of Interest statement: At the time of writing, PF and LH were employed and/or affiliated with Royal Philips, a commercial company and manufacturer of consumer and medical electronic devices, commercializing products in the area of sleep diagnostics and sleep therapy. Philips had no role in the study design, decision to publish or preparation of the abstract. SO received an unrestricted research grant from UCB Pharma and participated in advisory boards for UCB Pharma, Jazz Pharmaceuticals and Bioprojet, all paid to institution and all unrelated to the present work. The other authors have no conflicts of interest.

P434 | The impact of chronic insomnia and benzodiazepine use on sleep architecture in older adults

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Insomnia disorder affects around 10% of the population, and has serious implications for general health and cognitive decline in older adults. In older adults with insomnia, benzodiazepine (BZD) consumption is widespread, yet how this impacts sleep quality is not completely understood. The aim of this study is to assess changes in

sleep architecture associated with chronic insomnia and BZD consumption in older adults.

We investigated 3 groups of older adults: 24 good sleepers (GS; 64.7 ± 7.5 years; 15F), 26 individuals with chronic insomnia who do not use BZD (INS; 64.1 ± 5.3 years; 22F) and 25 individuals with chronic insomnia who are BZD users (BZD; 66.4 ± 3.5 years; 22F, BZD use: 5.15 ± 3.28 years; 5.2 ± 3.0 mg diazepam dose equivalent). Following an adaption night, participants completed an experimental sleep assessment in the lab.PSG recording included 17 EEG channels sampled at 512 Hz, EOG, EMG and were scored according to the AASM guidelines to compare time in bed (TIB), total sleep time (TST), wake after sleep onset (WASO), sleep onset latency (SOL), sleep efficiency (SE), and sleep stages duration (%). Groups were compared using ANOVA or Kruskal-Wallis with age as a covariate and post-hoc tests (Bonferroni) were computed.

We found a main effect of group on SE ($H(2,75) = 19.3$, $p < 0.001$) along with group difference in TST ($F(2,71) = 7.59$, $p = 0.001$) and WASO ($H(2,75) = 14.8$, $p < 0.001$). More specifically, while there was no difference between INS and BZD (all p>0.05), they both exhibited lower SE and more WASO compared to GS (all $p < 0.05$). Also INS reported sleeping less than BZD ($t = 3.53$, $p = 0.002$) and GS ($t = -3.16$, $p = 0.007$). We found no difference in light sleep (all p>.05), but there was a group effect for proportion of time spent in N3 ($F(2,71) = 4.65$, $p = 0.01$) and REM ($F(2,71) = 3.89$, $p = 0.02$) that was driven by INS spending less time in N3 compared to GS ($t = -2.87$, $p = 0.01$) and BZD spending less time in REM compared GS ($t = -2.58$, $p = 0.03$).

These findings show that chronic insomnia with and without BZD use impact sleep physiology in older adults. While BZD increase total sleep time compared to non-users, sleep architecture may be affected, which could have implications for cognitive health.

Disclosure: No

P435 | Add-on circadian rhythm support is essential for the long-term preservation of depression prevention by cognitive behavioral therapy for insomnia

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Objective/introduction: Circadian rhythm support (CRS) - or chronotherapy - entrains rhythms in melatonin and other physiological processes. CRS has a strong potential to alleviate depression. Recent work suggests that CRS given as add-on to Cognitive Behavioral Therapy for Insomnia (CBT-I) can also be instrumental in preserving positive mood effects of CBT-Ifor a weeks (Dekker, Psychother Psychosom 2020; doi: 10.1159/000503570) and even a year (Leerssen, Psychother Psychosom 2021; doi: 10.1159/000520282). It is unknown whether CRS can actually aid to the prevention of a diagnosis of depression in people currently suffering from Insomnia Disorder. We here evaluated whether CRS can help combat the global burden of depression through long-term prevention in people with insomnia, primary risk factor for depression.

Methods: Insomnia is routinely treated with cognitive behavioural therapy (CBT-I). We therefore followed119 people with insomnia disorder for 3.6 years after they had received either no treatment ($N = 24$) or CBT-I stand-alone ($N = 24$) or in combination with CRS, being either bright light ($N = 22$), physical activity ($N = 24$) or warm baths ($N = 25$), each scheduled at a fixed time of day. The primary outcome was the development of clinically diagnosed depression.

Results: Development of depression in people with insomnia could only be prevented if routine treatment was supplemented by any CRS (16% versus 43%, $\chi^2(1, N = 92) = 7.13$, $p = 0.01$). Without an added CRS, CBT-I was as ineffective as no treatment (43% versus 38%, $\chi^2(1, N = 45) = 0.13$, $p = 0.71$).

Conclusions: This is the first study evaluating the value of CRS for the long-term prevention of a diagnosis of depression in people at high risk due to their insomnia. The findings show that the addition CRS to routine insomnia treatment is essential to prevent depression in the following years. This approach may provide the most effective long-term prevention of depression to date and would be a feasible and efficient strategy to mitigate its global burden.

Disclosure: No

P436 | Rest-activity rhythms following digital cognitive behavioural therapy for insomnia: a randomised controlled trial

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Objectives: While digital cognitive behavioural therapy for insomnia (dCBTI) improves both night and daytime insomnia symptoms, little is known about effects on actigraphy-defined sleep and rest-activity rhythms. In the context of a randomised controlled trial, we aimed to assess the effects of dCBTI versus waitlist control on actigraphy-derived outcomes.

Methods: Thirty-three participants meeting diagnostic criteria for insomnia were randomised to either dCBTI (n = 15; female = 14; mean age 54.8 ± 8.1 years) or waitlist control (WLC) (n = 18; female = 13; mean age 53.1 ± 8.1 years). Outcomes were evaluated at baseline (pre-randomisation) and following the 10-week treatment period. Rest-activity patterns were recorded with MW8 CamNtech actigraphy watches over 7 days at baseline and post-treatment, and were evaluated in Motion Ware software (v1.3.17) for both sleep and circadian estimates (non-parametric circadian rhythm analysis, NPCRA). Self-reported insomnia symptoms were measured with the Sleep Condition Indicator (SCI). Analyses of covariance (ANCOVA) were conducted to test for group differences (dCBTI vs WLC) at post-treatment, using baseline values as a covariate. Multiple imputation was used to account for missing data.

Results: Self-reported insomnia symptoms were significantly improved at post-treatment in the dCBTI group compared to WLC (SCI: mean difference = 4.40, CI[1.53,7.27], hedges g = 1.12). No significant differences were found for actigraphy-defined total sleep time (mean difference = 5.73 min, CI[−18.42,29.88]), wake-time after sleep onset (mean difference = 5.60 min, CI[−8.25,19.45]), sleep efficiency (mean difference = −1.51%, CI[−4.04,1.01]) or sleep onset latency (mean difference = 2.51 min, CI[−0.71,5.72]). NPCRA also revealed no group differences for intradaily variability (mean difference = 0.10, CI[−0.26,0.05]), interdaily stability (mean difference = 0.06, CI[−0.05,0.16]), relative amplitude (mean difference = 0.01, CI [−0.03,0.06]), start time of the five least active h (mean difference = −45.15 min, CI[-119.77, 29.47]), and start time of the ten most active hours (mean difference = −22.85 min, CI[−133.37,87.67]).

Conclusions: Our small study suggests that Improvements in insomnia symptoms following dCBT are not reflected in actigraphy-derived outcomes. Further work will investigate actigraphy-derived outcomes throughout the treatment period.

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Disclosure: Yes

Conflict of Interest statement: Colin Espie is co-founder and Clinical & Scientific Director of the CBT for insomnia programme (Big Health (Sleepio®) Ltd). Sleepio was provided to all participants at no cost. No other investigators have conflicts of interest.

P437 | Insomnia in young adults exposed to the Utøya island terrorist attack during adolescence: A prospective longitudinal study

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Background: Approximately 1 in 4 children and adolescents will experience a potentially traumatic event. Following trauma, insomnia is commonly reported in adolescents in the first 1–2 years. In non-trauma exposed adolescents, insomnia is reported to increase into early adulthood. However, rates of insomnia over a long time period and during the transition into early adulthood following a traumatic event have not been reported.

Objective: To assess the prevalence of insomnia in a trauma exposed population transitioning from adolescence to adulthood over a 6 year period.

Methods: 336 survivors of the Utøya Island attack (67% of all survivors) completed the Bergen Insomnia Scale (BIS) 2.5 years (T3) and 8.5 years (T4) after the attack. At the time of the attack, the survivors were primarily adolescents (75% under 20 years), and approximately half the participants were female.

Results: Insomnia was indicated in 53.9% of survivors at T3 and 47.7%–59.9% at T4 (dependent on criteria for insomnia used). No significant difference was found in insomnia prevalence between these time periods, though statistically significant higher levels of symptoms (BIS sum score) were reported at T4. Age was found to be negatively associated with insomnia symptoms and prevalence at T4, but not T3. No consistent differences were found between males and females.

Conclusions: The rates of insomnia indicated in the survivors almost a decade after the Utøya Island terrorist attack are almost double what is reported using comparable methods in the general population (20%–30%). Moreover the expected age and sex differences were not always found. These findings indicate that exposure to a single highly traumatic event at an early age can have a long lasting impact on sleep.

Disclosure: No

P438 | The effect of group cognitive training intervention versus personalized computerized cognitive training intervention on sleep quality in older adults with insomnia

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Objectives: Late-life insomnia is a chronic sleep disorder which affects over 40% of older adults, and may have a significant negative impact on quality of life. This study examined the effects of personalized computerized cognitive training intervention (PCTI) compared to group cognitive training intervention (GCTI) on subjective and objective sleep quality. It then evaluated the long-term effects of these methods on sleep quality among older adults with insomnia.

Methods: Sixty-seven older adults with insomnia (mean age 71.8 ± 4.62 years, 46 females) participated in the study. Participants were randomly allocated to 1 of 3 groups: PCTI (n = 22), GCTI (n = 21), and active control (AC) (n = 24). The participants in the PCTI and AC groups completed an 8-week, home-based, computerized program, while the participants in the GCTI group met once a week for 8 weeks. All participants completed the Pittsburgh Sleep Quality Index (PSQI) 3 times: 2 weeks before the onset of the intervention (baseline), directly after the intervention (post-intervention), and 6 weeks

later (follow-up). At each stage, sleep quality was monitored by actigraphic recording.

Results: Mixed model analysis revealed that PCTI significantly enhancedactigraphy-based sleep efficiency (SE; 75.82 ± 8.35% to 81.74 ± 10.69%), and significantly reduced actigraphy-based wake after sleep onset (WASO; 68.69 ± 33.85 min to 52.26 ± 33.47 min). GCTI also significantly enhanced SE (78.58 ± 8.39% to 85.70 ± 4.21%) and significantly reduced WASO (55.88 ± 30.07 min to 35.03 ± 17.62 min). No changes were found in AC group. However, 6 weeks after training, only the GCTI maintained the improvement in SE (85.70 ± 4.21% to 84.36 ± 7.18%) and the reduction in WASO (35.03 ± 17.62 min to 36.17 ± 22.68 min). Neither the PCTI nor the GCTI had significant effects on actigraphy-based sleep duration and sleep latency nor on total PSQI.

Conclusions: Among older adults with insomnia, 8 weeks of cognitive training interventions (either personalized or in a group) improved the maintenance of sleep, while only GCTI improved the maintenance of sleep 6 weeks after the intervention. The possibility of improving sleep quality among older adults with insomnia via a non-pharmacological treatment is an encouraging new concept that requires in-depth testing.

Disclosure: No

P439 | Insomnia and sleep characteristics in post COVID-19 related fatigue

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Aims: Following COVID-19 a substantial number of patients report persistent fatigue and insomnia. As these symptoms have overlapping features, insomnia can be easily underdiagnosed in post COVID-19 related fatigue (PCRF). The main object of this study was to determine the prevalence of insomnia in patients with PCRF and investigate their sleep characteristics. Data of PCRF patients were compared with those of patients with chronic fatigue syndrome (CFS/ME), a condition also characterized by persistent fatigue.

Methods: In this cross-sectional study insomnia severity, assessed with the Insomnia Severity Index (ISI), and prevalence of clinical insomnia (ISI score ≥10), were determined in patients with PCRF ($n = 114$) and compared with CFS/ME patients ($n = 59$) using ANCOVA and logistic regression, respectively. Linear regression analyses were used to evaluate if fatigue severity, concentration problems, pain, depressive symptoms and having PCRF or CFS/ME were associated with insomnia severity. Sleep characteristics assessed with sleep diary and accelerometer were determined in patients with PCRF and compared with CFS/ME patients using ANCOVA.

Results: In PCRF patients the mean (SD) insomnia severity was 11.46 (5.7) and prevalence of clinical insomnia was 64%. Both did not differ significantly from CFS/ME. Insomnia severity was significantly associated with depressive symptoms ($\beta = 0.49$, $p = 0.006$) and higher age ($\beta = -0.08$, $p = 0.04$). In PCRF the mean subjective sleep duration in h was 7.39 (1.00), sleep onset latency 0.97 (0.62) and wake after sleep onset 1.24 (0.72). The PCRF group reported a significantly shorter sleep duration than the CFS/ME group ($p = 0.002$), with a moderate effect size ($d = 0.59$).

Conclusion: Insomnia severity and prevalence of clinical insomnia is high in PCRF. Insomnia should be assessed and if present treated with insomnia focused therapy in patients reporting post COVID-19 related chronic fatigue.

Disclosure: No

P440 | Day-to-day relationships between mind-wandering, sleep quality, and mood across three intensive longitudinal studies

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Objectives: Impaired subjective sleep quality is associated with lower cognitive performance and poor mental health. Mind-wandering (MW) or daydreaming is a state of the human mind when the focus of attention shifts from the ongoing task and the external environment toward internally generated cognitive and emotional processes. Cross-sectional research has shown that poor sleep and negative mood are associated with increased MW, however, it is unknown whether these relations are uni- or bidirectional.

Methods: We investigated the day-to-day dynamics between subjective sleep quality, mind-wandering, and mood across three experience sampling studies in university student samples. The first study included healthy individuals ($N = 73$,2758 observations) with medium or high trait schizotypy, the second sample included students with high dream recall frequency ($N = 55$,2078 observations), and the third contained a general student sample ($N = 61$,1119 observations) who were surveyed during the second and third waves of the Covid pandemic. Data were analyzed with mixed-effect modeling where we separated within and between-person effects.

Results: Poor sleep quality predicted more MW during the day across all studies, and this relationship was more pronounced within than across individuals. However, if we included mood as a predictor (daytime or right after awakening) sleep quality was no longer significant. On the other hand, more MW significantly predicted lower sleep

quality during the night, but the size of the effect was negligible. Elevated trait depression scores were significant predictors of worse sleep quality and more MW but again, if mood was included in the models, then higher trait depression was no longer significant.

Conclusion: Our findings suggest a unidirectional association of poor sleep with lower mental health and mind-wandering. MW seems more affected by within-person fluctuations in sleep quality. These findings strengthen the evidence that striving for better sleep hygiene is key to functioning and being well during the day, even among healthy young adults.

Disclosure: No

P441 | The effect of digital cognitive behavioural therapy for insomnia on emotional processing: a preliminary randomised controlled trial

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Objectives: According to experimental sleep deprivation studies (Palmer & Alfano, 2017; Tomaso et al, 2021), sleep is important for emotional regulation and emotion processing. Negative bias in emotional processing contributes to the development and maintenance of depressive symptoms (Beck, 1979). As emotional processing and perception is affected in insomnia (Kyle et al., 2014; Wassing et al., 2019), we seek to examine whether insomnia treatment modifies emotional processing.

Methods: Thirty-three participants (5 males, mean age 53.85 years ± 8.01) with insomnia disorder were randomised to digital cognitive behavioural therapy for insomnia (dCBT-I, $n = 15$) or wait list control (WLC, $n = 18$). Outcomes were assessed at baseline (W0) and post-treatment (W11). Objective tests of emotional processing, assessed with Oxford Emotional Test Battery (ETB; P1vital, 2014), was used to measure perception, attention and memory of emotional faces and words. Self-reported questionnaires were administered to assess worry, rumination and difficulties in emotional regulation. Analyses of covariance (ANCOVA) were conducted to test group differences (dCBT-I vs WLC) at post-treatment, using the baseline score as a covariate. Multiple imputation was used to account for missing data.

Results: Insomnia severity and sleep quality was improved in the dCBT-I group relative to WLC ($d = 0.8$). ANCOVA revealed participants in the dCBT-I group showed increased vigilance for fearful faces in ETB ($F(1,30) = 4.098$, $p = 0.044$) at post-treatment compared to WLC, but revealed no significant group differences at post-treatment ($p > 0.05$) for perception and memory of emotional faces and words. Moreover, ANCOVA revealed participants in the dCBT-I group reported less difficulties in emotional regulation ($F(1,30) = 6.871$, $p = 0.009$), but revealed no significant group differences at post-treatment ($p > 0.05$) for reports of worry and rumination.

Conclusions: Our results show that dCBT-I improved emotional regulation difficulties and changed vigilance to fearful faces at post-treatment. However, dCBT-I did not have a substantial impact on other objective emotional processing tasks and self-reported worry and rumination. The small sample size may have mitigated against stronger findings and create scope for false positive results.

Disclosure: Yes

Conflict of Interest statement: Professor Colin Espie is co-founder and Clinical & Scientific Director of the CBT for insomnia programme (Big Health (Sleepio®) Ltd). The programme is being provided to all participants at no cost. No other investigators have conflicts of interest.

P442 | Mindfulness-based stress reduction in the treatment of chronic insomnia

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Introduction: Cognitive behavioural therapy for insomnia (CBT-I) is recommended as first-line treatment for chronic insomnia (1). CBT-I uses relaxation training, but mindfulness-based stress reduction (MBSR) is not a standard component of CBT-I.

Methods: 73 patients with chronic insomnia participated in a 9 sessions group therapy providing MBSR (2). All participants had been treated with other components of CBT-I before entering the group (psychoeducation/sleep hygiene, stimulus control and sleep restriction therapy).

Treatment effect was evaluated by the Regensburg Insomnia Scale (RIS) and the Perceived Stress Scale (PSS) when entering group treatment (t1), immediately after (t2), and 3 months after ended group treatment (t3). Changes were evaluated with the Wilcoxon matched pairs test.

Results: 56 participants completed the questionnaires at both t1, t2 and t3 and were included in the analysis. During treatment, The RIS sum score improved (t1 median = 22,5 [range 13–37], t2 median = 20 [range 8–35], $p < 0.001$). This effect remained at t3 (median = 20 [range 9–34]). In the same way, perceived stress decreased during treatment (PSS t1 median = 22 [range 4–33], t2 median 16 [range 3–31], $p < 0.001$), with still a lower PSS sum score at t3 (median 18 [range 1–30]).

Conclusion: Mindfulness-based stress reduction treatment improved sleep and perceived stress in chronic insomnia patients in an open-label design. These results must be confirmed in a randomised controlled study.

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Disclosure: No

P443 | On the efficacy of a web-based treatment program for sleep disorders and insomnia – a pilot study

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Objectives/introduction: As only a small proportion of people suffering from sleep problems are actually treated, there is an urgent need for easily accessible, effective treatment options. In this study we aim at assessing the efficacy of an online intervention based on CBT-I compared to an active control group by using objective sleep measures from ambulatory Polysomnography (PSG).

Methods: Using a single-blind randomized controlled design, we evaluate the efficacy of a 6-week minimal-guided web-based program for improving sleep and insomnia. Thirty-one volunteers aged 21–71 years (mean age 43.1 ± 13.3 years), 16 female, suffering from sleep problems and insomnia were included in the preliminary analysis. Participants were randomly assigned either to the intervention group (GSC, $n = 13$) or to an active control group (CG, $n = 18$). The GSC group participated in a 6-week online-program based on the principles of CBT-I. Members of the CG participated in an online-program which did not include therapy specific components but elements that have been shown to promote healthy sleep (e.g., movement, exposure to daylight).

Sleep was assessed at three time points (i.e., baseline, pre- and post-intervention) both objectively, via ambulatory PSG, as well as subjectively, via questionnaires and daily sleep diaries. For the subjective data, we added a follow-up assessment one month after post-intervention.

Results: Preliminary analyses of PSG data show significant improvements from baseline to post-intervention in "wake after sleep onset" (78.5 min to 38.5 min.; $p < 0.05$) and "sleep efficiency" (from 81.3% to 90.1%; $p < 0.01$) only for the GSC-group. "Sleep onset latency" however showed no significant change over time. Regarding subjective sleep data, we found a significant improvement of insomnia symptoms (assessed via the Insomnia Severity Index) from baseline to follow-up in both groups (GSC: 13.5 to 7.23; $p < 0.01$; CG: 12.8 to 10.6; $p < 0.05$).

Conclusions: The findings support the beneficial effect of low-threshold, minimal-intervention programs for improving sleep, which are especially important today, as prevalence of sleep problems is rising and treatment availability is scarce. Furthermore, we show that CBT-I based online-programs are a useful tool to improve sleep not only subjectively but also objectively.

Disclosure: No

P444 | Insomnia, anxiety and depression in healthcare workers during the COVID-19 pandemic crisis in Quebec, Canada

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Objectives/Introduction: The nature of work among healthcare workers (HCW) puts them at risk for insomnia, anxiety and depression. This is especially true during the COVID-19 pandemic crisis since they are required on the frontlines and consistently working under duress. The study aims at identifying insomnia, anxiety, and depression rate among Quebec HCW and to test whether the presence of insomnia during the first wave increases the risk of having anxiety or depression at the second one.

Methods: A sample of 891 HCW ($Mdn_{age} = 35$; 87.7% women) took part in a large survey called MAVIPAN (my life during the pandemic). Among them, 791 completed online versions of the *Depression Anxiety Stress Scale* and the *Insomnia Severity Index* at time 1 (April-July 2020). From those 791 participants, 455 answered the same questionnaires at time 2 (October 2020) during the second pandemic wave.

Results: At time 1, 10.6% of HCW reported mild to severe depression, 7.8% reported mild to severe anxiety, while 48.2% reported mild to severe insomnia. These percentages were stable at time 2 (13.2%, 9.7%, and 47.7%, respectively). At time 1 and 2, around 35% of HCW reported having insomnia only (without depression and anxiety). At time 1, if HCW reported having insomnia, they were 4.76 more at risk of also having depression (18.1% vs 3.8%; $p < 0.0001$) or 7.37 more at risk of also having anxiety (14.0% vs 1.9%;$p < 0.0001$). At time 2, if they reported having insomnia, the relative risk of having depression or anxiety were 3.39 and 3.02, respectively. HCW reporting insomnia at time 1 were two times more at risk of having anxiety at time 2 (12.8% vs 6.4%; $p = 0.03$), while reporting insomnia at time 1 did not increase the risk of depression at time 2 ($p = 0.26$).

Conclusions: Insomnia is a highly prevalent condition in HCW during the COVID pandemic. Moreover, when present, it increases the chance of having anxiety in the near future. Improving HCW's sleep should be a target in improving their mental health. Since a large proportion of HCW works on atypical work schedules, further analyses will take work schedules into consideration.

Disclosure: No

P445 | Longitudinal assessment of sleep and fatigue according to baby feeding method in postpartum women

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Introduction: Postpartum women report less sleep in the first weeks after delivery, as compared to the pregnancy period, partly due to nighttime feeding and/or baby care. Decreased total sleep time, sleep efficiency and increased wake after sleep onset, documented in several studies, can lead to fatigue and increased risk of depressive symptoms.

Objectives: Comparison of subjective sleep quality, depressive symptoms and fatigue and their respective associations, from pre-partum to early vs different late post-partum time points in bottle- vs breast-feeders.

Methods: Prospective longitudinal observational study using PSQI, ISI, Center for Epidemiologic Studies Depression Scale and fatigue severity scales between 35 and 37 weeks of gestation (T0), 2 weeks after delivery (T1), at 8 weeks (T2) and 6 months post-partum (T3). Descriptive statistics were calculated by using means and standard deviations for continuous and frequencies for categorical variables. We used Somers' *d* ordinal correlations and ordinal regressions with the feeding method variable on T1 as dependent variable as well as *t* tests and Mann Whitney tests when appropriate.

Results: 188 pregnant women were recruited in late pregnancy; 163 filled in the questionnaires at T1, 138 at T2 and 119 at T3. The number of subjects providing exclusive breastfeeding vs. exclusive bottle feeding was 102 (63%) vs. 33 (20%) at T1; 76 (55%) vs. 42 (30%) at T2; and 25 (21%) vs. 78 (65%) at T3. Higher fatigue within late pregnancy was moderately associated with primary choice for bottle feeding. No significant difference in fatigue appeared between breast- and bottle-feeders in early and later post-partum. Fatigue decreased at early and late postpartum in bottle feeders, remaining unchanged from late pregnancy through early and late postpartum in breast-feeders. There were no differences in sleep quality or insomnia symptoms at all time points. Depressive symptoms in postpartum were associated with switching to bottle feeding.

Conclusion: This study confirms the lack of a difference in postpartum fatigue according to feeding method but shows that higher prenatal fatigue and depressive symptoms are associated with a subsequent choice for or switch to bottle feeding.

Disclosure: No

P446 | Cognitive behavioural therapy and overnight emotion regulation in chronic insomnia patients: Preliminary results

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Introduction: Emotion regulation difficulties often accompany insomnia disorder and are related with disrupted REM sleep. However, whether cognitive behavioural therapy for insomnia (CBT-I) positively affects these problems via improving sleep architecture remains unknown. Therefore, the present study aims to assess overnight changes in negative self-conscious emotions (shame, embarrassment, and humiliation) and their association with REM sleep in a clinical insomnia sample; and explore overnight changes in these emotions after CBT-I.

Methods: Chronic insomnia patients enrolled in the group CBT-I at the outpatient clinic were invited to participate in the study. An experimental night with polysomnography (PSG) was conducted before and after the CBT-I. To evocate emotional distress, participants were exposed to their out-of-tune karaoke signing recordings the evening before and the morning after the PSG. The reaction to stimuli was measured by subjective scales (Experimental Shame Scale, ESS; Qualitative Assessment of Emotions, QAE). Differential scores of ESS/QAE were computed (morning-evening) to assess overnight changes in emotions.

Results: Eleven insomnia patients without comorbidities and medication (6 females; mean age = 39.42 ± SD 9.22 years) completed the study. At the pre-treatment assessment, the overnight change in emotions was associated with REM sleep duration. The more time patients spent in REM sleep, the stronger decrease in the physical component of the ESS ($r_s = -0.766$; $p = 0.006$) and humiliation on QAE ($r_s = -0.670$; $p = 0.034$). CBT-I increased the time in REM sleep from 56.08 ± SD 20.71 min pre-treatment, to 81.95 ± SD 27.25 min post-treatment ($z = -2.824$; $p = 0.005$). Although this increased REM sleep duration did not contribute to a stronger overnight adaptation to emotional distress, we did find lower levels of humiliation ($z = -2.121$; $p = 0.034$) and embarrassment ($z = -2.271$; $p = 0.023$) on the morning exposures after treatment.

Conclusions: Confirming the role of REM sleep on overnight emotion regulation, we found that the overnight decrease in emotional ratings was proportional to the total duration of REM sleep in a clinical sample of insomnia patients. Furthermore, CBT-I was associated with prolonged REM sleep and reduced emotional distress in the morning exposures, which could indicate enhanced emotion regulation.

Disclosure: No

P447 | The effects of bright light treatment on sleepiness during three consecutive night shifts among hospital nurses with insomnia – secondary analyses: a counter-balanced placebo-controlled crossover study

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Objectives/Introduction: To investigate effects of timed bright light treatment on subjective and objective measures of sleepiness during three consecutive night shifts among hospital nurses with insomnia. Considering previous research showing limited effects of such treatment on nurses during night shifts, the aim of the present study was to investigate whether the treatment would be more beneficial for a sub-group of nurses with insomnia.

Method: The primary study included 35 participants in a counterbalanced crossover trial of whom 18 nurses were identified with insomnia (as indicated by the Bergen Insomnia Scale) and thus included in the present study. Data was registered for each participant during two periods, each lasting nine days (included three days before and three days after three-night shifts). The participants were exposed to bright light (10,000 lux, 4000 Kelvin) and red dim light (~ 200 lux) during the night's shifts. They were instructed to sit in front of the light box at a 30 cm distance for 30 min in-between 2 and 3 a.m. during the first night shift. The timing was thereafter delayed by one h per night in order to delay the circadian rhythm. We measured subjective sleepiness daily (percentage with reduced performance and heavy eyelids) and every second h while awake with Karolinska Sleepiness Scale (KSS). Objective sleepiness (Psychomotor Vigilance Task, PVT) was measured at 5 a.m. during each night shift. Results in term of performance, heavy eyelids, reaction time and KSS were investigated by means of ANOVA.

Results: Bright light treatment did not significantly reduce subjective sleepiness as measured with KSS, nor did it affect the PVT-results. However, bright light treatment significantly reduced heavy eyelids during parts of the night shift, for example, on the second of the three night-shifts, the control group had 28.1 percentage points higher heavy eyelid scores ($p < 0.05$).

Conclusions: Surprisingly, this bright light treatment protocol did not convincingly decrease sleepiness among nurses with insomnia during three consecutive night shifts. The limited effect may possibly be explained by too few successive nights shifts or inappropriate timing of light.

Disclosure: No

P448 | Efficacy of a smartphone-based virtual companion to treat insomniac complaints in the general population: Sleep diary monitoring versus an internet autonomous intervention

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Objectives/Introduction: Insomnia is the most prevalent sleep disorder worldwide and cognitive behavioural therapy is the front-line treatment. Digital health technologies have a role to play in screening and delivering interventions remotely and without the need for human intervention. The KANOPEE app, which provides a screening and behavioural intervention for insomnia symptoms through an interaction with a virtual agent, showed encouraging results in previous studies during and after the COVID-19 lockdown, but has not yet been evaluated in a controlled study.

This study aims at comparing the benefits of KANOPEE, a smartphone application proposing repeated interactions with a virtual companion to screen and deliver personalized recommendations to deal with insomnia complaints; with another application proposing an electronic sleep diary and named "My Sleep Diary". The acceptance and potential benefits of these digital solutions are demonstrated in real-life settings (i.e., without soliciting human medical resources) and in the general population.

Methods: Subjects were included if they downloaded one of the apps between December 2020 and October 2021; and were of legal age. Both apps are available on downloading platforms in France and both groups were equivalent in terms of baseline characteristics. Primary outcome was Insomnia Severity Index (ISI) and secondary outcomes were Total Sleep Time (TST) and Sleep Efficiency (SE).

Results: 535 users completed the 17-day intervention with KANOPEE and 489 users completed My Sleep Diary for 17 days. A differential effect was obtained for KANOPEE users compared to My Sleep Diary users regarding ISI score (interaction Time × Group: $F[2,2014] = 16.9$, $p < 0.001$) and TST (KANOPEE users gained 48 min of sleep after intervention, while My Sleep Diary users gained only 16 min of sleep). Patients with the most severe ISI score (>15) benefited the most from KANOPEE (interaction severity × Time: $F[4,2014] = 26.3$, $p < 0.001$).

Conclusions: KANOPEE provides significantly greater benefits than an electronic sleep diary regarding reduction of insomnia complaints in a self-selected sample of the general population.

Disclosure: No

P449 | Event-related potentials reveal that sleep loss affects emotion regulation regarding sleep-disturbance related film clips

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Introduction: Inadequate emotion regulation, specifically in response to sleep-related stimuli, is a candidate mechanism for the maintenance of insomnia disorder. In the current study we aimed to quantify the effect of emotional film clips by event-related potentials to the same neutral face stimulus presented before and after each clip. In order to capture potential effects of sleep loss, a sleep deprived control group was examined in addition to a group with insomnia and a non-sleep deprived control group.

All participants were examined twice, one time without instruction and one time with the instruction to watch the clips with either a "suppress" or "reappraise" emotion regulation strategy.

Methods: 97 patients with insomnia (ID) were compared to 47 non-sleep-deprived good sleepers (CN) and 49 good sleepers which were restricted to 5 h of sleep in the week before the examination. Before and after the film clip, the same neutral face stimulus was shown 30 times (SOA 3s). Within each session, two emotionally challenging film clips were presented - one with and one without relation to sleep disturbance. Event-related potentials (ERPs) were obtained and amplitudes as well as latencies measured for components P1, N1, P2 as well as 5 later occipital positive potentials. The effect of each clip was computed as a difference Post-Pre clip and the effect of emotion regulation strategy (ERS) as difference in this clip effect After-Before ER instruction (Session2-Session1).

These differences were then analyzed using multivariate mixed effects analysis with factors Group, ER (Suppression vs Reappraisal), Film (Insomnia vs Non-Insomnia), Sequence (second vs first clip) and covariate Age.

Results: No main effect but the interaction Group × Film × ER was significant: While the ID group showed no difference in the Film effect, amplitudes of late positive potentials were reduced in KN and increased in KR group if the Suppression instruction was given instead of the Reappraisal instruction.

Conclusions: While we had expected a pattern of ERP changes indicating a response to the emotionally challenging clips that would be specific to ID and perhaps indicate disease-specific emotion regulation, actual sleep loss appears to be the main driver of the results.

Disclosure: No

P450 | Investigating the relationship between insomnia symptoms and medication adherence in breast cancer survivors prescribed adjuvant hormone therapy

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Objectives/Introduction: Approximately 70% of breast cancer (BC) cases are hormone-receptor positive, therefore treatable with hormone therapy (HT). While this medication is highly effective in reducing the risk of BC recurrence following primary treatment, it is estimated up to 50% of women take less than 80% of the prescribed dosage (Moon et al., 2019). The most consistent predictor of non-adherence to emerge from existing research is side effects associated with HT. However, the focus has been on an overall side effect profile rather than exploring specific side effects. Insomnia is a common side effect mentioned by BC survivors prescribed HT and is a modifiable risk factor of non-adherence as it is treatable with cognitive behavioural therapy (CBT-I). The aim of this study is therefore to investigate the relationship between insomnia and self-reported HT adherence.

Methods: Participants (N = 823; *0.4%m*, *99.5%f*, *0.1%*non-binary, age range: 25–85 years) were recruited through social media and collaboration with BC charities/organisations in English-speaking countries. An anonymous online survey was conducted, including self-reported measures of medication adherence (Medication Adherence Report Scale, range 1–5), insomnia (Sleep Condition Indicator, range 0–32), demographic, and medical questions.

Results: Adherence scores were high overall (M = 23.09, SD = 3.03). SCI scores were low (M = 12.74, SD = 7.32), indicating poor sleep and insomnia symptoms were highly prevalent among the sample: 73.44% of participants reported problems with their sleep at least 3 nights per week for at least 3 months, and 73.03% reported either delayed sleep onset or wake after sleep onset of at least 31 min. A Spearman correlation was conducted as data was not normally distributed (Shapiro-Wilk test was significant for MARS and SCI (p<.05)). A significant positive relationship was found between SCI and MARS total score (r = 0.12, p < 0.05), indicating better sleep is associated with better HT medication adherence.

Conclusions: A significant positive relationship was found between better sleep and higher self-reported adherence, however these measures did not share much variance. As our sample was highly adherent, exploration of sleep in relation to non-adherence was limited. Future research should further investigate the potential for addressing insomnia to improve adherence, including participants who struggle to adhere to HT medication.

Disclosure: No

P451 | Insomnia assessment during peripartum: a joint position paper from the european insomnia network task force "sleep and women" and marcè society for perinatal mental health

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Introduction: Sleep is an important regulatory psychophysiological behaviour in life, influencing mood, emotion and impulse behaviour,

which are key mediators of stress adjustments so commonly needed in the perinatal period. On the other hand women's sleep during pregnancy and post-partum is altered by anatomical, endocrinological, physiological, psychological, behavioural, socio-economic and cultural factors and insomnia and are considered risk factors for peripartum psychopathology. Assessing and treating insomnia and related conditions of sleep loss during peripartum should be a priority in the clinical practice. The aim of this paper was to conduct a systematic review on insomnia evaluation and treatment during peripartum which may be useful for clinicians.

Methods: The literature review was carried out between January 2000 to May 2021 on the evaluation and treatment of insomnia during the peripartum period. The PubMed, PsycINFO and Embase electronic databases were searched for literature published according to the PRISMA guidance with several combinations of search terms "insomnia" and "perinatal period" or "pregnancy" or "post partum" or "lactation" or "breastfeeding" and "evaluation" and "treatment".

Results: Based on this search, 136 articles about insomnia evaluation and 335 articles on insomnia treatment were found. According to the inclusion/exclusion criteria 41 articles were selected for the evaluation part and 22 on the treatment part, including the most recent meta-analyses and systematic reviews.

Conclusions: Evaluation of insomnia during peripartum, as for insomnia patients, may be conducted at least throughout a clinical interview, but specific rating scales are available and in particular Insomnia Severity Index and Consensus Sleep Diary may be useful for assessment Cognitive Behavioral Therapy for insomnia (CBT-I), as for insomnia patients, should be the preferred treatment choice during peripartum, and it may be useful to also improve mood, anxiety symptoms and fatigue. CBT-I adaptations during peripartum are suggested. Pharmacological treatment may be considered when women who present with severe forms of insomnia symptoms do not respond to non-pharmacologic therapy. Pharmacological options during pregnancy and lactation are discussed

Disclosure: No

P452 | Cognitive functioning after cognitive behaviour therapy for insomnia and continuous positive airwaindividuals with comorbid insomnia and OSA (COMISA)

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Introduction: Impairments in cognitive functioning have been reported in individuals with OSA and insomnia separately, however, the evidence for impairment in comorbid insomnia and OSA (COMISA) is much less abundant and the impact of treatment is still inconclusive. We aimed to evaluate the benefits of treatment on objective cognitive functioning.

Methods: Participants from a 3-arm randomised clinical trial combining Cognitive Behaviour Therapy (CBT-I) and Positive Airway Pressure (PAP) concurrently or sequentially for individuals with COMISA ($n = 45$; 51.1% female; mean age = 52.07 ± 13.29),completed objective cognitive testing at baseline and before and after treatment. From this, we could deduce the effects of CBT alone, PAP alone and combined treatment compared to baseline, as well as combined treatment compared to PAP alone. Bayesian mixed model analyses were conducted to assess the superiority of each treatment (CBT-I alone, PAP alone, CBT-I+PAP) compared to baseline and superiority of combined treatment over CPAP alone. Age, gender, race, baseline total sleep time and sleepiness were included as covariates.

Results: Cognitive functioning (working memory, vigilance/attention, verbal memory, associative ability and executive functioning) in this COMISA sample at baseline was slightly worse compared to normative values reported in the literature. Scores after receiving CBT-I alone were compared to baseline scores. In only 4 of 13 neurocognitive markers CBT-I was superior to baseline, indicating that after CBT-I, individuals had mostly poorer neurocognitive performance compared to baseline. When comparing CPAP alone to baseline, 11 of the 13 markers were superior after treatment compared to baseline. Comparing CBT+PAP to baseline generated almost identical results to the PAP only comparisons (except that treatment was superior to baseline in only 9 of the 13 markers). When comparing CBT+PAP to PAP alone, neurocognitive scores were superior on only 4 of the 13 comparisons.

Conclusions: After receiving CBT-I neurocognitive performance is poorer than at baseline or compared to PAP alone, and may be a result of sleep restriction therapy (a component of CBT-I). Patients require close monitoring, especially when undergoing CBT-I. These effects may only be temporary (our follow-ups were only 60 or 90 days) and thus need to be replicated over longer periods.

Disclosure: No

P453 | A systematic review of the literature examining the biobehavioural mechanisms underpinning the relationship between insomnia and chronic migraines

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Introduction: Previous research has identified a link between chronic migraines and insomnia. It has been proposed that the relationship is bi-directional, however the mechanisms underlying this are not fully understood. In this systematic literature review, we aim to examine the current research evidence base to gain a better understanding of the biobehavioural mechanisms underpinning the relationship between chronic migraine and insomnia, and to discern intervention

targets to support individuals with comorbid insomnia and chronic migraines.

Methods: The following databases were searched from the inception of the database: APA PsychINFO, Web of Science, Scopus, Cochrane. The search terms were "Insomnia", "Migraine*", "Mechanisms", "Comorbid*","Direction", "Relationships", "Behavio*". We included studies that examined the relationship between migraines and insomnia, which could be cross-sectional studies that examined the prevalence of insomnia in chronic migraines (or prevalence of migraine in chronic insomnia), prospective cohort studies examining the risk of developing insomnia if diagnosed with chronic migraine at baseline (or risk of developing chronic migraines if diagnosed with insomnia at baseline), studies examining the exact mechanism, or treatment studies. We excluded editorials, commentaries, animal studies, non-adult samples (under 16), if the full-text was unavailable, PhD dissertations, case studies, and studies not written in English or German, or if the focus was on other medical health conditions other than migraine and insomnia.

Results: The search generated 506 articles, of these 293 duplicates were removed. At the title/abstract review stage 175 articles were deemed irrelevant, and 26 articles were excluded at full-text stage. Data from 12 studies were included in the final analysis. Of these 12, seven were cross-sectional studies, three were prospective cohort studies and two were treatment studies. Data extraction is currently still in progress.

Conclusions: Studies investigating the biobehavioural relationship between insomnia and chronic migraine are lacking, and many studies have used a cross-sectional design. The results of this systematic literature review will give insight into the mechanisms that have been investigated and hopefully identify promising treatment targets for future intervention studies.

Disclosure: No

P454 | Light therapy (LT) as add-on therapy to cognitive behaviour therapy for insomnia (CBT-I)

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Objectives/Introduction: Insomnia disorder (ID) is very common; around 10% of the general population meet the diagnostic criteria. Guidelines recommend Cognitive Behaviour Therapy for Insomnia (CBT-I) as first-line treatment, however approximately 25% of the patients do not respond to this treatment. Among the ambient factors that affect sleep, daylight is an effective modulator of sleep timing, sleep quality and mood. At the same time, modern societies usually suffer from a relative lack of daylight exposure. Surprisingly, light therapy (LT), using daylight lamps, is barely examined in the treatment of ID. Additionally a suitable placebo-condition is often missing and relevant measurements of melanopic equivalent daylight illuminance (EDI) are not provided. Our primary hypothesis is that CBT-I + LT outperforms CBT-I + placebo-LT in terms of insomnia severity. Our secondary hypothesis is that CBT-I + LT reduces depressive symptoms and daytime sleepiness more compared to CBT-I + placebo-LT.

Methods: 46 adults diagnosed with ID (DSM-5) will be recruited and block randomised either to (i) CBT-I + placebo-LT or to (ii) CBT-I +- LT. Placebo- and active-lamps are tested regarding their illuminance and melanopic EDI in order to examine whether they are suitable for the respective conditions. LT and placebo-LT will be applied at home using daylight lamps by the participants themselves. Insomnia severity, depressive symptoms and daytime sleepiness will be assessed by questionnaires, sleep will be monitored by a sleep diary and with actigraphy, melatonin onset and cortisol awakening response will be examined. All outcome parameters will be assessed pre- and post-treatment, sleep will additionally be monitored during the treatment period. Linear regression analyses and analyses of covariance will be conducted to evaluate treatment effects.

Results: Preparing the study, measurements of daylight lamps revealed that the placebo-lamp vs. the active-lamp emits 28 versus 7356 lux melanopic EDI and showed a photopic illuminance of 60 versus 12480 lux. Preliminary results of the clinical trial will be reported.

Conclusions: Our pre-measurements showed large differences of the lamps regarding melanopic EDI. This emphasises the importance of our study containing a suitable placebo-condition which is important but not often reached in LT research until now.

Disclosure: No

P455 | Psychological and sleep-related factors among quarantined Omani students returning from abroad during COVID-19 pandemic

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Background: One of the many repercussions from the COVID-19 pandemic has been stress. The death toll from the pandemic, as well as sleep loss, have been noted to be the root causes of COVID-19 related stress and distress among students in the Arabian Gulf countries.

Aims: This study aimed to examine the relationship between self-reported sleeping problems and the socio-demographic, clinical and lifestyle factors among quarantined Omani students arriving from abroad

Methods: This was a cross-sectional analytical study conducted during the COVID-19 pandemic, from April 1–10, 2020. The participants were all Omani students who had arrived from abroad during the pandemic. The outcome measures consisted of the Athens Insomnia Scale (AIS) and the Generalized Anxiety Disorder -7 (GAD-7), as well as relevant socio-demographic, clinical, and life- style factors.

Result: A total of 376 participants were included in this study with 49.5% (n = 186) noted to be suffering from insomnia. Multivariate

logistic analysis suggested that female students were 2.4 times (odds ratio [OR] = 2.43; confidence interval [CI]: 1.50–3.93; $p < 0.001$) more likely to suffer from insomnia when compared to male students.

Conclusion: Almost half of the participants self-reported sleeping problems, with a higher prevalence among female students. Further studies are needed to confirm these findings.

Disclosure: No

P718 | Self-reported perceptions of medication effectiveness in subjects receiving lemborexant for up to 12 months

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Objectives/introduction: Lemborexant (LEM) is a dual orexin receptor antagonist approved in multiple countries for the treatment of adults with insomnia. The Patient Global Impression–Insomnia (PGI-I) is a self-report instrument that can be used to evaluate patients' perception of the effects of their insomnia medication. PGI-I items 1–3 are related to medication effects (helped/worsened sleep; decreased/increased time to fall asleep; and increased/decreased total sleep; responses include: 1 = positive, 2 = neutral, 3 = negative); item 4 is related to perceived appropriateness of study medication strength (responses include: 1 = too strong, 2 = just right, 3 = too weak). In Study E2006-G000-303 (Study 303; NCT02952820), significantly greater percentages of LEM- versus placebo (PBO)-treated subjects reported a positive impact of their medication and rated medication strength as "just right" at 1, 3, and 6mo. These analyses report long-term perceptions of the effect of LEM on sleep in subjects who received LEM through 12mo.

Methods: Study 303 was a 12 months, randomized, double-blind, PBO-controlled (first 6mo [Period 1]), phase 3 study in subjects age ≥18 y with insomnia disorder. During Period 1, subjects received PBO (n = 318), LEM 5 mg (LEM5; n = 316), or LEM 10 mg (LEM10; n = 315). During Period 2 (second 6 months), LEM-treated subjects continued their assigned dose, and PBO subjects were rerandomized to LEM5 or LEM10 (rerandomized subjects not reported here). The PGI-I was administered at 1, 3, 6, 9 and 12 months.

Results: The majority of subjects treated (9/12 months) with LEM5 (n = 241/n = 205) and LEM10 (n = 211/n = 192) reported their study medication "helped" them sleep at night (LEM5 = 73.4%/74.6%; LEM10 = 76.3%/77.6%), reduced time to fall asleep (LEM5 = 79.3%/76.6%; LEM10 = 78.2%/80.2%), and increased total sleep time (LEM5 = 62.2%/62.4%; LEM10 = 73.0%/65.1%). Additionally, most LEM-treated subjects rated treatment strength (9/12 months) as "just right" (LEM5 = 60.6%/63.4%; LEM10 = 62.1%/60.4%); "too weak" responses did not increase over time. Rather, the percentages of those who reported medication was "just right" in Period 2 were higher than those reported in Period 1. LEM was well tolerated. Most adverse events were mild/moderate in severity.

Conclusions: Most subjects treated with LEM5 or LEM10 over 12mo reported positive medication effects and perceived their medication strength as "just right". These data support the long-term use of LEM without the development of tolerance.

Disclosure: Yes

Conflict of Interest statement: CLD has served as a speaker for Eisai Inc., Harmony Biosciences, and Jazz Pharmaceuticals; and has received research funding and served as a consultant for Aladdin Dreamer, Axsome Therapeutics, Eisai Inc., Fisher Wallace Laboratories, Inc., Harmony Biosciences, Jazz Pharmaceuticals, Merck, Procter & Gamble, Suven Life Sciences, and UpToDate (contributor). JY and KP are employees of Eisai, Ltd. CP and MM are employees of Eisai Inc.

P719 | Subjective ratings of medication strength of lemborexant over 6 months in subjects with moderate or severe insomnia

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Objectives/Introduction: A concern with sedative-hypnotic medication to treat insomnia is development of tolerance. The Patient Global Impression–Insomnia (PGI-I) and Insomnia Severity Index (ISI) assess patients' perceptions of medication effectiveness/strength and insomnia severity, respectively, and were incorporated into the lemborexant (LEM) clinical program. LEM is a dual orexin receptor antagonist approved in multiple countries for the treatment of adults with insomnia. In Study E2006-G000-303 (Study 303; NCT02952820), significantly more subjects reported a positive effect of LEM versus placebo (PBO) at 1, 3 and 6 months, as assessed by PGI-I items 1-3. LEM-treated subjects also reported larger and statistically significant decreases in ISI versus PBO. In these post hoc analyses, potential tolerance to LEM was evaluated based on PGI-I item 4 (appropriateness of medication strength [responses: 1 = too strong, 2 = just right, 3 = too weak]) in subjects with moderate (ISI total score [ISI-TS] 15-21) or severe (ISI-TS 22-28) insomnia at baseline.

Methods: Study 303 was a 12 months, double-blind, PBO-controlled (first 6 months), phase 3 study in subjects age ≥18 y with insomnia disorder and baseline ISI-TS ≥15. Subjects were randomized to PBO (n = 318), LEM 5 mg (LEM5; n = 316), or LEM 10 mg (LEM10; n = 315). PGI-I and ISI were administered at 1, 3, and 6 months.

Results: Overall, 692 and 223 subjects had moderate or severe insomnia at baseline, respectively. The percentages of LEM-treated subjects (moderate/severe) who rated their medication strength as "just right" increased from 1mo (LEM5 = 46.4%/35.8%; LEM10 = 43.3%/40.6%; PBO = 31.3%/15.0%) to 6mo (LEM5 = 56.5%/54.8%; LEM10 = 53.9%/55.4%; PBO = 39.7%/21.6%). The majority of LEM-treated subjects who rated their medication strength as "just right"

had ISI-TS ≤14 (subthreshold insomnia) at each of the time points. Ratings of "too weak" decreased from 1mo to 6mo (1, 6 months, LEM5: 47.9%/59.3%, 39.8%/41.9%; LEM10: 47.1%/50.7%, 37.7%/41.1%; PBO: 67.9%/83.3%, 58.8%/76.5%); percentages remained higher for PBO- than LEM-treated subjects. Ratings of "too strong" for LEM-treated subjects (moderate/severe) were low and stable over time (1mo, LEM5 = 5.7%/4.9%: LEM10 = 9.5%/8.7% and 6mo, LEM5 = 3.8%/3.2%: LEM10 = 8.4%/3.6%). Most adverse events were mild/moderate in severity.

Conclusions: Findings from these analyses suggest that LEM tolerance does not develop over 6mo with either LEM dose in subjects with moderate or severe insomnia since the ratings of "too weak" did not increase over time.

Disclosure: Yes

Conflict of Interest statement: CLD has served as a speaker for Eisai Inc., Harmony Biosciences, and Jazz Pharmaceuticals; and has received research funding and served as a consultant for Aladdin Dreamer, Axsome Therapeutics, Eisai Inc., Fisher Wallace Laboratories, Inc., Harmony Biosciences, Jazz Pharmaceuticals, Merck, Procter & Gamble, Suven Life Sciences, and UpToDate (contributor). JY and KP are employees of Eisai, Ltd. MM is an employee of Eisai Inc.

P720 | Cognitive behavioral therapy for insomnia (CBT-I) In patients with mental disorders and comorbid insomnia: a systematic review and meta-analysis

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Introduction: Up to one third of patients with mental disorders fulfil the criteria for insomnia disorder. Current guidelines recommend cognitive behavioral therapy for insomnia (CBT-I) as the gold standard for the treatment of insomnia, still it is often treated pharmacologically. To date, it is not sufficiently understood how effective CBT-I is in patients with different mental disorders and a comorbid insomnia. The aim of this meta-analysis was therefore to quantify the effect of CBT-I on the insomnia severity and on the severity of the comorbid mental disorder in patients who suffer from both.

Methods: We conducted a systematic literature search on the data bases PubMed, CINHAL (Ebsco) and PsycINFO (Ovid). Eligible studies were identified by screening papers according to predefined inclusion and exclusion criteria. A risk of bias rating of individual studies was conducted with the Cochrane Tool.

Results: Twenty-two studies fulfilled the inclusion criteria. The comorbidities were depression (8 studies), post-traumatic stress disorder (PTSD, 4 studies), alcohol dependency (3 studies), bipolar disorder (1 study), psychosis (1 study) and mixed comorbidities (5 studies). CBT-I had an overall large effect (Hedges' g) of 0.9 (CI 0.7;1.2) on the insomnia severity immediately after treatment and a large effect of 0.8 (CI 0.4;1.3) at follow-up, which was on average 3 to 6 months after post treatment. Regarding the severity of the mental comorbidity, CBT-I had an overall medium effect of 0.7 (CI 0.4–0.9) post treatment and an overall medium effect of 0.5 (CI 0.1; 0.8) at follow-up (non-significant follow-up for individual disorders).

Conclusions: These medium to large effects of CBT-I indicate that it is an effective treatment for patients who suffer from a mental disorders and a comorbid insomnia. The insomnia severity and the severity of the mental disorders were reduced after treatment. In conclusion, insomnia should be treated with CBT-I as a first-line treatment. CBT-I should only be regarded as an add-on to the treatment as usual for the mental disorders. More implementation and dissemination studies are needed to further promote CBT-I in the care of patients with mental disorders.

Disclosure: No

P721 | Emotion regulation in insomnia: Be calm - just sleep!

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Introduction: Insomnia is a highly prevalent disorder worldwide and has particularly high prevalence rates in subjects with mental disorders (NIH, 2005; Smith, Huang & Manber, 2005). Nevertheless, its pathophysiological mechanisms and especially the role of emotional aspects are not fully understood yet. Due to the close association between insomnia and mental disorders we need to better understand the interaction between sleep and emotional processes. Previous studies found that insomnia or patients who suffer from poor sleep experience more negative and less positive emotions compared to good sleeper controls (Baglioni et al., 2010; Bettie et al., 2015). This study investigated differences in emotion regulation between insomnia patients, participants with sleep deprivation and good sleeper controls.

Methods: The Insomnia Severity Index and a clinical interview were used to assess insomnia severity. The Emotion Regulation

Questionnaire (ERQ) was used to assess emotion regulation. Ninety-seven participants who fulfilled the criteria for insomnia disorder and 86 good sleeper controls participated. Out of the 86 good sleeper controls 41 participants were randomized to a sleep deprivation condition and 45 participants were asked to maintain their normal sleep habits. In total, 183 participants participated in the study. Mixed effects analyses were used to assess between-subject effects and within-subject effects.

Results: Results show that participants with higher sleep efficiency (SE) were more able to regulate their emotions than participants with lower SE ($C = 0.002$; $F(1;174) = 6.34$; $p = 0.013$). The three groups did not differ regarding emotion regulation measured by the ERQ.

Conclusion: Although results show that the three groups – insomnia patients, sleep deprived participants, and good sleeper controls – did not differ regarding emotion regulation, it could be demonstrated that participants with higher SE were more able to regulate their emotions than participants with lower SE. This lends further credibility to a link between emotion regulation and sleep.

Note: Johann AF and Baglioni C share first authorship.

Disclosure: No

P722 | The effects of a gentle rocking stimulation on sleep in poor sleepers

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Objectives/Introduction: We previously demonstrated that a gentle rocking motion (0.25 Hz) during a whole night or a nap benefited sleep (i.e., faster sleep onset, extended N3 duration, fewer nocturnal awakenings) and declarative memory performance in healthy good sleepers (Bayer et al., 2011, Perrault et al., 2019). We also found that rocking increased sleep spindles and slow oscillations (SOs). The aim of the present study was to investigate the effects of rocking stimulation during sleep in individuals complaining of sleep difficulties akin to chronic insomnia.

Methods: We studied 16 young participants (age = 24.3 ± 3.6; 11F) reporting poor sleep, that is, difficulties to fall asleep and/or maintain sleep at least 2 nights per week in the last 3 months (screened with questionnaires, actimetry and clinical polysomnography, PSG). Each participant slept during two counterbalanced experimental nights in the rocking bed, which either remained in a stationary position or rocked laterally at 0.25 Hz. Whole night PSG recordings were scored according to the AASM guidelines. Micro-events (e.g., arousals, spindles, SOs) were detected semi-automatically.

Results: In the rocking condition (vs stationary), participants had increased sleep efficiency (SE; +4.5%, $t = -2.69$, $p = 0.016$; $g' = -0.4$) due to a decrease in the time spent awake (−34% $t = 22$, $p = 0.015$; $g' = 0.53$; $r = -0.73$; $p = 0.0013$). Change in SE was also associated with a faster entrance into consolidation NREM sleep (i.e., 10 min without fragmentation; $r = -0.57$, $p = 0.02$). We also found a decrease in the proportion of time spent in N1 (−15%, $t = 108$, $p = 0.03$; $g' = 0.5$) but no significant change for N2, N3, or REM (all $p > 0.05$), and no change in sleep fragmentation index or arousal density (all $p > 0.05$). Similar to good sleepers, we observed an increase in spindle density during N3 (all $p < 0.005$; $g' = 0.3$) and their entrainment (as well as SO) into a rhythmic occurrence relative to the rocking cycle.

Conclusions: The present findings suggest that a continuous low-frequency rhythmic rocking stimulation applied during a whole night beneficially influences the regulation of sleep in poor sleepers by decreasing the time spent awake and in light sleep. Rocking may thus alleviate two main symptoms of chronic insomnia pertaining to entrance into deep sleep and sleep maintenance.

Disclosure: No

P723 | Two years later: reassuring longitudinal trajectories of sleep quality, insomnia, and mental health over the endless pandemic

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Objectives/introduction: Since the first *lockdown* period of Spring 2020, the several COVID-19 contagion waves deeply impacted the sleep and mental health of the general population. Notwithstanding the largest vaccination campaign in human history, the pandemic has continued to disrupt the daily life of the worldwide population for two years now. Here, we report preliminary results on the longitudinal trajectories of sleep quality, insomnia, and mental health throughout the pandemic in Italy.

Methods: A total of 1039 Italians (mean age ± standard error, 35.37 years ± 0.39; 18–81, 201 males) participated in a longitudinal study consisting of three survey waves. Subjects were evaluated during the first two contagion waves (T1: April 2020, T2: December 2020) and after two years from the first *lockdown* period (T3: April 2022). The survey comprised: Pittsburgh Sleep Quality Index (PSQI), Insomnia Severity Index (ISI), Beck Depression Inventory-second edition (BDI-II), and the state-anxiety subscale of the State-Trait Anxiety Inventory (STAI-X1). Longitudinal data were analysed using linear mixed models.

Results: Analysis showed unchanged PSQI overall score ($p = 0.20$; T1: 6.69 ± 0.11; T2: 6.70 ± 0.11; T3: 6.54 ± 0.11). Comparisons on PSQI

sub-components revealed improved subjective sleep quality, sleep latency, and sleep disturbances at T3 than at T1 (all $p < 0.002$). Conversely, participants reported shorter sleep duration and higher daytime dysfunctions at T3 than at T1 (both $p < 0.001$). Finally, the analyses highlighted differences in ISI ($p < 0.001$), BDI-II ($p = 0.03$), and STAI-X1 scores ($p < 0.001$) between the three assessment points. Bonferroni *post hoc* showed reduced ISI (T1: 8.05 ± 0.16; T2: 7.42 ± 0.16; T3: 6.96 ± 0.16), and STAI-X1 scores (T1: 48.14 ± 0.30; T2: 46.24 ± 0.30; T3: 45.23 ± 0.30) over time (all $p < 0.01$), and lower BDI-II scores (T1: 11.80 ± 0.28; T2: 11.69 ± 0.28; T3: 11.15 ± 0.28) at T3 than at T1 ($p = 0.03$).

Conclusion: Our study described a reassuring scenario after two years of the pandemic. We demonstrated relieving sleep disturbances, insomnia, depressive, and anxiety symptoms in a context of shorter sleep duration and more severe sleep-related daytime dysfunctions. Further long-term monitoring of sleep and mental health time course is necessary to claim the end of the pandemic emergency on sleep and psychological status of the general population.

Disclosure: No

P724 | Investigating the effect of digital cognitive behavioural therapy on sleep and cognition in insomnia: the scotia trial

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Introduction: Insomnia disorder is a highly prevalent sleep disorder affecting approximately 10%–12% of the adult population. It is characterised by persistent (≥3 months) problems with sleep initiation and/or maintenance, accompanied by significant impairment to cognitive functioning. Digital cognitive behavioural therapy for insomnia (dCBTI) has been shown to effectively improve self-reported insomnia severity. However, the effect of dCBTI on objective measures of sleep and cognition has not yet been systematically investigated. The aim of this randomised controlled trial was to assess subjective and objective measures of sleep and cognition after dCBTI in participants with insomnia.

Methods: Thirty-three participants meeting diagnostic criteria for insomnia were randomised to either a dCBTI group ($n = 15$; $f = 14$; age 54.8, (standard deviation (SD): 8.1) or a wait-list group (WLC) ($n = 18$; $f = 13$; age 53.1 (SD: 8.1). Sleep and cognition were assessed prior (baseline) and after (post-assessment) a 10-week period using polysomnography (PSG), a word-pair task and self-reported questionnaires. During the 10-week period the dCBTI group received dCBTI, whereas the WLC group received no treatment. Statistical analysis was performed using an ANCOVA with multiple imputations with the baseline as a covariate.

Results: At post-assessment the dCBTI group showed significant improvements in self-reported measures of insomnia severity (Sleep Condition Indicator; standard mean difference (SMD): 4.40 (standard error (SE): 1.41), p-value = 0.002), sleep quality (Pittsburgh Sleep Quality Index; SMD: 2.50 (SE: 0.90), p-value = 0.006) and pre-sleep arousal (Pre-sleep arousal scale; SMD: 5.15 (SE: 1.83), p-value = 0.005) compared to the WLC group. However, no significant differences in objective sleep (i.e. PSG outcomes of sleep architecture and sleep continuity) were found between the groups (p-values ranging from 0.28–0.94). Furthermore, no changes in objective or subjective measures of cognition were observed (British Columbia Cognitive Complaints Inventory [p-value = 0.13]; word-pair task [p-value = 0.82]).

Conclusions: Our findings show that dCBTI led to an improvement in subjective but not in objective measures of sleep (i.e., PSG outcomes) in participants with insomnia. In additions, no significant differences in cognition were found between the two groups. These findings are in line with results from face-to-face CBTI, reporting that CBTI primarily improves self-reported sleep measures.

Disclosure: No

P725 | Impact of baseline comorbidity on insomnia severity ten years after a randomized trial of cognitive behavioural therapy for insomnia

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Objectives: To investigate if comorbidity has an impact on insomnia severity in the very long-term after cognitive behavioural therapy for insomnia (CBT-I). We have previously shown that effects of CBT-I were maintained ten years after the end of treatment. Comorbidity may affect severity of insomnia and effectiveness of CBT-I, but it is not known whether it affects long-term treatment outcome.

Methods: Ten years after a randomized controlled trial of CBT-I, the 133 participants were contacted again and asked to fill out assessments. Data from baseline and ten-year follow-up assessments were used. Participants were divided into groups based on baseline comorbidity (psychiatric, somatic and sleep related) and we performed three separate 2x2 analyses of variance (ANOVAs) to compare insomnia severity at baseline and ten-year follow-up for participants with and without the respective conditions. In addition, effect sizes with 95% confidence intervals [95%CI] were calculated for within-group changes, and a correlation between number of comorbid conditions and insomnia severity change score.

Results: At ten-year follow-up, 98 participants (74%) contributed data. ANOVAs revealed statistically significant main effects of time in all three analyses ($F_{(1,96)} = 102.22–182.18$, $ps < 0.001$), as insomnia severity improved in all participants. ANOVA also revealed a statistically significant main effect of group for psychiatric comorbidity ($F_{(1,96)} = 6.04$, $p = 0.016$), as participants with psychiatric comorbidity had more severe insomnia at both baseline and ten-year follow-up

compared to participants without psychiatric comorbidity. However, there was no statistically significant interaction for psychiatric comorbidity ($F_{(1,\ 96)} = 0.12$, $p = 0.744$), and effect sizes for the within-group changes did not differ significantly (Hedge'sg[95%CI] = 1.38[0.89–1.86] v/s 1.84[1.41–2.28]). ANOVAs for sleep related and somatic comorbidity did not reveal main effects of condition ($F_{(1,96)} = 0.00$, $p = .996$-, and $F_{(1,96)} = 58$, $p = 0.448$, respectively), or interaction effects ($F_{(1,96)} = 0.04$, $p = 0.848$, and $F_{(1,96)} = 0.39$, $p = 0.536$ respectively). The correlation between number of comorbid conditions and insomnia severity change score was also not statistically significant ($r_{(96)} = 0.14$, $p = 0.171$).

Conclusions: In line with some previous research, participants with psychiatric comorbidity display higher levels of insomnia severity both before and ten years after treatment, compared to participants without psychiatric comorbidity, but comorbidity does not diminish the size of improvement in insomnia severity assessed in the very long-term.

Disclosure: Yes

Conflict of Interest statement: I am the author of the commercially available self-help book used in this study.

P726 | Validation of fitbit charge 4 for assessing sleep in chinese patients with chronic insomnia: a comparison against polysomnography and actigraphy

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Objectives: Our research aims to assess the performance of a new generation of consumer activity trackers (Fitbit Charge 4™: FBC) to measure sleep variables and sleep stage classifications in patients with chronic insomnia disorder compared to polysomnography (PSG) and a widely-used actigraph (Actiwatch Spectrum Pro: AWS).

Methods: We recruited 37 participants, diagnosed with chronic insomnia disorder, for one night of sleep monitoring in the sleep laboratory using PSG, AWS and FBC. Epoch-by-epoch analysis along with Bland-Altman plots was used to evaluate FBC and AWS against PSG for sleep-wake detection and sleep variables: total sleep time (TST), sleep efficiency (SE), waking after sleep onset (WASO) and sleep of latency (SOL). FBC sleep stage classification of light sleep (LS), deep sleep (DS) and rapid eye movement (REM) was also compared to PSG.

Results: When compared with PSG, FBC notably underestimated DS (-41.4, $p < 0.0001$) and SE (−4.9%, $p = 0.0016$), while remarkably overestimating LS (37.7, $p = 0.0012$). However, the TST, WASO and SOL, assessed by FBC, had no significant difference from that of PSG. Compared with PSG, AWS and FBC showed great accuracy (86.9% vs. 86.5%) and sensitivity (detecting sleep; 92.6% vs. 89.9%) but comparatively poor specificity (detecting wake; 35.7% vs. 62.2%). Both devices showed better accuracy in assessing sleep than wakefulness, with same sensitivity, but statistically different specificity. FBC supplied equivalent parameters estimation as AWS in detecting sleep variables except for SE.

Conclusions: Our research shows that the FBC cannot replace PSG thoroughly in the quantification of sleep variables and classification of sleep stages in Chinese patients with chronic insomnia, however, the user-friendly and low-cost wearables do show some comparable functions. Whether FBC can serve as a substitute for actigraphy and PSG in patients with chronic insomnia needs further investigation.

Disclosure: No

P727 | Associations between sleep health and amygdala reactivity in the UK biobank cohort ($n = 25{,}758$)

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Objectives/Introduction: Sleep health (SH) is regarded as a substantial factor for physiological and psychological human well-being. Confirming this link, previous research has shown that poor sleep goes along with a wide range of psychiatric disorders, particularly with anxiety and depression. Even though little is known about the neurobiological mechanisms underlying these associations, several findings suggest that key dimensions of SH are related to altered amygdala reactivity (AR), however, evidence to date remains inconsistent and underpowered.

Methods: Addressing this shortcoming, the current (pre-registered) study examined associations between SH and AR to angry and fearful facial expressions in the UK Biobank cohort ($N = 25{,}758$ participants). Building upon a large sample size and coherent data acquisition, five dimensions of SH (insomnia symptoms, sleep duration, daytime sleepiness, chronotype, and sleep medication) were investigated.

Results: Linear regression analyses yielded that short sleep duration was associated with decreased AR while neither insomnia symptoms, daytime sleepiness, chronotype, sleep medication nor a composite measure of all SH dimensions were associated with AR. Exploratory analyses suggest that this association applies particularly for stable short sleep duration over years.

Conclusions: To our knowledge, the relation between SH and AR has not been examined in a comparably large sample so far. Habitual short sleep duration was shown to be associated with decreased AR, possibly indicating compensation for known implications of chronic sleep loss like impaired prefrontal processes and hampered emotion regulation.

Disclosure: No

P728 | Sleep onset misperception in insomnia disorder: a pilot study with methodological implications

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Objective/Introduction: Subjects with insomnia frequently report a discrepancy between objectively and subjectively defined sleep onset. The aim of this study was to investigate which factors may influence sleep onset misperception in insomnia patients by assessing the presence of possible links between the degree of misperception and objectively detected sleep variables.

Methods: 16 patients with insomnia disorder were recruited. They underwent a full night polysomnographic recording and completed a comprehensive sleep diary. The values of objective and subjective sleep onset latencies were recorded and a sleep onset misperception index was calculated. A series of sleep parameters were chosen on the basis of a review of the literature and were tested. These variables were: latency to N1, latency to N2, latency to N3, latency to the first K-complex and percentage of clearly detectable and stereotypical alpha rhythm during subjectively defined sleep onset. Moreover, a model proposed by Hermans and collaborators in 2019 was also tested. This model postulated the existence of a variable called L, which express the duration of an uninterrupted sleep fragment at sleep onset in order to be perceived as sleep. Finally, a colour-graded representation depicting the presence of sleep/wake states during subjective sleep onset was performed.

Results: A positive correlation between sleep onset misperception and the percentage of stereotypical alpha rhythm was found ($rho_{spearman} = 0.564$, $p = 0.025$). Moreover, both latency to the first epoch of N2 and to the first K-complex showed a tendency towards statistical significance in correlation with sleep onset misperception ($rho_{spearman} = 0.380$, $p = 0.065$; $rho_{spearman} = 0.403$, $p = 0.057$, respectively). Moreover, by dividing the sample in patients with a sleep onset misperception <or> 10 min, we found that patients with more than 10 min of discrepancy showed a significant increase in percentage of alpha rhythm during subjective sleep onset (16,5% vs 2,6%, $p = 0.009$). No significant association was found between L and the degree of sleep onset misperception.

Conclusions: These data suggest the importance of further investigating the link between misperception, alpha rhythm, and hyperarousal levels and once again the need to redefine the construct of sleep onset latency both in research and in clinical contexts.

Disclosure: No

P729 | Insomnia symptoms are related to a misperception of working memory deficit

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Objective/introduction: Several studies have examined subjective-objective discrepancies in cognitive impairment, providing mixed results relating to attention and psychomotor processing. This study examined whether, compared to normal-sleepers, individuals presenting insomnia symptoms misperceive deficits of working memory following subjective and objective assessment.

Methods: Fifty individuals were stratified as normal-sleepers ($n = 22$; 23.91 ± 7.67yrs, 66% female) determined as scoring <8 on the Insomnia Severity Index (ISI), and individuals displaying insomnia symptoms ($n = 28$;21.82 ± 3.70 years, 71% female) determined as scoring≥8. The Stanford Sleepiness Scale and Working Memory Questionnaire assessing three domains of working memory: attention; storage; and executive control were administered. Total scores on each domain were summated to yield a composite where higher scores indicate greater working memory deficits. Three computer-based tasks of working memory were also completed, including: the corsi-blocks task (recalling order presentation and location of squares); and alphanumeric recall (stating whether an individually presented number/letter had previously been shown in a sequence participants were required to remember at the beginning of each respective (numeric/alphabetic) task). An overall objective working memory score was calculated by summing the score from each task, with lower scores indicating greater working memory deficits. Subjective and objective working memory scores were analyzed between groups, controlling for sleepiness.

Results: Multivariate analysis of covariance analysis was employed with group-membership (normal-sleepers vs. insomnia symptoms) as the independent, sleepiness as covariate, and assessment type (subjective-objective) as dependant variables. The Wilk's Lambada multivariate test of between group differences was significant ($F(3,46) = 0.88$, $p = 0.05$). Univariate between-subjects tests demonstrated that the insomnia symptoms group (67.68 ± 13.98) reported greater subjective memory deficits relative to normal-sleepers (57.55 ± 10.95; $F(1,47) = 6.32$, $p = 0.015$), whereas no objective performance deficits were observed ($F(1,47) = 0.211$, $p = 0.65$: INS = 197.45 ± 13.24; NS = 195.92 ± 11.91).

Conclusions: The current findings add to the body of literature suggesting that insomnia is characterised by a misperception of daytime deficit, specifically in the domain of working memory. From a cognitive perspective, this discrepancy between subjective and objective performance in working memory may be attributed to dysfunctional beliefs, attentional, and interpretive biases in relation to daytime performance. However, further research is required to clarify this standpoint both in the context of working memory and wider daytime impairments.

Disclosure: No

P730 | Circadian characteristics in youths with insomnia disorder

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Objectives: Previous studies suggested that a delayed circadian phase is implicated in insomnia in adults. However, this has not been examined in the youth population. The current study aimed to examine the circadian phase differences and abnormality in youths with insomnia.

Methods: Seventeen youths (age: 20.29 ± 1.68; 59% female) with insomnia disorder according to DSM-5 criteria and 26 healthy sleepers (age: 20.27 ± 1.71; 69% female) were recruited. All were free of other sleep disorders, including delayed sleep phase disorder, as confirmed by clinical interviews. Participants completed the Insomnia Severity Index (ISI), Morningness-Eveningness Questionnaire (MEQ), and the Munich Chronotype Questionnaire (MCTQ). Participants also completed actigraphy monitoring followed by dim light melatonin onset (DLMO) assessment. Actigraphy was analysed using cosinor and nonparametric circadian analysis. Welch's *t*-test for unequal variances was used for testing between-group differences.

Results: The insomnia group scored significantly higher on ISI, had a slightly lower MEQ score (Healthy = 47.46 ± 10.53; Insomnia = 42.41 ± 6.79, $p = 0.049$), and a later midpoint of sleep derived from the MCTQ (Healthy = 05:36 ± 01:12; Insomnia = 06:48 ± 01:32, $p = 0.011$) as compared to healthy sleepers. As compared to healthy sleeper group, the insomnia group also had a significant delay in acrophase (Healthy = 16:45 ± 01:03; Insomnia = 17:37 ± 01:20, $p = 0.037$), a later melatonin onset (Healthy = 22:34 ± 01:29; Insomnia = 23:47 ± 01:44, $p = 0.027$), a lower amplitude of the melatonin (Healthy = 234.9 ± 227.7; Insomnia = 95.2 ± 88.7, $p = 0.008$), and a shorter phase angle between melatonin onset and their habitual bedtime (Healthy = 02:45 ± 01:07; Insomnia = 01:55 ± 01:03, $p = 0.019$). The percentage of individuals with a phase angle of one h or less was 3.8% and 17.6% in healthy sleepers and insomnia group, respectively, suggesting that participants with insomnia tended to initiate sleep too early relative to their circadian rhythm.

Conclusion: The present study demonstrated the unique circadian features in youths with insomnia, namely a later circadian phase, shorter phase angle, and blunted melatonin circulation, compared to healthy sleepers. The findings suggested that circadian related pathophysiology is implicated in youth insomnia.

Disclosure: No

P731 | Alcohol use and poor sleep quality: a longitudinal twin study across 36 years

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Objectives/Introduction: Poor sleep is one of the multiple health issues associated with heavy alcohol consumption. While acute effects of alcohol intake on sleep have been widely investigated, the longitudinal associations remain relatively underexplored. The objective of our research was to shed light on cross-sectional and longitudinal associations between alcohol use and insomnia symptoms over time, and to elucidate the role of familial confounding factors in such associations.

Methods: Using self-report questionnaire data from the Older Finnish Twin Cohort ($N = 13{,}851$), we examined how alcohol consumption and binge drinking are associated with sleep quality during a period of 36 years.

Results: Cross-sectional logistic regression analyses revealed significant associations between poor sleep and alcohol misuse, including heavy and binge drinking, at all four time points (OR range = 1.61–3.37, $p < 0.05$), suggesting that higher alcohol intake is associated with poor sleep quality over the years. Longitudinal cross-lagged analyses indicated that moderate, heavy and binge drinking predict poor sleep quality (OR range = 1.25–1.76, $p < 0.05$), but not the reverse. Within-pair analyses suggested that the associations between heavy drinking and poor sleep quality were not fully explained by genetic and environmental influences shared by the co-twins.

Conclusions: In conclusion, our findings support previous literature in that alcohol use is associated with poor sleep quality, such that alcohol use predicts poor sleep quality later in life, but not vice versa, and that the association is not fully explained by familial factors.

Disclosure: No

P732 | Nukkuaa: insomnia treatment using a novel smartphone App – first results and clinical data

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Objectives/introduction: With a prevalence of 6%–10% insomnia is the most common sleep disorder, making easily accessible treatment highly important. Given insufficient CBT-I-treatment options the need for well-validated digital treatment options rises. Here, we evaluate the App "NUKKUAA", which combines treatment for insomnia through daily exercises based on elements of CBT-I, as well as the possibility of reliable sleep-tracking with an affordable ECG breast-belt.

Methods and materials: In our ongoing study we assess the efficacy of a digital 6-week-intervention-program, which follows upon a 2-week-waitlist-baseline. During the intervention-phase, participants use the App and ECG belt daily to monitor their sleep. At the beginning of the baseline (T0), at the start (T1) and end (T2) of the 6-week-intervention-phase, several questionnaires were completed. The questionnaires consisted of the Pittsburgh-Sleep-Quality-Index (PSQI), the Insomnia-Severity-Index (ISI), Dysfunctional Beliefs about Sleep (DBAS), Brief-Symptom-Inventory (BSI) and the WHO Quality-of-Life Questionnaire (WHOQOL-BREF). Additionally, 3 ambulatory polysomnographies (PSG) are conducted (T0-T2). A follow-up (T3) is planned 4 weeks after the end of the program yet ongoing.

To date 20 participants (10 female), aged 30–73 ($M = 52.25$, $SD = 12.58$) have completed the 6-week-intervention-program.

Results: Preliminary results show a significant improvement in PSQI (8.35 to 6.90, $t(19) = 2.96$, $p = 0.008$), ISI (14.60 to 11.70, $t(19) = 3.68$, $p = 0.002$) and BSI (1.31 to 1.18, $t(19) = 2.31$, $p = 0.032$) from start to end of the 6-week-intervention. For the other questionnaires, DBAS ($F(1.63) = 2.01$, $p = 0.16$) and sub-domains of the WHOQOL, we do not find significant changes with the preliminary study sample (p's > 0.47).

Conclusion: Our preliminary results indicate the potential clinical efficacy of the digital App-program NUKKUAA as improvements in insomnia symptoms and Brief-Symptom-Inventory are found after 6 weeks in the program. It is believed that early and low-threshold intervention using digital intervention for insomnia may help to ease a societal problem that is widespread and in need for more attention.

Disclosure: Yes

Conflict of Interest statement: MS is co-founder and Chief Scientific Officer of NUKKUAA.

P733 | Nukkuaa – a novel mobile phone application for tracking sleep and treating insomnia: a first efficacy study

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Introduction: Insomnia disorder is the by far most common sleep disorder and affecting 6-20% of the adult population when defined in accordance with formal diagnostic criteria. Still many patients stay untreated and there is need for specialized and more easily accessible treatment options that are well validated. Here, we do a first evaluation of the APP NUKKUAA that is reliably tracking sleep using an ECG chest band, and that offers small treatment ""nuggets" based on well-known techniques know from cognitive behavioral therapy (CBT-i).

Materials and Methods: We are in the midst of evaluating a 6-week APP-guided intervention group that starts with a 2-week waitlist period. Every 7 to 10 days in the protocol one "level" in the program is completed. Thirty-nine volunteers (21 women; age = 51.03 [12.05], range= 30–73 years) suffering from insomnia were included in the current analysis. The study protocol includes sleep questionnaires as well symptom inventories and quality of life scales. In addition, all participants undergo 3 ambulatory polysomnographies (PSG). During the program, participants are asked to use the APP daily, and evaluate subjectively their sleep in addition to wearing an ECG breast belt for monitoring sleep objectively.

Results: 74.4% of the sample reported a PSQI > 5. The PSQI mean of the current sample was 8.87 ($SD = 2.86$), with a median of 10. Preliminary analyses of people being at least 30d in the protocol (completing level 1-3) show improvements in subjective sleep quality (0–10) (Level 1: 5.74 to Level 3: 6.25; $t_{39} = -4.19$, $p < 0.01$) and objective number of awakenings (Level-1: 18.4 to Level-3: 11.3; $t_{32} = 3.50$, $p < 0.01$). Objective sleep onset latency did not (yet) change significantly (Level-1: 19.29 min to Level-3: 15.00 min; $p = 0.15$), as did subjective wake after sleep onset (36.92 to 31.28 min; $p = 0.12$).

Conclusions: The findings give a first indication for a potential beneficial effect of a low-threshold digital intervention for improving sleep and complement subjective findings with objective measures from PSG as well as affordable consumer devices. Results of a final sample with 60 participants and another 3 weeks of treatment will be added in a next step.

Disclosure: Yes

Conflict of Interest statement: MS is co-founder and Chief Scientific Officer of NUKKUAA.

P734 | Relationship, differences and agreement between objective and subjective sleep measures in chronic spinal pain patients with comorbid insomnia: a cross-sectional study

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Introduction: Sleep disturbances are frequently reported in people with nonspecific chronic spinal pain (nCSP) and presents an additional challenge in the management of nCSP. The aim of this study was to get better insight in the characteristics of the sleep problems in people with nCSP by evaluating the relationship and conformity between self-reported and objectively measured sleep parameters (i.e., questionnaire vs. polysomnography and actigraphy).

Methods: The data of 123 people with nCSP and comorbid insomnia was analysed. Pearson correlations were used to examine the relationship between objective and subjective sleep parameters. Differences between objective and subjective sleep parameters were analysed using t-tests. Bland-Altman analyses were conducted to quantify and visualise agreement between the self-reported and objectively measured sleep parameters.

Results: Only a significant, moderate correlation between perceived time in bed (TIB) and actigraphic TIB ($r = 0.667$, $p<0.001$) was found. There were no other significant associations between subjective and objective measures ($r < 0.400$, $p > 0.05$). In general, participants underestimated their total sleep time (TST) (Mean Difference [MD] = −52.37 [−67.94,−36.81], $p < 0.001$) and overestimated sleep onset latency (SOL) (MD = 13.76 [8.33, 19.20], $p < 0.001$).

Conclusions: The results of this study suggest a discrepancy (differences and lack of agreement) between subjective and objective sleep parameters in people with nCSP and comorbid insomnia. Based on the findings, people with nCSP and comorbid insomnia tend to underestimate TST and overestimate SOL.

Disclosure: No

P735 | Differences in status of mental disorders and changes in sleep and mood during prolonged winter-over residence in two korean antarctic bases in different lattitude

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Introduction: Antarctica is a region with extreme climate, characterized by extreme cold and photoperiod. There has been insufficient research on this topic in the Korean Antarctic station. The aim of this study was to investigate the status of mental illness and changes in sleep and mood among Korean crew members staying for a long-term period in the Antarctic station.

Methods: From 2017 to 2020, crew members who were dispatched from South Korea to two Antarctic stations for a one-year period participated in this study. The crew were interviewed by board-certified psychiatrists once before departure and twice during their stay in Antarctica and were evaluated for sleep and mood status and mental illness through psychological tests, including self-questionnaires. The incidence of mental illness was confirmed and changes in sleep and depression were analyzed.

Results: A total of 88 participants were included in the final analysis, and 7 of them (8.0%) were diagnosed with mental disorders such as insomnia in early winter. The total Beck Depression Inventory (BDI) score increased significantly in the early winter period, and the total Insomnia Severity Index (ISI) and Pittsburgh Sleep Quality Inventory (PSQI) scores increased in both early and late winter. The difference in changes in sleep and depression between the two stations was not significant.

Conclusion: This is the first study to investigate the mental illness and sleep and mood status of Korean crews dispatched to Antarctica. In early winter, there were significant increases in mental illness and depressive symptoms, and a worsening of sleep status.

Disclosure: No

P736 | Sleep continuity, stability and organization in insomniacs compared to good sleepers

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Introduction: The possibility to distinguish insomniacs from good sleepers based on polysomnography (PSG) is still an open question (Edinger et al., 2013). While only modest differences between these groups are generally observed in traditional PSG parameters (e.g., sleep stage proportions), some studies suggest that finer objective sleep quality measures may be more useful. Here we assess possible differences between good sleepers (GS) and insomniacs (IN) not only in classical PSG measures but also in sleep continuity, stability and cyclic organization parameters.

Methods: Eighteen GS (Pittsburgh Sleep Quality Index (PSQI) < 5) and 17 IN (diagnosed through a standard interview by a licensed psychologist and with PSQI ≥ 5 and Insomnia Severity Index ≥ 8) underwent two nights of home PSG recording.

Results: IN participants showed longer sleep latency ($p = 0.002$), lower sleep efficiency ($p < 0.001$) and higher WASO% ($p = 0.036$) than GS subjects, with no differences in sleep state proportions. Moreover, relative to the GS group, IN participants showed lower sleep continuity (higher frequency of long awakenings; $p = 0.011$), stability (higher microarousal index; $p = 0.050$) and organization

(fewer sleep cycles, $p = 0.029$; lower time spent in sleep cycles, $p = 0.017$), as well as higher power in the alpha ($p = 0.022$), sigma ($p = 0.007$) and beta ($p = 0.016$) bands. Spindle parameters displayed no differences.

Conclusions: In line with previous literature, our findings show that more fine-grained PSG analyses are useful to distinguish insomniacs from good sleepers. Also, they add to extant data showing differences in sleep continuity, stability and organization between good and bad sleepers (Conte et al., 2021) and between young and elderly individuals (Conte et al., 2014). Overall, our results point to the utility of including these measures among the PSG-based eligibility criteria which are increasingly used in insomnia research.

Disclosure: No

P737 | Insomnia among a sample of egyptian patients in the era of the COVID-19 pandemic

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Introduction: Detection of Insomnia was higher during the COVID-19 pandemic with higher prevalence rates. Insomnia's possible factors include anxiety about contracting the virus, loss of loved ones, social restrictions, and increased economic burden.

Aim of Work: This study aims to measure the impact of COVID-19 on sleep quality in a sample of Egyptian patients.

Methods: The study was an online survey study that involved 101 adult Egyptians in the period from July to December 2020. The survey included sociodemographic data, Insomnia Severity Index (ISI), Beck Anxiety Inventory (BAI), and Pittsburgh Sleep Quality Index (PSQI) Addendum for PTSD.

Results: Fifty-six percent of the participants had severe Insomnia. BAI showed that 84% suffered from severe anxiety, 11.9 % moderate and 2% mild anxiety symptoms. Results show a mean and SD of 21.68 ± 5.14 for ISI, 38.27 ± 12.59 for BAI, and 10.47 ± 5.21 for PSQI addendum, denoting high anxiety levels and Insomnia among these participants. ISI results were positively correlated with BAI ($r = 0.32$, $p = 0.001$) and PSQI ($r = 0.34$, $p = 0.001$).

Conclusion: Insomnia related to COVID-19 anxiety was common among Egyptians during the pandemic.

Disclosure: No

P738 | A single shot sleep intervention for postgraduate researchers: Pilot findings and future directions

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Objectives/Introduction: Recent findings demonstrate that 37.4% of postgraduate researchers reported difficulties with their sleep in the past year in addition to mental health difficulties; including thoughts of self-harm and suicide (Milicev et al, 2021). Cognitive Behavioural Therapy for insomnia (CBT-I) remains the most extensively researched and supported intervention for sleep difficulties with studies showing its effectiveness employing a single session intervention format (Ellis et al, 2015). The present study aimed to explore and evaluate the acceptability of a single shot sleep session in reducing sleep difficulties, and its effects on mental health and wellbeing, in postgraduate researchers.

Methods: An online sleep session (60–70 min long) via a teleconferencing platform (Zoom) was offered to postgraduate researchers at a UK Higher Education Institution. The session comprise material based on CBT-I components adapted for the target population accordingly. Participants completed a sleep diary pre and post session and responded on a battery of sleep, stress and wellbeing measures including loneliness.

Results: Twenty seven postgraduate researchers ($n = 27$; 70% females) participated in the study. The sessions were offered to all enrolled postgraduates and were not screened for insomnia or other mental health issues. Overall, participants demonstrated trends of improved mental health following the session with moderate changes in sleep and sleep diary outcomes. The online delivery was well accepted by the participants.

Conclusions: The present study builds on the existing knowledge of the impact of sleep interventions can have on mental health and poor wellbeing in addition to sleep disturbances on postgraduate researchers. Brief online CBT-I can be a promising avenue in improving wellbeing and mental health in this context.

Disclosure: No

P739 | An ongoing clinical trial. Pharmacopuncture effects on insomnia disorder: Multi-site, pragmatic randomized controlled trial

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Introduction: Acupuncture is widely adopted in Korean medicine to treat Insomnia disorder and its effectiveness and safety are well evaluated through many randomized clinical trials, systematic reviews and meta-analysis studies.

Pharmacopuncture is a new treatment method combining acupuncture and injection of herbal medicine on acupuncture-points based on the theory of meridians, and is one of the treatments frequently used by Korean Medicine doctors for insomnia disorder. We designed a pragmatic randomized controlled trial to compare the effectiveness and safety of pharmacopuncture and acupuncture as treatment for insomnia disorder.

Methods: This study is a multi-site, pragmatic, randomized, active controlled trial for patients with moderate or severe insomnia based

on total score of Insomnia Severity Index (ISI). The 138 participants will be randomly assigned to the pharmacopuncture ($n = 92$) or acupuncture ($n = 46$) group at a ratio of 2:1, respectively to receive 10 session treatment for 4 weeks. The details of the procedures of pharmacopuncture or acupuncture will be determined based on the doctor's experience or symptom differentiation. The follow up visit is scheduled at 4 weeks after 10 session treatments. The primary outcome is Pittsburgh Sleep Quality Index (PSQI). The secondary outcomes are ISI, quality of life questionnaire, and cost-related questionnaire, sleep parameters in the Actigraphy and sleep diary. The primary and secondary outcomes will be assessed before and after intervention, at follow up visit. This study protocol was approved by the institutional Review Board at each institution before recruiting participants and was registered in Clinical Research information Service (KCT0006803, CRIS.nih.go.kr).

Results/Conclusions: This study is now ongoing state to evaluate which treatment strategy is more effective to treat insomnia disorder. We expect that the results will provide clinical evidence to make decision by evaluating the effectiveness, safety and cost-effectiveness of pharmacopuncture compared to acupuncture treatment. Through sub-analysis, we will explore which material could be the optimal option for insomnia disorder.

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Disclosure: No

P906 | Long-term effects of digital cognitive behavioural therapy for insomnia in a diverse sample: results from outcomes at 6-month follow-up

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Introduction: In Germany, the integration of digital health applications (DiGAs) has pathed new ways to improve access to first-line treatment for insomnia through digital cognitive-behavioural therapy (dCBT-I). With its current use in mind, we designed a waitlist-controlled trial with 6-month follow-up to investigate the effects of dCBT-I in a diverse insomnia population. Only very limited inclusion/exclusion criteria were applied. While between-group effects showed promising results in favour of dCBT-I at post-treatment, we now analysed outcomes at 6-months follow-up in the intervention group to test whether treatment effects are stable over time.

Methods: Participants aged ≥18 who met diagnostic criteria for insomnia disorder were randomised (1:1) to 8-weeks dCBT-I (somnio, mementor DE GmbH) or waitlist control (access to dCBT-I at 8-weeks post-randomisation). Follow-up assessment took place at 6-months post-randomisation and included insomnia severity (Insomnia severity index [ISI]), depressive symptoms (Allgemeine Depressionsskala [ADS-K]), symptoms of anxiety (State-Trait Angstinventar [STAI]), and measures of daytime functioning (Fatigue severity scale [FSS], Epworth sleepiness scale [ESS]) and overall wellbeing (WHO wellbeing index [WHO-5]). Linear-mixed-models (LMMs) with outcomes at 8-weeks and 6-months were fitted to determine improvements over time. This trial was registered with the German Clinical Trials Register (DRKS00024477).

Results: Of the n = 238 patients ($n = 161$ female, *mean age* = 43.73 ± 13.90), n = 118 were randomised to dCBT-I. Of these, n = 106 (89.83%) completed post-treatment and $n = 94$ (79.66%) completed follow-up assessments. In comparison to values at baseline, LMMs revealed significant improvements over time: at 6-months follow-up, the ISI was reduced by 8.12 points (95%CI = 7.05–9.20), depressive symptoms decreased by 4.05 points (95%CI = 2.80–5.31), and symptoms of anxiety improved by 4.95 points (95%CI = 3.41–6.47). Similarly, we observed improvements in daytime functioning (FSS change score = 1.30 [95%CI = 1.03–1.56]; ESS change score = 1.34 [95% CI = 0.77–1.91]) and overall wellbeing (WHO-5 change score = 2.59 [1.68–3.50]). Magnitude of change scores were comparable to those observed at post-treatment, indicating stable improvements over time.

Conclusions: The results of our 6-months follow-up analysis showed that dCBT-I improves clinical outcomes in the long-term. Since the study was conducted in a diverse study sample in Germany, these findings support the current use of dCBT-I as a feasible and viable treatment option within regular care.

Disclosure: Yes

Conflict of Interest statement: NL and AR are founders of and shareholder in mementor DE GmbH., a company that specialises in the digital delivery of cognitive behavioural therapy for sleep improvement (somnio). LFM is a salaried employee of mementor DE GmbH. JS is a part-time salaried employee of mementor DE GmbH. AG declares non-financial support in the form of no cost access to somnio for use in clinical research. RP declares no competing interests.

17: SLEEP DISORDERS - PARASOMNIAS

P138 | K-complexes density changes in isolated REM sleep behavior disorder and relations with cognitive functioning

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Objectives/introduction: Isolated REM sleep Behaviour Disorder (iRBD) is a Rapid Eye Movements (REM) sleep disorder, representing a prodromal stage of α-synucleinopathies.

Evidence shows as Non-Rapid Eye Movements (NREM) sleep suggest a role in protecting the aging brain from neurodegeneration. Moreover, alterations in K-complexs (KCs) features during NREM sleep in Alzheimer's disease patients has been proven. Also in iRBD a recent study highlighted a relation between KC density (KCd) and cognitive functioning, particularly in cognitive domains known to be relevant in predicting conversion into neurodegenerative disorders.

However, NREM sleep alterations in RBD and their possible role in cognitive decline, has not yet been extensively investigated.

The present study aimed to assess for the first time the existence of KC alterations in iRBD patients compared to Healthy Controls (HC).

Methods: KCs were visually scored during Stage 2 NREM sleep in frontal, central and parietal derivations. KCd index was assessed in 31 patients with iRBD (4 F; age: 68.64 ± 6.67 y) and 31 HC (8 F; age: 69.03 ± 6.12 y). We performed a comparison of the KCd between groups. Moreover, we performed the correlation between KCd index, performance in global cognitive function and performance in neuropsychological measures.

Results: Results show a significant KCd index reduction in iRBD patients in the frontal, central and parietal derivations compared to HC. In the whole sample the KCd scored in the midline central derivations was correlated positively with Mini-Mental State Examination performances. Moreover, in the iRBD group the midline central KCd index was also positively correlated with scores in attentional matrices and Raven Colored Progressive Matrices.

Conclusions: For the first time, our findings describe a clear KCd index reduction in iRBD patients compared to HC. Moreover, we corroborated the relationship between KCd and specific cognitive domains, considered crucial for the prediction of phenoconversion into α-synucleinopathies. With this evidence the present study highlights the need of a further understanding of NREM sleep alterations, and particularly KC features in iRBD, and their possible role to predict neurodegenerative processes.

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Disclosure: No

P140 | Automated REM atonia index predicts cognitive decline in both isolated and parkinsonian REM sleep behavior disorder

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Objective/introduction: REM sleep without atonia (RSWA) is the neurophysiological hallmark of RBD and progress overtime. REM atonia index (RAI) is a well-known and validated automated scoring method for RSWA with high diagnostic accuracy and high agreement with visual methods. We aimed to assess whether higher degrees of RSWA are associated with an increased risk of mild cognitive impairment (MCI) in patients with RBD, both isolated (iRBD) and associated with PD (PDRBD).

Methods: A total of 142 patients (93 male, median age 66.9 years, range 62.0–73.3) were enrolled, namely 48iRBD (36 male, median age 71.0 years, range 67.0–76.0), 55PDRBD (36 male, median age 65.0 years, range 61.8–70.0), and 39PD without RBD(PDnoRBD) (21 male, median age 63.0 years, range 57.3–70.0). All participants underwent a video-polysomnography, clinical and neuropsychological assessment. MCI was diagnosed according to diagnostic criteria for MCI in PD, and divided in three classes, namely MCI class I amnestic, MCI class II non-amnestic and MCI class III multi-domain impairment. RSWA was quantified according to RAI. The relationship between MCI and RAI was assessed by unconditional logistic regression models predicting MCI non-zero class; polytomous logistic regression models predicting MCI classes as a function of RAI scores was also performed.

Results: A total of 57(40%) MCI subjects were found (17iRBD, 26PDRBD and 14PDnoRBD), namely 4 MCI class I (1PDRBD, 1iRBD, 2PDnoRBD), 25 MCI class II (6PDRBD, 14iRBD, 5PDnoRBD), and 28 MCI class III (19PDRBD, 2iRBD, 7PDnoRBD). RAI scores tended to be lower in MCI class III. Higher RAI was associated with a reduction in odds of MCI class III in the whole study population (OR 0.54). A suggestive inverse association between increasing RAI scores and MCI class III was observed in iRBD (OR 0.25).

Conclusions: Severity of RSWA might indicate a more widespread neurodegenerative process, corroborated by the association with MCI. Automated quantification of RSWA by RAI is a useful and easily available scoring tool in both clinical and research setting. Thus, RSWA-RAI quantification combined with neuropsychological assessment might be useful to stratify RBD phenotype, in order to assess whether RBD with more severe RSWA and MCI represents a more severe phenotype.

Disclosure: No

P141 | Developmental changes in the frequency of episode-related aggressive behavior in chronic somnambulism

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Objectives/Introduction: Far from being benign, somnambulistic episodes can be severe and carry a risk of injury to self or others. Despite the risk of injurious behaviors during somnambulistic episodes and its serious potential consequences, questions regarding the frequency of aggressive somnambulistic episodes and how it changes over time within the same individuals remain largely unanswered. The present study aimed to examine the developmental changes and sex differences in the frequency of aggressive somnambulistic episodes during childhood, adolescence and adulthood. We hypothesized that aggressive somnambulistic episodes occur more frequently during adulthood than in childhood, including within individual participants and that aggressive somnambulistic episodes occur more frequently in men than in women.

Materials and Methods: Adult sleepwalkers with a diagnosis of primary somnambulism and a childhood onset of the disorder ($n = 113$) were assessed for changes in the frequency of aggressive somnambulistic episodes during childhood, adolescence, and adulthood.

Results: In line with our first prediction, we found a gradual increase in the frequency of aggressive somnambulistic episodes from childhood to adolescence and into adulthood. Approximately 5% of sleepwalkers in the present study reported "often" or "always" having experienced an aggressive somnambulistic episode during childhood as compared to 8% during adolescence and 25% during adulthood. Contrary to our second prediction, the frequency of aggressive somnambulistic episodes did not differ between men and women.

Conclusions: Our study demonstrates that in chronic sleepwalkers, episodes worsen in severity from childhood to adulthood. Although the frequency of aggressive episodes was lower during childhood than during subsequent developmental periods, our results indicate that childhood somnambulism is not always benign and that, in certain cases, it can involve aggressive and/or injurious behaviors. Our finding adds to the limited literature in the field and provides valuable insights into how this key clinical characteristic of somnambulistic episodes evolves across the lifespan.

Disclosure: No

P142 | Neuropsychological and emotional characteristics of parasomnia patients

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Introduction: Parasomnias are defined as unpleasant or undesirable physical events or experiences that occur predominantly or exclusively during sleep or during arousals from sleep. Parasomnias are classified according to the state they predominantly occur in rapid eye movement (REM)-related parasomnias and non-REM (NREM)-related parasomnias. Although parasomnias are nightime phenomena, there are indications that they may also have an impact during the daytime through a variety of manifestations. The aim of the study is the investigation of neuropsychological and emotional profiles of parasomnia patients.

Methods: We have recruited 30 patients diagnosed with parasomnia (REM or NREM) and 30 healthy controls. Patients were assessed for one night by performing a polysomnography and by sleep interview; standardized questionnaires were used to assess neuropsychological and emotional measures for all participants.

Results: Among the patients 17 had a REM parasomnia and 13 had a NREM parasomnia. The majority (91.7%) of patients were males. The mean age of the patients was 52.7 years (SD = 20.5). The majority of the controls were males (90%). The mean age of the controls was 53.3 years (SD = 10.6).Patients diagnosed with parasomnias, compared to healthy controls, seem to have difficulties on visual scanning, attention and processing speed (TMT A) $p = 0.001$; to be more depressed (BDI & DASS scale) $p < 0.001$; to experience more anxiety and stress (DASS) ($p < 0.001$)and to be more worried (PSWQ) ($p < 0.001$). Also, patients with parasomnias scored higher on attentional and motor impulsiveness (BIS-11) ($p < 0.001$).

Conclusions: Parasomnia patients manifest neuropsychological and emotional alterations compered to healthy controls. These findings are of importance in understanding the daytime profile of patients with parasomnias.

Disclosure: No

P456 | Severity of REM sleep without atonia is associated with higher risk of cognitive impairment and depression in REM sleep behavior disorder

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Objective/introduction: REM sleep behavior disorder (RBD) represents a prodromal condition of alpha-synucleinopathies, mainly Parkinson's Disease (PD) and Dementia with Lewy Body (DLB), and it is often associated with cognitive impairment. REM sleep without atonia (RSWA) is considered the neurophysiological hallmark of RBD, and its severity has found to progress overtime. We aimed to correlate RSWA with neuropsychological data in patients with RBD both isolated RBD (iRBD) and associated with PD (PDRBD), in order to assess whether higher degrees of RSWA are related to poorer cognitive and behavioral functioning.

Methods: A total of 142 patients (93 male, median age 66.9 years, range 62.0–73.3) were enrolled, namely 48 patients with iRBD (36 male, median age 71.0 years, range 67.0–76.0), 55 PDRBD (36 male, median age 65.0 years, range 61.8–70.0), and 39 patients with PD without RBD (PDnoRBD) (21 male, median age 63.0 years, range 57.3–70.0). All participants underwent a full-night attended video-polysomnographic recording in sleep laboratory, clinical and neuropsychological assessment, including evaluation of global cognitive functions, visual-constructional abilities, short-term verbal memory, working memory, visuo-spatial and visuo-perceptual abilities, executive functions, depression, anxiety and aggressiveness. RSWA was quantified according to two manual scoring methods (Montréal, SINBAR) and one automated method (RAI). The relationship between neuropsychological data and RSWA metrics was assessed by multiple linear regression analysis and logistic regression models.

Results: iRBD patients showed higher age and lower score in Non-motor symptoms questionnaire and UPDRS II, III, IV and total score compared to the other groups. IRBD patients showed significant lower visuospatial functions and working memory, compared to the other groups. In iRBD more severe RSWA was associated with higher risk of reduced visuospatial abilities (OR 0.15), working memory (OR 2.48), attention (OR 2.53) and semantic fluency (OR 0.15). In the whole RBD group, higher RSWA was associated with an increased risk for depressive symptoms (OR 3.6).

Conclusions: RBD is a heterogeneous clinical and neurophysiological condition. Greater severity of RSWA seems to be associated with an increased risk for poor cognitive performance and depressive mood in patients with RBD. RSWA quantification combined with neuropsychological evaluation might be useful to stratify RBD phenotype.

Disclosure: No

P457 | Multilingual validation of the international RBD study group symptom severity scale (RBDSSS)

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Introduction: There is currently no standard scale to assess clinical severity of REM Sleep Behavior (RBD) symptoms. To meet this need, the RBD Severity Scale (RBDSSS) was designed by the International RBD Study Group for use in clinical settings as well as clinical trials.
The study aimed to assess the psychometric properties of the RBDSSS, such as internal consistency, concurrent validity (e.g. correlation to the Clinical Global Impression of Severity, CGI-S), and test-to-test reproducibility in RBD patients and their bedpartners.

Methods: RBD patients and their bedpartners, when available, completed the RBDSSS at baseline and after one week, together with the CGI-S. Both patient (RBDSSS-PT) and bedpartner (RBDSSS-BP) versions of the scale consist of 3 core dimensions, namely vocalizations, body movements, and injury. In the patient version, dream content/nightmares are also evaluated. For each dimension, the frequency and the severity/impact of the behavior during the previous month are assessed. The total score is obtained by multiplying frequency by severity scores for each dimension, and summing these for the individual RBDSSS-PT (max score = 54) and RBDSSS-BP (max = 38). We assessed internal consistency using Chronbach α, concurrent validity by means of non-parametric Spearman's rank correlation coefficient, and test-to-test reproducibility using Lin coefficient.

Results: A total of 136 RBD patients (108 M, mean±SD age: 69.8 ± 6.9 years, median (interquartile range, IQR) RBD symptoms duration: 8[4–11]), including $n = 99$ isolated RBD and $n = 37$ symptomatic RBD ($n = 33$ Parkinson's Disease, $n = 2$ Multiple System Atrophy and $n = 2$ Narcolepsy), together with $n = 51$ bedpartners, were enrolled in 8 sleep centers across France ($n = 103$) and Italy ($n = 84$).The median (IQR) for RBDSSS-PT and RBDSSS-BP was 8(4–14) and 9(4–13), while CGI-S and CGI-BP were 3(3–4) and 4(3–4) respectively. Internal consistency was acceptable for RBDSSS-PT (Chronbach α:0.75), poor for RBD-BP (Chronbach α:0.51). Concurrent validity (e.g. correlation with CGI) was good for both RBDSSS-PT ($r = 0.70$, $p < 0.0001$) and RBDSSS-BP ($r = 0.67$, $p < 0.0001$). Reproducibility was high for RBDSSS-PT (rho = 0.90) and good for RBDSSS-BP (rho = 0.77).

Conclusion: Both the patient and bedpartner version of the RBD Symptom Severity Scale showed a good validity and reproducibility, providing a useful tool to test the severity of RBD symptoms in clinical and research settings.

Disclosure: No

P458 | Sexual abuse and its impact on nightmares in young adolescents

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Objectives/Introduction: Nightmares are frequently reported by victims of trauma. Although several studies have investigated the impact of childhood sexual abuse on sleep disorders, including nightmares, in adult populations, little empirical work has addressed this link in adolescent populations. We used multivariate logistic regressions to investigate nightmare frequency in a large sample of teenagers presenting with or without a history of sexual abuse.

Methods: 402 teenagers (355 girls, 47 boys, mean age = 15.9 ± 0.9 years) reporting a history of sexual abuse and 402 non-victims matched for age and gender were selected from a representative stratified cluster sample of 8194 teenagers as part of a larger investigation on the prevalence of interpersonal violence and associated risk factors and mental health outcomes in the province of Quebec, Canada. Participants were required to report their nightmare frequency over the past 6 months on a Likert scale ranging from 0 (never) to 4 (very often).

Results: 72.4% of the total sample of 804 participants (N = 582) reported having nightmares over the previous 6 months: 59% reported having nightmares rarely, 21% sometimes, 8% often and 12% very often. Nightmare frequency was grouped into two categories (never-rarely and sometimes or more) to form an outcome variable while gender, age, sexual abuse victimization, intra-family sexual abuse, and number of other traumas were included in one block as predictor variables. The resulting model was significant, explained 20% of the variance in nightmare frequency, and correctly classified 75% of all participants. Female gender (OR = 2.36, 1.31–4.27), sexual victimization (OR = 8.36, 5.52–12.64), intra-family sexual abuse (OR = 0.62, 0.40–0.098) and number of other interpersonal traumas experienced (OR = 1.19, 1.07–1.31) emerged as significant independent predictors of nightmare frequency, while age was not a significant predictor.

Conclusions: Nightmare frequency in teenagers is associated with female gender, sexual victimization, intra-family victimization and number of traumas.

Disclosure: No

P459 | Neuropsychological changes in isolated REM sleep behavior disorder: a systematic review and meta-analysis of cross-sectional and longitudinal studies

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Introduction: The identification of early biomarkers in isolated rapid eye movement (REM) sleep behavior disorder (iRBD) patients is of utmost importance, as this sleep disorder is recognized as a prodromal stage of synucleinopathies. Cognitive performance worsens over time in iRBD patients, suggesting that neuropsychological profile could play a role as a prodromal marker. Up to now, despite the presence of multiple studies addressing this issue, results are highly heterogeneous, and their impact is frequently reduced by small sample sizes. Indeed, a neuropsychological profile associated with subsequent phenoconversion has not yet been clearly identified.

Objectives: The aim of this meta-analysis is twofold: (a) to assess cognitive impairments in iRBD patients in comparison to healthy controls (HC); (b) to quantitatively estimate the risk of developing a neurodegenerative disease in patients affected by iRBD according to baseline cognitive assessment.

Methods: Cross-sectional and longitudinal studies were searched from PubMed, Web of Science, Scopus, and Embase databases. Using random-effect (RE) modelling, we performed a meta-analysis on the differences in cognitive domains between iRBD patients and HC. Moreover, we employed a survival analysis to identify the baseline neurocognitive profile associated with phenoconversion.

Results: A total of 86 studies, including 75 cross-sectional and 11 longitudinal studies, were selected. With regards to cross-sectional studies, 2,398 HC and 2,460 polysomnography (PSG)-confirmed iRBD patients were included. Concerning longitudinal studies, 495 PSG-confirmed iRBD patients were included.

Cross-sectional studies showed that iRBD patients performed significantly worse in global cognition (RE model = −0.69), memory (RE model = −0.64), and executive function (RE model = −0.50) domains in comparison to HC. The survival analyses conducted for longitudinal studies provided an estimated risk of phenoconversion for iRBD patients of 73.7% at a 7-year follow-up. Notably, lower executive function and language performance, as well as the presence of mild cognitive impairment (MCI), at baseline were associated with an increased risk of conversion at follow-up.

Conclusions: Our study underlines the importance of a comprehensive neuropsychological assessment in the context of iRBD, encouraging future longitudinal studies to identify cognitive trajectories useful to predict the development of different forms of neurodegeneration in this disorder.

Disclosure: No

P741 | Pupillary light reflex in the early stages of progression to alpha-synucleinopathies: A preliminary cross-sectional study in isolated REM sleep behaviour disorder patients

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Objectives/Introduction: Previous pupillometric studies reported early cholinergic deficits in Parkinson's Disease (PD) and Alzheimer's Disease patients. Isolated rapid eye-movement sleep behaviour disorder (iRBD) has been recognized as an early stage of neurodegenerative diseases, mainly PD. Of note, cholinergic denervation has also been reported in iRBD patients. Given these premises, the aim of the present study was to evaluate cholinergic dysfunction in patients with iRBD. To this end, a portable pupillometer was used to assess changes in the Pupillary Light Reflex (PLR) of these patients compared to healthy controls (HC).

Methods: 24 polysomnography-confirmed iRBD patients (29.2% females; mean age: 69.04 ± 8.67) and 7 HC (57.1% females; mean age: 60.71 ± 10.01) were involved in the present study. All participants underwent a comprehensive clinical evaluation, which included neuropsychological and pupillometric assessments. Based on neuropsychological performances, the possible presence of mild cognitive impairment (MCI) was evaluated, resulting in 13 iRBD patients with MCI (iRBD+MCI; 54.5% females; mean age: 70.36 ± 8.87) and 11 iRBD patients without MCI (iRBD-NMCI; 7.7% females; mean age: 67.92 ± 8.69). The pupillometric evaluation was performed by means of the portable pupillometer "NeuroLight" (version 1.16 – IT; IDMED, France). Ten acquisitions for each subject were recorded. Using these data, the following parameters were obtained: baseline pupil diameter (mm), pupil diameter variation after flashlight presentation (mm and percentage), latency of pupil's reaction to light (ms) and maximum constriction velocity (VCmax; mm/s). Data of the two groups were compared adjusting for age and gender.

Results: iRBD patients showed a significantly altered PLR compared to HC in all parameters ($p < 0.001$), except for the latency parameter. Specifically, iRBD showed significantly higher pupil diameter variation, lower baseline pupil diameter and lower VCmax compared to HC. Furthermore, when comparing these parameters between iRBD+MCI and iRBD-NMCI, we observed no statistically significant difference between these two groups. Of note, both iRBD+MCI and iRBD-NMCI showed significantly altered PLR compared to HC ($p < 0.05$).

Conclusions: The present study showed an alteration in PLR of iRBD subjects. These preliminary findings suggest that pupillometry may represent a possible supportive tool in the detection of early cholinergic dysfunction in the progression to alpha-synucleinopathies.

Disclosure: No

P742 | How to COVID-19 affected sleep talking episodes?

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Introduction and objectives: Current literature documents the negative effect of COVID-19 on sleep and mental health. The drastic changes in nocturnal and diurnal habits increase symptoms of stress, anxiety and depression, and low sleep quality and sleep hygiene. The symptoms listed and sleep are closely related, and it has been repeatedly demonstrated how stressful factors and/or bad sleep habits can affect parasomnia behaviours. The high prevalence of nightmares during the pandemic period could reflect this relation. However, the studies focusing on the influence of COVID-19 on other parasomnias are scarce. We present a preliminary study focusing on the impact of the pandemic on Sleep Talking (ST).

Method: We recruited $N = 29$ participants with frequent ST ($F = 23$; age mean: 23.48) during the pandemic (January 2021–October 2021) and selected $N = 27$ participants with frequent ST episodes (STs) ($F = 21$; age mean: 23.55) from a previous study conducted during a pre-COVID period (from 2017 to 2018). The inclusion criteria were:

1. Frequent STs, as reported in the Munich Parasomnia Questionnaire (score of 5–7 on the item related to STs);
2. Absence of medical conditions;
3. Absence of other sleep disorders except for ST;
4. No drug or alcohol abuse.

For seven days, all participants performed home monitoring. They were instructed to complete sleep logs and audio-recorded their vocal activations.

Results: The results showed a higher STs frequency in the ST group during the pandemic (Mann-Whitney $U = 543.000$; $p = 0.013$). Moreover, we found a positive correlation between STs and the intra-night wake (WASO), exclusively in the pandemic group ($rho_s = 0.388$; $p = 0.037$). However, there were no differences in the sleep variables between the two groups.

Conclusion: The influence of stressful factors on ST is poorly understood. The pandemic group produced more STs than the pre-pandemic group. Consistently with the literature, this result could reflect the stressful effect of COVID-19 on the frequency of STs. Although the findings revealed no differences in sleep variables, the correlation between STs and WASO may show the indirect negative influence of COVID-19 on nocturnal sleep. Further studies should focus on the relation between ST and the pandemic trend.

Disclosure: No

P743 | Altered parasympathetic activity in idiopathic nightmare sufferers during sleep states and wakefulness under emotional arousal

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Objectives/introduction: In nightmare disorder, dysfunctional emotion regulation goes along with poor subjective sleep quality, which is characterised by pathophysiological features such as abnormal arousal processes and sympathetic influences. Dysfunctional parasympathetic regulation, especially before and during rapid eye movement (REM) phases, is assumed to alter heart rate (HR) and its variability (HRV) of frequent nightmare recallers. We hypothesised that cardiac variability is attenuated in participants experiencing frequent nightmares as opposed to healthy controls during less deep sleep stages and an emotion-evoking picture-rating task.

Methods: Based on the second nights' polysomnographic recordings of 24 nightmare disordered (NM) and 30 control (CTL) subjects, we examined HRV during pre-REM, REM, post-REM and slow wave sleep periods, separately. Additionally, electrocardiographic recordings of wakeful periods such as resting state before sleep onset and during an emotional picture-rating task were also analysed. The two groups were contrasted along three cardiac measures with repeated measures analyses of variance models and group comparisons. Only the two most reliable indicators of HRV reflecting parasympathetic activity were applied and natural log-transformed in case of abnormal distribution.

Results: According to our results, a significant difference was found in the HR of the NM and CTL groups in the nocturnal segments but not during resting wakefulness before sleep onset, suggesting autonomic dysregulation, specifically during sleep in nightmare disorder. However, despite the accelerated HR of NM subjects at night, they did not exhibit lower HRV. Regarding the emotional task, we also found a contrast between the NM and CTL subjects' HR and HRV, which might indicate altered processes of emotion regulation in nightmare disorder, but the two groups' subjective picture ratings did not differ.

Conclusions: In summary, our study suggests that there might be some trait-like autonomic changes during sleep, but also state-like autonomic responses to emotion-evoking pictures in nightmare disorder.

Disclosure: No

P744 | Sleep-related painful erections treated effectively with continuous positive airway pressure

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Objectives/introduction: Sleep-related painful erections (SRPE) is a rare parasomnia characterized by episodes of painful nocturnal penile tumescence. It is associated with sleep deprivation, anxiety and irritability. Normal non-painful erections are experienced when awake. There is no conclusive recommendation for the management of SRPE. The aim of this case study is to report the effective treatment of SRPE with auto-Continuous Positive Airway Pressure (auto-CPAP) without pharmacological intervention.

Methods: A 47-year-old man (MBI = 26.6) with no comorbidities, suffering from SRPE was referred to Sleep Disorders Center by urologist. A complete urological work up and a brain MRI revealed no abnormalities. Patient complained of poor sleep quality and snoring. He underwent an attended polysomnography (with video surveillance) after clinical evaluation. Epworth Sleepiness Scale (ESS), Pittsburg Sleep Quality Index(PSQI) and Short Form-12 Health Survey (SF-12) scores were accessed before polysomnography and 3 months after auto-CPAP therapy initiation.

Results: Patient was diagnosed with Obstructive Sleep Apnea (OSA) since an Apnea-Hypopnea Index (AHI) = 13 was recorded. Sleep Efficiency = 65,7%, restriction and fragmentation of Rapid Eye Movement (REM) sleep, REM time = 5.6% of total sleep time and minimum oxygen saturation = 90% were observed during polysomnography. CPAP therapy was initiated after auto-titration

(settings: min-max pressure = 4–12 cm H_20) and resolution of obstructive events confirmed. Auto-CPAP memory card data showed optimal compliance to therapy (patient used auto-CPAP 87% of nights / mean usage: 5 h 20 min). Both frequency and intensity of SRPE gradually decreased during a period of 3 months follow-up, with maintenance of normal sexual function. Patient reported improvement in quality of sleep (PSQI in 1st evaluation = 9 vs PSQI in follow-up evaluation = 4) and in sleepiness (ESS in 1st evaluation = 11 vs ESS in follow-up evaluation = 7). No difference in SF-12 score was noted during the follow-up period.

Conclusion: SRPE were effectively treated with auto-CPAP therapy. Patient reported reduction in frequency / intensity of SRPE episodes and improvement in quality of sleep and sleepiness.

Disclosure: No

P745 | Actigraphy - a potential follow up tool in isolated RBD

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Biomarker for disease progression and conversion in isolated REM sleep Behavior Disorder (RBD) are in the centre of clinical and basic research. This "ideal biomarker must be highly sensitive and specific, reproducible, cost-effective, readily available" (Miglis et al International RBD study group 2021).

This desciption could apply to actigraphy.

In our case of a 58 year-old patient two actigraphy recordings were done: one in 2016, one year after diagnosis of i-RBD and one in 2020 2 years after conversion to Parkinson's disease.

The patient first presented to our sleep clinic in 2013 with a severe obstructive sleep apnea syndrome (AHI 71/h, Epworth 4/24) diagnosed during a screening in the context of severe obesity (BMI 38 kg/m2).

Despite being efficiently treated with PAP-therapy he started complaining about fatigue and sleepiness (ESS 13/24) in 2016.

Sleepiness remained important (ESS 9/24) after PAP-therapy adjustment and the patient reported a decline in his cognitive abilities.

In 2017 for the first time he reported regularly vivid dreams and out-acting occuring since 2015. Polysomnography detected REM-Sleep without atonia (RSWA) > 27% in REM-phases without respiratory events leading to the diagnosis of i-RBD.

By the end of 2017 an intermittent tremor of the left hand and a hypokinesis of the left upper limb became apparent and the patient was diagnosed with Parkinson's Disease.

Retrospectively we compared actigraphy recordings from 2016 and 2020 showing a reduction of the mean maximal diurnal activity amplitude to one third of the initial values.

The activity pattern was established using mean activity values over 7 days (2016) respectively 14 days (2020) (Motionwatch®).

According to Feng et al in 2020 rest-activity pattern alterations can be detected using actigraphy prior to phenoconversion from isolated RBD to the full alpha-synucleinopathy.

We can only suspect that further actigraphy recordings in between would have shown a gradual reduction of the activity amplitude over the years.

Our case report underlines the potential important role of this comfortable and easily applicable tool as a follow up parameter and in the future potentially as part of a disease progression biomarker set.

Disclosure: No

P746 | The prospective bernese RBD cohort – study protocol

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REM sleep behavior disorder (RBD) is a parasomnia, characterized by enactment of vivid and violent dreams. The pathophysiological cause is the malfunctioning of brainstem neurons responsible for muscle atonia during REM sleep. In isolated RBD (iRBD), deposits of α-synuclein lead to neurodegeneration in this brainstem region. Therefore, iRBD is considered an early stage of α-synucleinopathies. Little is known on development of RBD symptoms (frequency, severity) over the course of the disease and its relevance to the individual's risk of phenoconversion.

Quantification of individual phenoconversion risk is important for iRBD patient counselling in regard to disease prognosis and future clinical trials on disease modifying therapies. In recent years, numerous parameters were subject to investigations on their potential role as a diagnostic, prognostic, monitoring or therapy-response biomarker in iRBD. Determination of a single or combined biomarker is currently the goal of intense international research effort.

In order to contribute to this effort we established the prospective Bernese RBD cohort study with the main goal to expand knowledge on course of the disease and its symptoms.

Our single-centre observational study conducted at the Sleep-Wake-Epilepsy Centre of the University Hospital of Berne, Switzerland wants to monitor and measure dream enactment behaviour in RBD longitudinally.

We plan to include 70 patients over a 5-year period, followed by yearly consultations during a follow-up period of minimum 5 years.

Methods comprise questionnaires documenting RBD symptom frequency and intensity complemented by objective monitoring with wearable devices in an ambulatory setting.

Furthermore, established clinical, paraclinical (polysomnography, imaging, blood analysis) and genetic parameters associated with increased phenoconversion risk will be systematically collected at baseline as well as longitudinally in order to contribute to their validation.

The study will deepen our understanding of RBD symptom development over the course of the disease and will contribute to the evaluation of RBD symptom severity as a biomarker for phenoconversion risk.

Disclosure: No

18: SLEEP DISORDERS - MOVEMENT DISORDERS

P145 | Clinical, polysomnographic, and histopathological characteristics of isolated and antidepressant-related REM sleep behaviour disorder

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Introduction: Isolated REM sleep behaviour disorder (iRBD) most often foreruns alpha-synuclein neurodegenerative disorders but may be triggered by antidepressant drugs (pharmacologically induced RBD, pRBD). Distinguishing pRBD from iRBD is challenging, being antidepressants commonly prescribed in prodromal stages of synucleinopathies for comorbid depression.

We present a retrospective observational cohort study, investigating clinical, polysomnographic, instrumental, and histopathological features of iRBD and pRBD.

Methods: Patients with polysomnographically-defined iRBD and no signs of neurodegeneration were included, 10 taking antidepressants before the onset of RBD (AntiD+RBD) and 29 antidepressant-free (AntiD-RBD). All patients underwent skin biopsy for immuno histochemical detection of intraneuronal phosphorylated alpha-synuclein (P-A-SYN). Clinical characteristics of RBD, complaint of hyposmia, cognitive impairment, psychiatric symptoms, symptoms of dysautonomia, MDS-UPDRS-III score, DAT-SPECT result, REM atonia index (RAI) and sleep macrostructure were collected. The same features were compared combining antidepressant assumption with skin biopsy result (SYN+/-) in four groups of patients: AntiD+/SYN+, AntiD+/SYN-, AntiD-/SYN+, AntiD-/SYN-. Chi-square test was used to compare frequencies of nominal variables, non-parametric test for independent samples was used to compare median values of continuous variables.

Results: Compared to AntiD-RBD, AntiD+RBD patients were more frequently females (50% vs 13.2%, $p = 0.019$), complained more frequently psychiatric symptoms (100% vs 13.8%, $p < 0.001$). More AntiD-RBD reported violent dream-enactment behaviours (88.9% vs 40%, $p = 0.02$), and falls from bed during sleep (73.7% vs 33.3%, $p = 0.041$). Skin biopsy tested positive for P-A-SYN in 93.1% of AntiD-RBD vs in 30% of AntiD+RBD ($p < 0.001$). No significant differences were detected in the other clinical, PSG and neuroimaging parameters. Considering combined groups (3 AntiD+/SYN+, 7 AntiD+/SYN-, 27 AntiD-/SYN+, 2 AntiD-/SYN-), RAI was significantly different between groups (0.716 ± 0.126 in AntiD+/SYN-, 0.497 ± 0.160 in AntiD-/SYN+, 0.311 ± 0.167 in AntiD+/SYN+, and 0.270 ± 0.097 in AntiD-/SYN-, $p = 0.035$).

Conclusions: In this cohort, cutaneous intraneuronal P-A-SYN is rare in AntiD+RBD compared to AntiD-RBD. AntiD+RBD patients presented less thriving dream-enactment behaviours and, if considering AntiD+RBD with positive P-A-SYN as iRBD instead of pRBD, less pronounced loss of REM atonia. These features could represent useful diagnostic biomarkers allowing early distinction of pharmacologic and neurodegenerative iRBD. Otherwise, as some authors claimed, antidepressants could precociously unveil degenerative iRBD before other features of synucleinopathy appear.

Disclosure: No

P146 | A prospective case-control study of excessive fragmentary myoclonus in sleep and electrophysiological work-up

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Introduction: Excessive fragmentary myoclonus (EFM) is listed in the ICSD-3 in the section of "Sleep Related Movement Disorders". It's clinical significance is still unclear, although in a proportion of patients, an association with peripheral nerve impairment has been suggested. We aimed to evaluate peripheral nerve pathology in sleep lab patients with video-polysomnography (VPSG) documented EFM and controls.

Methods: Two-hundred consecutive patients with VPSG documented EFM according to ICSD-3 criteria and 100 controls without EFM, matched for age-, sex- and presence of sleep-related breathing disorder, were included. All patients underwent motor and sensory nerve conduction studies. Electromyography was done in 179 patients and 91 controls.

Results: Periodic leg movements during sleep (PLMS) were found significantly more often in patients (131/200 [65.5%] vs. 45/100 [45%]; $p = 0.001$). Rapid eye movement (REM) sleep, measured as % of sleep period time (SPT), was reduced in patients (median [interquartile range, IQR]; 16.1 [11–19.8] %/SPT vs. 18 [13.3–21.8] %/SPT; $p = 0.012$). Median PLMS-index (20.2/h [6.9–46.5] vs. 11.5/h [5.3–27.2]; $p = 0.005$) and Apnea-Hypopnea-Index (AHI) (6.9/h [2.5–13.9] vs. 4.4/h [1.6–10.9]; $p = 0.049$) were higher in patients. In the EFM group electrophysiological work-up demonstrated polyneuropathy (PNP) (63/200 [31.5%] vs. 21/100 [21%]) or nerve root lesions at level L5 and S1 (10/200 [5%] vs. 0/100) significantly more often compared to controls ($p = 0.003$).

Conclusions: This case-control study confirms the previously reported relationship between EFM and peripheral nerve pathology, PLMS as well as sleep related breathing disorder, the latter only of minor extent.

Disclosure: No

P147 | Actigraphy enables home screening of REM behavior disorder in Parkinson's disease: Preliminary data

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Objectives: REM sleep behavior disorder (RBD) is a parasomnia affecting up to 70% of patients with Parkinson's disease. This disorder is often overlooked in routine clinical practice. Identifying and treating RBD is critical to prevent severe injuries, both to patients and bedpartners. Current diagnosis relies on nocturnal video-polysomnography, which is an expensive and cumbersome exam requiring specific clinical expertise. Here, we explored the use of wrist actigraphy to enable automatic RBD diagnoses in home settings.

Methods: Twenty-six Parkinson's patients underwent two-week home wrist actigraphy worn on their most affected arm, followed by two in-lab evaluations. Patients were classified as RBD vs. non-RBD based on dream enactment history and video-polysomnography. We comprehensively characterized patients' movement patterns during sleep using actigraphic signals. Both (i) the characteristics of single, isolated movement episodes, and (ii) global movement patterns over the course of each night were considered. We then trained machine learning classification algorithms to discriminate patients with or without RBD using the most relevant features. Classification performance was quantified with respect to clinical diagnosis, separately for in-lab and at-home recordings.

Results: Overall, twenty-nine features were extracted. To verify the degree of separability (RBD vs no-RBD patients) captured by the extracted features, we further computed principal component (PC) analysis on this 29-dimensional feature representation. Actigraphic features related to both global nocturnal activity and individual movement episodes were critical to characterize RBD. Parkinson's patients with RBD were more active overall, and exhibited movements that were shorter, of higher magnitude, and more scattered in time. Using these features, we compared the performance of different classification algorithms, which consistently yielded a high prediction accuracy (mean performance 89.6%). During in-clinic tests. the best classification algorithm reached an accuracy of 92.9 ± 8.16%. When validated on home recordings, accuracy rose to 100% over a two-week window. Features showed robustness across tests and conditions.

Conclusions: These results open new perspectives for faster, cheaper, and more regular screening of sleep disorders, both for routine clinical practice and clinical trials.

Disclosure: No

P148 | Disrupted sleep due to neck myoclonus can interfere with emotion regulation

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Study Objectives: Neck myoclonus (NM) impaires sleep continuity, but its clinical relevance is still unknown. Our aim was to ascertain, how NM events interferes with subjective sleep quality or contribute to daytime fatigue/sleepiness or mood changes.

Methods: The study sample consists of 46 subjects (30 males, mean age 31.4 ± 8.3; range 20–53 years) who present neck myoclonus on video-polysomnography. All of them filled in PSQI, FSS, ESS and BDI-II questionnaires and underwent video-polysomnographic examination, during which NM and associated events were manually scored.

Results: Findings show higher NM prevalence in REM sleep than in NREM sleep (86.7% vs. 13.3%, $p < 0.001$). The NM detected on video-polysomnography, was followed by vocalization in one case; 33.04 % were associated with limb/body movements; 32.02 % with arousals and 11.55 % with awakenings. Although RSWA was not observed, a total of 65 % of patients reported history of vivid negative or aggressive dreams. The total number of myoclonus was correlated with BDI-II ($p = 0.030$), as well as NM events in REM sleep ($p = 0.034$) and NREM sleep ($p = 0.044$). No correlation NM with macrostructural PSG parameters or PSQI, FSS, ESS scores was found.

Conclusions: Despite significant disruption of sleep structure, NM in most cases neither contributes to subjectively impaired sleep quality or daytime fatigue/sleepiness, nor does it convincingly alter the sleep macrostructure. However, it may lead to increased negative dream recall and interfere with emotion regulation.

Disclosure: No

P149 | Content analysis of Korean videos regarding restless legs syndrome on YouTube

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Objective/introduction: To evaluate the accuracy and quality of Korean videos associated with restless legs syndrome (RLS) on YouTube.

Methods: A YouTube search was performed on April 1, 2020 using the term "restless legs syndrome" in the Korean language. Two reviewers coded the source, contents, and demographics of the included videos. Video quality was assessed using the modified DISCERN (mDISCERN) instrument.

Results: Among the 80 videos analyzed, 44 (55.0%) were reliable and 36 (45.0%) were misleading. There was a trend toward a higher number of mean daily views in the misleading videos compared to the reliable ones. Most of the misleading videos (72.2%) advocated complementary and alternative medicine as a primary treatment for RLS. Although the reliable videos had higher mDISCERN scores than the misleading videos, the overall quality of the reliable videos was low.

Conclusion: Many Korean videos regarding RLS on YouTube involved a risk of exposure to misinformation and were of unsatisfactory quality.

Disclosure: No

P150 | Prevalence and risk factors for sleep disorders in people with Parkinson's disease

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Objectives/introduction: Sleep disturbances are commonly reported by people with Parkinson's disease (PwPD). The aim of this study is to assess the prevalence of sleep disorders and their risk factors in PwPD.

Methods: Prospective study on 89 PwPD. We used the following assessment tools: Hoehn and Yahr staging, UPDRS part III, Parkinson‘s disease sleep scale version two (PDSS-2), SCOPA-Sleep, Epworth Sleepiness Scale (ESS). A specific sleep questionnaire was designed and applied.

Results: There were 50 men (56.17%), with the mean age of 62.13 ± 17.86 years. All patients reported at least one sleep disturbances; 58.42% complained of two different sleep symptoms and 29.21% reported more than three different sleep problems. Over 46% patients had a PDSS score >15. The most prevalent sleep symptom was insomnia (85.39%), followed by vivid dreams and possible abnormal motor behavior during sleep (66.29%), excessive daytime sleepiness (58.42%), and restless legs syndrome (35.95%).

Severity of sleep complaints and their frequency correlated with disease severity and duration. There was an increase in the severity of sleep disturbances with the Hoehn and Yahr stage.

Conclusions: Sleep disorders were encountered in all stages of Parkinson's disease, with a higher prevalence and increased severity in the advanced stages.

Disclosure: No

P460 | Facial activity and muscle tone during sleep in patients with multiple system atrophy and parkinson's disease

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Introduction: Sleep state dissociation is the simultaneous presence of characteristics from different states of being during sleep. Parkinsons'-Disease (PD) and Multiple System Atrophy (MSA) patients may present with complex sleep state dissociation, including REM Sleep Behavior Disorder (RBD). Motivated by the fortuitous observation of a facial muscle activity during routine nocturnal video-Polysomnography (vPSG) in some patients with MSA, we aimed to assess facial muscle activity and chin muscle tone during sleep in MSA compared to PD and healthy controls (HC).

Methods: We retrospectively analysed 62 vPSG (11 MSA, 38 PD, 13 HC). RBD have been diagnosed in 10/11 (90%) MSA and 25/38 (63%) PD patients. Full-night video-recordings were examined by a sleep expert blinded to clinical condition and sleep stage. Facial movements were classified into six categories: “Eyes closing/opening”, “Eyebrows frowning”, “Raising of eyebrows”, “Smiling”, “Other mouth movements” and “Strained face”, a particular expression involving both superior and inferior part of the face, resulting in a scrunched-up expression. Chin EMG activity during both REM and NREM sleep was quantified using a validated automatic method, the Atonia-Index (AI).

Results: During both NREM and REM sleep, pairwise comparison showed an increased number of all type of facial movements in MSA compared to HC. During NREM, the frequency of facial movements did not differ between MSA and PD patients, except for “Strained face” ($p = 0{,}004$) that was higher in MSA patients. This type of activity was also more frequent during REM sleep in MSA patients, even after controlling for the presence of RBD ($p = 0{,}03$). A lower AI was found in MSA compared to HC during all sleep stages, while no difference was observed between PD and HC. Compared to PD, MSA patients showed lower AI during N1($p = 0{,}02$) and N2 ($p = 0{,}02$) after adjusting for presence of RBD.

Conclusion: Facial movements during sleep are frequent in MSA, particularly “strained face” which appears to be a hallmark of this condition.

The presence of both increased facial activity and elevated muscle tone during all stages of sleep in MSA may be two manifestations of sleep state dissociation, reflecting a more severe neurodegenerative process.

Disclosure: No

P461 | Distractive strategies to improve symptoms of restless legs syndrome

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Background and objectives: Symptoms of restless legs syndrome (RLS) are partially or completely relieved by movement. Whether a distractive task also decreases sensory discomfort remains unclear in RLS. Our objectives are to assess the frequency of patients with RLS who report decreased sensory discomfort during non-motor activities, and quantify this decrease during a cognitive task in controlled condition.

Methods: Consecutive adults with primary RLS recruited at sleep/wake unit of Montpellier (France), answered the question "Does the intensity of your RLS symptoms decrease when you perform activities other than moving your legs?" rated on 9-point Likert scale (from fully-agree to totally-disagree). Excluding criteria were secondary RLS and international restless legs study group severity scale <15. Socio-demographic characteristics, insomnia, depressive symptoms and the Urgency, Premeditation, Perseverance, Sensation seeking (UPPS) impulsive behavior scale were assessed. A subgroup of 65 patients underwent an 80-min suggested immobilization test (SIT) at 8 PM to quantify legs discomfort on a visual analogue scale before polysomnography, including 40 patients performing a cognitive task (balloon analogue risk task) from the 60^{th} to 80^{th} min of the SIT.

Results: Overall, 358 patients with RLS (age 55.17 ± 14.62 years; 200 women, 99 treated for RLS) were included. A total of 130 (36.31%) patients reported a decrease, 158 (44.13%) no decrease, and 70 (19.55%) uncertain changes in severity of RLS symptoms during a non-motor activity, with a similar proportion whether treated or not. Patients experiencing a decrease had less severe RLS symptoms, and more urgency dimension on UPPS impulsive behavior scale. In the 80-min SIT, mixed-effect regression models showed that legs discomfort decreased in patients performing the cognitive task while it continued to increase in those with no task, with larger difference in patients reporting a decrease by questionnaire during non-motor activities.

Conclusions: One third of patients reported a decrease of RLS symptoms during non-motor activities. For the first time, this improvement in RLS was confirmed during a sustained cognitive task. Distractive strategies could be implemented for the management of RLS.

Disclosure: No

P462 | Treatment compliance appears unrelated to dental guard types in sleep-related bruxism

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Objectives/Introduction: Sleep-related bruxism (SB) is a sleep-related movement disorder with repetitive (phasic, tonic or mixed) jaw muscle contractions. SB has previously shown clinical impact on daytime fatigue and sleep quality, going way beyond the consideration of teeth wear. First-line recommended treatment strategies of SB, mainly rely on the use of prosthetic dental guards which differentiate regarding their composition, structure and potential comfort (rigid, flexible, semi-rigid). Till present, there are also no clear cut guidelines of which mouthpiece type will suit which SB patient best. Correspondingly, therapeutic compliance with respect to dental guard types remains unexplored. Given potentially different wearing comforts, we hypothesize that different types of dental guards will impact treatment adherence, compliance rates and secondarily therapeutic outcome measures.

Methods: Within a prospective study, we initially recruited 90 SB patients treated with a dental guard for at least 1 month before entering the study. SB diagnosis was based on thorough oro-dental investigations. Polysomnography was used as a confirmatory examination. Patients were non-randomly (clinically) assigned to either flexible/semi-rigid or to rigid dental guards (all guards were fully customized and individually tailored). The observational follow-up period was 15 months. The final sample retained 32 SB patients (12 with rigid and 20 with semi-rigid dental guards). Compliance rates of nights per week and h per night were self-recorded. Perceived sleep quality and associated daytime symptoms were assessed by means of structured clinical scales.

Results: Demographics of both groups were similar. The average compliance rate of nights per week were 6.2 h(+/−1.4) and 6.6 h(+/−0.8) for the rigid and semi-rigid groups respectively. Total treatment duration and compliance rates were positively correlated ($p = 0.05$). Symptom intensity levels (sleepiness, fatigue, mood, anxiety, insomnia index) did not show statistically significant differences between groups. Explorative correlations between perceived sleep quality and compliance were also not significant.

Conclusions: Treatment guidelines of SB, with respect to types of dental guards, remain till present controversial and without clear consensus. The used type of guard did not show to significantly impact therapeutic outcome measures in our sample. The similar compliance rates and overall therapeutic adherence were satisfactory and encouraging in both groups.

Disclosure: No

P463 | Comparing sleep quality and daytime fatigue in movement disorders

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Objectives/Introduction: Daytime fatigue and sleepiness are bound to different underlying phenomena, implying different relations to sleep. Therewith, the necessary semantic and semiological distinctions also bear consequences for eventual treatment strategies. In contrast to excessive daytime sleepiness, chronic fatigue has mostly been considered to be of a more complex nature on one hand and quite largely unrelated to sleep per se in most conditions, on the other. Nonetheless, several recent studies suggested fatigue rather than sleepiness as being a possible major symptom of patients presenting with movement disorders like sleep-related bruxism (SB). Fatigue severity has also previously been reported as a gender-independent complaint solely in periodic limb movements during sleep (PLMS). We hypothesize that fatigue and associated complaints, present with similar symptom intensities across such different movement-related sleep disorders.

Methods: Within a retrospective study-design, we compared 36 pure PLMS without clinical diagnosis of restless leg syndrome (RLS) and 18 pure SB patients (without RLS and/or PLMS), both also without any other comorbid sleep disorder, to 31 good sleeper control (GSC) subjects. All subjects underwent hospital-based polysomnography (psg). Clinical symptoms (i.e., fatigue, sleepiness, perceived sleep quality, affective symptoms) were assessed by means of validated structured symptom-scales. Explorative correlations were used to investigate associations between psg-derived parameters and clinical indicators.

Results: Both clinical groups displayed significantly higher symptom levels than GSC on all clinical scales (all $p < 0.01$). Fatigue intensity, perceived sleep quality impairment and affective symptoms were however similar for SB and PLMS patients. While significantly differing from controls, sleep-structure related variables (sleep time and efficiency, NREM and REM durations, arousal index) also appeared to be similar between patient groups.

Conclusions: Movement disorders during sleep, like PLMS and SB may not only present with similar structural sleep variables. Indeed, it also appears that such two distinct clinical conditions may lead to similar types of daytime complaints with similar symptom intensities. Non-restorative sleep associated to daytime fatigue, but not to excessive daytime sleepiness, may be specifically more frequent in neurological movement disorders, than in other primary sleep disorders in general.

Disclosure: No

P464 | Insomnia in people with Parkinson's disease – the patients' perspective

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Objectives/introduction: Insomnia represents one of the most common complaints among people with Parkinson's disease (PwPD). The aim of this study is to evaluate the patients' perspective regarding the main causes and consequences of insomnia.

Methods: Prospective study on 89 PwPD. We used the following assessment tools: Hoehn and Yahr staging, UPDRS part III, Insomnia Severity Index (ISI), and a specific structured questionnaire.

Results: There were 50 men (56.17%), with the mean age of 62.13 ± 17.86 years. 58.42% of PwPD reported delayed sleep onset (>30 min), 52.8% accused frequent nighttime awakenings, while 13.48% reported early morning awakenings. According to the patients with insomnia, the main causes for delayed sleep onset were lack of activity during daytime and restlessness. Nocturia (85.1%), rigidity (65.95%), pain (46.8%) and tremor (29.78%) were the most commonly reported causes for frequent awakenings during nighttime. Due to chronic insomnia (>3 months duration), most of the patients (72.36%) felt fatigued during the day. Other reported daytime consequences were sleepiness (48.68%), depression (44.73%), and anxiety (40.78%). The majority of patients (67.1%) considered insomnia as the main cause for poor sleep quality and 56.57% of PwPD need to take medications for a better sleep during night.

Conclusions: Insomnia is a major source of distress for PwPD. Neurologists should focus on the main causes and consequences of insomnia for each individual patient for a better management of this symptom.

Disclosure: No

P465 | Restless legs syndrome and mood disorders

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Introduction: Restless legs syndrome (RLS) is a sensory-motor disorder characterized by an uncomfortable sensation in the lower extremity, triggered by sitting and lying positions and release with motion. It is associated with important repercussions on the functioning of individuals, such as insomnia, drowsiness and mood disturbances.

Objectives: Analyse the clinical spectrum and polysomnography findings of patients with RLS of our sleep unit.

Methods: We analyse patients diagnosed with RLS between the years 2018–2022. Clinical history specific for sleep disorders; scores on sleep-questionnaires: Epworth Sleepiness Scale (ESS) ≥8 sleepiness mild, moderate or severe; Insomnia Severity Index (ISI) ≥ 15 clinical insomnia moderate or severe; psychological tests Beck depression inventory (BDI-II), no-mild ≤19, moderate-severe (20–63); the state-trait anxiety inventory (STAI) considered positive above 50th percentile. Polysomnography parameters according to the American

Academy of Sleep Medicine (AASM). Diagnosis of sleep disorders according to ICSD3 criteria. Descriptive statistical analysis: ANOVA, Wilcoxon and Mann-Whitney using Sigma Stat. Data displayed as (Media±DE).

Results: A total of 114 patients (48 men/66 women) with a mean age (55.31 ± 12.43) and body mass index (27.74 ± 5.43). Presenting the following antecedents of interest: hypertension 35.08%, dyslipidaemia 37.71%, diabetes 12.28%, renal insufficiency 0.87% liver disease 2.63%, migraine 5.26%, cognitive impairment 0.87%, anxiety 4.38, depression 7.01%, obstructive sleep apnea 10.52%, epilepsy 3.5%, heart disease 10.52%. In treatment with sedative antidepressants 7.8%, non-sedative antidepressants 24.56%, benzodiazepines 13.15%, melatonin 0.87%. Clinically moderate/severe chronic insomnia (59%), moderate-severe ESS scale drowsiness (37%). A statistically significant association was observed between depression (BECK) and RLS(40%), $p = < 0.001$, as well as with anxiety state STAI scale(38.7%) and trait STAI scale(47%) ($p = < 0.001$). The PSG study showed the following sleep data: Sleep latency(14.19 ± 17.11 min), total sleep time(324.17 ± 81.77 min), WASO(65.825 ± 59.50 min), stage N1(34.31 ± 24.61%), N2(173.38 ± 63.58%), N3(62.50 ± 37.59%), REM(53.23 ± 29.30%), REM Latency(118.82 ± 78,50 min), arousals Index(21.01 ± 20.77/h),-periodic leg movement index(23.49 ± 27.89/h), A/H index(18.00 ± 25.90/h).

Conclusion: In conclusion, this study has suggested that a is common coexist of mood disorders and RLS, depression and anxiety symptoms are common in adults with RLS. However, the relationship appears complex, with overlap between RLS and depression-related symptoms confounding the issue.

Disclosure: No

P747 | Leg movements in wakefulness in restless legs syndrome are associated with significant changes in spectral electroencephalography and heart rate variability

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Introduction: Restless Legs Syndrome/Willis-Ekbom disease (RLS/WED) is commonly associated with the periodic leg movements during sleep (PLMS). Electroencephalographic (EEG) activation with prominent changes in delta and other EEG bands, and an increase in sympathetic autonomic nervous system as demonstrated by the increased heart rate variability (HRV) were shown to be associated with PLMS. In this study, we investigated the leg movements occurring in wakefulness in the patients with RLS/WED during the suggested immobilization test (SIT).

Materials and Methods: The SIT was performed before polysomnography (PSG) recordings in 65 patients with RLS/WED during one-year study period. Both periodic (PLM) and isolated (ILM) leg movements were scored, and the spectral EEG changes 20 seconds before and after the leg movements and HRV analysis were performed.

Results: A total of 35 patients were females (53.8%), and 30 were males (46.2%). The mean age of the study population was 52.0 $\pm$ 12.6 years. In SIT, 49 patients (75.4%) had PLM index $\geq$40/hr (mean, 60.7 $\pm$ 18.0/hr). The index of ILM was 9.4 $\pm$ 4.2/h. In the EEG spectral analysis, an increase in theta band 2–3 s after PLM, alpha band 2–7 s after PLM, and beta band 3–10 s after PLM were significantly higher in compared to those following ILM ($p < 0.001$). The increase in HRV was present after both PLM and ILM, which was statistically similar $p = 0.771$). In patients with a PLM index$\geq$40/hr during SIT, LF ($p = 0.010$) and LF/HF ($p = 0.004$) were significantly higher, and HF ($p = 0.009$) was significantly lower in compared to those with a PLM index <40/hr in SIT.

Conclusions: Here we demonstrated that the leg movements during wakefulness in patients with RLS/WED are accompanied by significant changes in EEG activity (especially in the theta, alpha and beta bands) and by an increase in HRV. The increase in LF/HF ratio in SIT supports the presence of sympathetic activation during wakefulness, which may explain the increased risk of cardiovascular consequences in patients with RLS/WED.

Disclosure: No

P749 | Data-driven video analysis of motion behaviour during sleep in older and younger participants

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Objectives/introduction: The amount of body movement occurring during sleep is associated with sleep quality. Some sleep disorders, such as periodic limb movement disorder or rapid eye movement (REM) sleep behavior disorder are also characterized by major or minor movements. Infrared video can be used to directly characterise such restlessness as well as quantify sleep quality by measuring and characterising body motion. Here we present pilot results using AI/video-based method for the analysis of external sleep body behaviour, comparing older and younger participants.

Method: Video data were collected during an overnight 10-h laboratory sleep recording from eight older participants (65–80 years, 5 male:3 female) and eight younger (18–34 years, 6 male:2 female) participants. A block-matching algorithm was used as a motion estimation algorithm to determine major and minor movements, representing pose changes, and intra-pose motion, respectively. The algorithm was applied to video images acquired at 2 frames per second (FPS) to ensure short duration movement (<0.5 s) was also captured. Next, a data-driven analysis using k-means clustering was applied to the block matching output to automatically threshold the frames into no-movement, minor movement, and major movement. The performance of the data-driven method was compared

to manual scoring through visual inspection of the polysomnography (PSG) video.

Result: The above data-driven methodology demonstrated a sensitivity and specificity of 70.6 ± 13.4 and 90.1 ± 3.41 across both cohorts. Using this methodology the average number of minor movements observed in older and younger participants were 1570 ± 864.3 and 560.5 ± 213.1 (mean±SD) movements per 2FPS respectively which represents a statistically significant difference ($p = 0.03$). The number of major movements in older and younger participants was remarkably similar with 176.8 ± 126.4 and 154.0 ± 71.2, respectively ($p = 0.64$).

Conclusion: We have demonstrated the potential of automatically detecting body motion behaviour during sleep characterised as minor (within pose) and major (indicating pose change) motion. This approach has revealed differences in motion seen in older and younger subjects with a larger number of minor motion events and longer duration seen in the older group compared to the younger group.

Disclosure: No

P750 | The polysomnographic evaluation of sleep bruxism intensity and sleep architecture in arterial hypertension

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Introduction: Sleep bruxism being a repetitive jaw muscle activity characterized by clenching or grinding of the teeth is classified as a sleep movement disorder. In light of the fact of potential common pathomechanism of sleep bruxism (SB) and arterial hypertension as the activation of sympathetic system as well as the rise of the inflammation factors we aimed to examine the sleep bruxism intensity and sleep architecture among patients with arterial hypertension.

Methods: The authors gathered the database of 91 Caucasian adults patients among whom, 31 had arterial hypertension diagnosed according to the ESC/EHS guidelines. 61 normotensives patients were control group. Patients with obstructive sleep apnea were excluded from the study. We performed the single night polysomnographic examination in the Sleep Laboratory. Following, the results were analyzed in accordance with the guidelines of the American Academy of Sleep Medicine.

Results: The bruxism episode index (BEI) was increased in hypertensives ($n = 31$) compared to controls ($n = 60$) (4.47 ± 2.55 vs 2.03 ± 1.24, $p < 0.001$). The phasic, tonic, and mixed bruxism episodes were also increased (3.23 ± 6.09 vs. 0.79 ± 0.85, $p < 0.01$;1.69 ± 1.75 vs 0.77 ± 0.59, $p < 0.001$;1.07 ± 1.52 vs. 0.45 ± 0.43, $p < 0.01$, respectively). What is more, statistically significant differences were also found in polysomnographic indexes of sleep. The statistical significance was observed in the arousals (4.35 ± 3.29 vs. 2.79 ± 1.86, $p < 0.01$). The apnea-hypopnea index (AHI) and snoring was increased in hypertensives (4.77 ± 2.85 vs. 2.01 ± 1.62, $p < 0.001$; 18.80 ± 17.67 vs. 5.28 ± 10.03, $p < 0.001$ respectively). The mean and minimal oxygen saturation was decreased compared to normotensives (93.25 ± 1.87 vs. 94.71 ± 1.31, $p < 0.001$, 84.25 ± 8.14 vs. 90.15 ± .96, respectively). In hypertensives there was statistically significant correlation between oxygen desaturation index (ODI) and BEI ($r = 0.37$, $p < 0.05$) whereas among normotensives the ODI-BEI correlation was not statistically significant ($r = 0.02$, $p > 0.05$).

Conclusions: Non-apneic hypertensives had altered sleep architecture, decreased mean oxygen saturation, increased snore and sleep bruxism intensity compared to normotensives. The pathomechanism of sleep bruxism differs between hypertensives and normotensives and may include the influence of oxygen desaturation on bruxism episodes. The dental screening is indicated among patients with arterial hypertension, especially when the patient presents the symptoms of sleep bruxism.

Disclosure: No

P751 | An innovative treatment for restless legs syndrome: Non invasive vagal nerve stimulation

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Introduction: Pharmacoresistantrestless legs syndrome (RLS) is difficult to manage and affects patients' quality of life. Antiepileptics are effective in RLS and vagal nerve stimulation has been shown both to improve epilepsy and to modulate pain perception. A case study has reported improvement in RLS in a patient treated by VNS for depression.

Objectives: To study the effect of vagal nerve stimulation (VNS) on pharmacoresistantRLS.

Participants and Methods: 15 patients with severe pharmacoresistant RLS recruited from a tertiary care sleep centre. Intervention was 8 weekly one h sessions of transauricular Vagal Nerve Stimulation (taVNS) in the left cymba concha. The primary outcome measure was the score on the international restless legs rating scale (IRLS), secondary outcome measures were quality of life (QOL RLS), anxiety and depression on the Hospital Anxiety and Depression scale (HAD), and objective sleep latency, sleep duration, efficiency and leg movement time measured by actigraphy.

Results: 15 patients, 53% male aged 62,7 +/− 12,3 years with severe RLS, reduced quality of life and symptoms of anxiety and depression Symptoms were reduced after taVNS (IRLS 31.9 ± 2.9 vs 24.6 ± 5.9

$p = 0.0003$). 27% of participants had a total response with a decrease below an IRLS score of 20, 40% a partial response with an improvement in the IRLS >5 but an IRLS above 20 and 33% were non responders. After taVNS quality of life improved (RLS QOL 49.3 ± 18.1vs 80.0 ± 19.6 $p = 0.0005$), as did anxiety (HADA 8.9 ± 5.4 vs 6.2 ± 5.0 $p = 0.001$)and depression (HADD 5.2 ± 4.5 vs 4.0 ± 4.0 $p = 0.01$). No significant change was found in actigraphic outcome measures although there was a trend for improvement in sleep latency.

Conclusions: In a small pilot study taVNS was found to improve symptoms of severe pharmacoresistant RLS.

Disclosure: No

P752 | Long term follow-up on the efficacy of perampanel in restless legs syndrome resistant patients

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Introduction: Restless legs syndrome (RLS) is diagnosed by well-known criteria: an urge to move the legs, accompanied or not by unpleasant sensations; occurrence of symptoms during rest; relief of symptoms by movement; and worsening in the evening or night.

Effective dopamine agonists are limited by side effects, with a high risk of "augmentation". Nowadays alpha-delta agonists (Gabapentin/Pregabalin) constitute the first line of treatment for RLS. Perampanel is a selective, non-competitive AMPA antagonist which modulates glutamate. It has been shown to be effective for the treatment of RLS in short term administration.

Objective: To communicate the long term efficacy and tolerance of perampanel in RLS patients resistant to other treatments.

Patients and methods: Seven RLS patients (5 women, 2 men, mean age 64, 71 ± 14,93 years), diagnosed with clinical interview and that fulfilled the International Restless Legs Syndrome Study Group (IRLSSG) diagnostic criteria, were treated with perampanel in our clinic. The severity of RLS symptoms was assessed with the International Restless Legs Scale (IRLS).

Results: Patients have been suffering RLS for a mean duration of 23,71 years. They were treated with rotigotine, pramipexol, pregabaline, ropirinol and clonazepam. Before perampanel treatment mean IRLS score was 30,28 ± 9,21. We started perampanel 2 mg, uptritated to 4 mg in two patients, and 6 mg in one patient. Mean IRLS score with perampanel decreased to 18,57 ± 14,06 ($p = 0.022$). In four patients, this improvement allowed us to reduce or discontinue dopaminergic agonists or pregabaline.

Perampanel was well tolerated, with mild secondary side effects in two patients (gait instability, irritability and weight gain). One patient discontinued treatment due to somnolence. Mean period of treatment was 7,18 months (range 4–12 m). After one year of treatment two patients showed a sustained good response.

Conclusion: Perampanel improved RLS symptoms significantly reducing the IRLS score at long-term administration. Perampanel is a good option for RLS resistant cases and it can be used to withdrawal the dopamine agonist therapy.

Disclosure: No

P753 | Amyotrophic lateral sclerosis meets frontotemporal dementia – a case report

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Introduction: Amyotrophic Lateral Sclerosis (ALS) is a neurodegenerative condition characterized by loss of motor nervous functioning. It's a devastating disease– ultimately leading to death (through respiratory failure) within 2–5 years. It is estimated about 5%–10% consist of familial forms.

Dementia might be associated – preceding or following its diagnosis. Recent genetic and neuropathology findings support an overlap between Frontotemporal Dementia (FTD) and ALS.

Methods: We present a case of a patient, who was first diagnosed with early-onset FTD, and 5 years later came to develop motor symptoms – leading to ALS diagnosis.

Results: 47 year-old female with a significant family history: mother died with dementia at 63, maternal-uncle died with dementia at 51, and two other maternal-uncles passed away with ALS at 55 and 57.

She had no known past medical history when she presented with gradual onset (approximately 1year) memory loss, time-related confusion, and personality fluctuation. Diagnostic work-up revealed left temporal hypoperfusion and bilateral frontal atrophy. She was started on rivastigmine.

With disease progression, behavioral symptoms and language impairment got more pronounced. Subsequently, 5 years follow-up she started experiencing rapid-onset dysphagia (solids first, then liquids), mild-effort dyspnea (mMRC3) and lack of strength of the right limb and consequently gait abnormalities. Electro diagnostic studies confirmed ALS.

Pulmonary function tests showed no alterations besides Peak Cough Flow of 300 L/min. Polysomnographic study showed a medial nocturnal oxygenation of 88.5% and a cumulative sleep time percentage with $Spo_2 < 90\%$(CT90) of 79.9%.She was started on non-invasive ventilation with symptomatic benefit.

At this point, a multidisciplinary care was provided- pulmonology, gastroenterology, psychotherapy and physical rehabilitation. She was also referred to genetic counseling.

Conclusion: Although some experts still believe ALS does not affect mental processes, others begin to recognize this patients often

experience symptoms severe enough to be categorized as dementia. The description of our case corroborates the idea of a spectrum of diseases.

The only efficient way to limit progression of ALS is an early diagnosis and a targeted pharmacological therapy combined with a timely ventilatory support and physical rehabilitation. Therefore, we suggest standard careful exploration of subtle motor symptoms when early - FTD is present.

Disclosure: No

19: SLEEP DISORDERS - HYPERSOMNIA

P152 | Narcolepsy increases the risk of systemic rheumatoid disease: Evidence from a nationwide healthcare system data in South Korea

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Study Objectives: Using the Korean nationwide health insurance claim database, we examined the relationship between systemic autoimmune diseases and type I narcolepsy, which is believed to be also categorized into autoimmune response.

Methods: We enrolled all patients with type 1 narcolepsy and age- and sex- matched control subjects without narcolepsy from the 2010-2019 Korean nationwide health insurance claim database. We estimated the incidence rate of type 1 narcolepsy and the odds ratios of type 1 narcolepsy along with associated comorbidities in Korea.

Results: We identified 8,710 patients with narcolepsy and of which 5,916 patients were with type 1 narcolepsy (59.8% males and 40.2% females). The incidence rate of narcolepsy was 0.05%. The type 1 narcolepsy patients were at significantly increased risk of ankylosing spondylitis (OR, 2.460, 95% CI, 2.410 to 2.512), rheumatoid arthritis (OR, 2.225, 95% CI 2.164 to 2.287), and Sjogren's syndrome (OR,1.165, 95% CI 1.121 to 1.210).

Conclusions: We found that type 1 narcolepsy is closely related to systemic autoimmune diseases, especially those related with the human leukocyte antigen (HLA) genes.

Disclosure: No

P153 | Sleep architecture in idiopathic hypersomnia

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Introduction: Idiopathic hypersomnia (IH) is a poorly understood sleep disorder. The study of sleep architecture has the potential to reveal sleep abnormalities in IH and provide new insights into its pathophysiology. However, few studies have described sleep architecture in IH and most had small samples. This study aims to characterize sleep architecture and verify whether sleep parameters correlate with subjective and objective sleepiness in IH participants compared to healthy controls with a sizable sample.

Methods: 123 IH participants (37.8 ± 10.9 years; 78 women) and 134 healthy controls (38.7 ± 14.2 years; 78 women) underwent a full night of in-laboratory polysomnography followed by a multiple sleep latency test (MSLT) for IH patients. They all had a MSLT ≤8 min, <2 sleep onset rapid-eye movement (SOREM) period and were diagnosed with IH by a sleep physician. Participants with comorbid sleep disorders were excluded. 37.4% of IH participants were taking antidepressant medication during the PSG recording and analyses were performed with and without them. We used two sample t-tests to compare groups on sleep architecture variables. We used correlations to test whether sleep parameters were associated with Epworth Sleepiness Scale (ESS) scores and mean MSLT.

Results: Compared to controls, IH participants had shorter sleep latency ($p = 0.04$), longer total sleep time ($p < 0.001$), shorter wake after sleep onset ($p < 0.001$) and higher sleep efficiency ($p < 0.001$). No group differences were observed for sleep stage proportions. IH participants had higher microarousal ($p = 0.006$), apnea-hypopnea ($p < 0.001$) and periodic leg movement indices ($p < 0.001$). Similar group differences were observed when IH patients using antidepressants were removed, except for min of N1 and N3 stages and microarousal index. IH participants with higher ESS scores had shorter REM latency, less N1 sleep and lower microarousal index (*ps* < 0.05). Those with shorter MSLT had shorter sleep latency and longer total sleep time (*ps* < 0.05).

Conclusions: Our results show that IH participants differ from controls on multiple sleep architecture variables, including higher sleep efficiency. Less fragmented and longer total sleep time correlated with subjective and objective sleepiness. Future studies must investigate finer sleep structures, such as sleep microstructure, to further explore the presence of sleep irregularities in IH.

Disclosure: No

P154 | National estimates on narcolepsy in Korea

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Objectives: Epidemiological data on narcolepsy are rare in South Korea. We aimed to estimate the prevalence, incidence and

cost of narcolepsy in South Korea based on representative nationwide data.

Methods: Narcolepsy patients were identified by their registration in the Rare and Intractable Disease (RID) beneficiary program and Health Insurance Review and Assessment database. Individuals who were registered with the RID program with the code V234 were considered as having "definite narcolepsy", while those who claimed health insurance for any health care utilization with G47.4 as the primary diagnostic code were considered "probable narcolepsy" patients. We estimated the prevalence, incidence, and medical costs of narcolepsy and their time trends from 2010 to 2019.

Results: The prevalence of definite narcolepsy in 2019 was 8.4/100,000, with a peak (32.0/100,000) in the age range of 15–19 years. The prevalence was higher in men, with the relative risk of 1.72. The prevalence has increased over the past six years, with an average annual growth rate (AAGR) of 12.2%. The prevalence of probable narcolepsy was 10.67/100,000 in 2019. The incidence of definite narcolepsy was 1.28/100,000 in 2019 with higher age-standardized incidence rate in urban areas than in rural areas. The incidence showed significantly rising trend over the past ten years with an AAGR of 7.1%. Annual medical expenditure for definite narcolepsy gradually increased up to 4.1 billion KRW in 2019, with a complex annual growth rate of 11.93%.

Conclusion: The estimated prevalence of narcolepsy in this study is comparable with that previously reported in the study with screening survey in Korean adolescents and within the low range of that reported in other countries.

Disclosure: No

P155 | Feelings of lost time and acceptance as a coping strategy in idiopathic hypersomnia - an inductive qualitative study

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Objectives/Introduction: Idiopathic hypersomnia (IH) is a rare, chronic sleep disorder characterized by excessive daytime sleepiness, long sleep duration, and non-restorative sleep (Trotti & Arnulf, 2020). IH negatively affects subjects' quality of life, but research targeting patients' experiences in dealing with and managing their disease has been sparse (Ong et al., 2021). The present study aims to answer the question: How do individuals with IH experience and cope with their disease?

Methods: Participants were selected among 225 individuals diagnosed with IH at the Sleep Unit, Uppsala University Hospital, Sweden. The subjects were assessed with qualitative interviews following a semi-structured interview guide. The data was analysed using inductive thematic analysis.

Results: 12 subjects (4 men and 8 women) were interviewed, mean age 38 years (SD = 11.5). The analysis revealed three topics:

1) Experiences of sleepiness,

2) Consequences of sleepiness, and

3) Managing and coping with symptoms.

Participants described physical, mental, and emotional symptoms, such as mental fatigue and low mood. Many participants experienced strong, although not uncontrollable, urges to sleep. All participants described negative consequences to their greater sleep needs, such as feelings of lost time and "sleeping their lives away". The coping strategies described as most effective were environmental modifications, self-employment, napping, and acceptance.

Conclusions: The topics are in line with previous research. The biggest consequence for most participants was feelings of lost time, described as a sense of missing milestones and time spent doing valued activities. Many participants expressed this affecting their mood and life satisfaction in a negative way. Feelings of low mood related to lost time is an area not explored in previous research. Furthermore, acceptance was explicitly mentioned by a multitude of participants. Acceptance took the form of coming to terms with one's needs and limitations and having a routine, such as strict waking and sleeping times, which increased health-promoting behaviors and activities of daily living, and led to an improvement in overall wellbeing. Research has shown that acceptance is an effective management strategy in other chronic illnesses (Prevedini et al., 2011), and further research is warranted to investigate these results' potential application in treatment for IH.

Disclosure: No

P156 | Easy telemedicine for narcolepsy (TENAR): 1-year feasibility study on televisit during COVID-19 epidemic in italy

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Introduction: Narcolepsy is a rare chronic central disorder of hypersomnolence often associated with complex comorbidities. The need of a multidisciplinary management, the scarcity of reference centers, the long diagnostic delay increase disease burden. We applied a

multidisciplinary telemedicine approach during COVID-19 epidemic to allow patient access to the multidisciplinary consultations.

Methods: During the first COVID-19 epidemic peak and the related lockdown we applied a multidisciplinary care protocol through televisit to consecutive narcolepsy patients planned to attend routine follow-up visit. We conducted a baseline clinical sleep and endocrinological assessment, the former repeated at month 2, 4, 6 and 12 from study inclusion.

Results: Thirty-nine out of 44 (88.6%) eligible patients (30 adults, 9 children/adolescents), from 12 different Italian regions (Figure), were included (Table 1); 36 were residents outside the city of Bologna (median distance from the patients' city of residence: 234 Km, range 48–1221) (Figure). At baseline (Table 2), median Epworth sleepiness scale score (ESS) = 10 (range 8–13); median BMI = 25.6 (range 22.1–30.9). At 1-year follow up, the ESS score improved reaching statistical significance (median 8, range 6–13, $p = 0.013$), and the proportion of patients with overweight and obesity significantly decreased ($p = 0.008$).

Conclusion: Telemedicine was well received by narcolepsy patients during lockdown and allowed to improve sleep and endocrinological aspects at 1-year follow up. Future randomized studies will test the non inferiority of telemedicine, possibly paving the way to innovative care of rare diseases.

Disclosure: Yes

Conflict of Interest statement: Speaking at symposia (Jazz), meeting attendance (Bioprojet), advisory board (Takeda)

P157 | Liquid chromatography coupled to a tandem mass spectrometry quantifies low levels of full-length hypocretin-1 in the cerebrospinal fluid of both narcolepsy patients and controls

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Objectives/introduction: Low levels of cerebrospinal fluid (CSF) Hypocretin-1 (Hcrt-1) are pathognomonic of narcolepsy type 1. The current standard method, a radioimmunoassay, does not allow precise quantification of Hcrt-1 and suffers of limitations (e.g., cross-reactions, detection of unspecified fragments, Sakai et al., 2018). Three recent studies using mass spectrometry reported conflicting results ((1) Hirtz et al., 2016, (2) Bårdsen et al., 2019, (3) Lindström et al., 2021). This study aims to establish liquid chromatography coupled to a tandem mass spectrometry (LC-MS/MS) to measure CSF Hcrt-1.

Methods: Analyses were performed on a Shimadzu UHPLC (Shimadzu Corporation, Kyoto, Japan) coupled to a QTRAP6500+ (Sciex, Darmstadt, Germany). In the established workflow, sample workup was done according to (3) and chromatography according to (2), the optimized mass transitions were similar to all three publications (1)–(3). Hcrt-1 was calibrated between 10 and 900 pg/ml.

To test the workflow, we analyzed 10 samples of patients with narcolepsy type 1 (NT1) and 23 controls.

Results: Calibration curves for intact Hcrt-1 show a linearity of $R^2 > 0.99$. However, low or absent levels of Hcrt-1 were observed in the CSF of both patients with NT1 (median= 4.68pg/ml [0-42pg/ml]) and controls (median = 18.56 pg/ml [3-39 pg/ml]). Samples spiked with known amounts of Hcrt-1 were measured correctly.

Conclusions: These preliminary data suggest that the developed workflow technically works, but that levels of the intact neuropeptide Hcrt-1 as measured with LC-MS/MS are low with overlapping ranges between NT1 patients and controls. Bårdsen et al. also observed low Hcrt-1 levels in controls. Possible reasons could be pre-analytic (e.g., adsorption, use of anticoagulant) and/or analytic factors (e.g., workup, columns), as well as interference of other fragments in the RIA. Supporting this hypothesis, an unbiased mass-spectrometric analysis showed an unspecified Hcrt-1 fragment, but no full-length peptide (unpublished). We will next address potential pre-analytical issues explaining the low Hcrt-1 levels in controls.

Disclosure: Yes

Conflict of Interest statement: The study is an investigator initiated research project, the project leader is financially supported by a Swiss National Funds project-funding grant (Project Number 320030_185362) and by two non-product related investigator initiated study grants from UCB Biopharma SRL (IIS-2017-120409) and Jazz Pharmaceuticals (IST-18-10975). Biobanking is supported by a cohort-funding grant (DLF Bern Biobank Call 2017). Dr. Wenz has personal funding from the University of Bern, Switzerland.

P158 | Insufficient sleep syndrome at the sleep medicine consultation: a retrospective analysis and a window to promote health in population

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Introduction: From al the causes of excessive daytime sleepiness, the insufficient sleep syndrome (ISS) is one easiest to treat. In most cases, resolution can be achieved through sleep education of the patient, avoiding consultation with a sleep specialist.

Methods: We analysed retrospectively, from January 2018 to December 2021, the clinical history of the patients who were referred to the sleep medicine consultation with somnolence, suspecting central hypersomnia. All patients with sleep-related breathing disorders who were not being adequately treated were excluded. The diagnose was made following the International Classification of Sleep Disorders.

Results: A total of 264 patients were referred. 49 of them (19%) were diagnosed with ISS. The mean age of these patients was 45 years. 23 were male and 26 female.

From those who were diagnosed with ISS, the time in bed distribution was: less than 5 h: 16%; between 5 and 6 h: 25%; 6 to 7 h: 49%; and 7–8 h: 10%.

The mean value of the Epworth Sleepiness Scale was 13,4. 49% of the patients diagnosed with ISS adjusted their sleep schedule and eased their symptoms. 6% changed the sleep schedule but did not improve their somnolence. From this subgroup, the patients had other comorbidities during the treatment that acted like confusion factor, such as ongoing anxious-depressive disorder. 25% did not change their sleep schedule, and 20% still under treatment.

All the patients were active workers or students. The mean delay until the diagnose was 4,1 years.

Conclusions: Nearly 1 in 5 patients who were referred to our sleep medicine clinic with excessive daytime sleepiness had insufficient sleep syndrome. All patients were working or studying at the time of consultation. The average time to diagnosis was 4.1 years, and half of the patients with insufficient sleep syndrome managed to adjust their sleep schedule with simple sleep hygiene measures, improving their symptoms. With these findings, we think it is a priority to promote adequate education on sleep hygiene among the population to reduce, among other things, the incidence of this disorder.

Disclosure: No

P466 | Skin temperature as a predictor of on-the-road driving performance in patients with central disorders of hypersomnolence

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Objectives: Excessive daytime sleepiness is the core symptom of central disorders of hypersomnolence. This can directly impair driving performance. Increased sleepiness is also known to be reflected in relative alterations of distal and proximal skin temperature. We therefore examined the predictive value of skin temperature for driving performance.

Methods: Distal and proximal skin temperature and their gradient (DPG) were continuously measured during a standardized, one-h driving test. Driving performance was defined as standard deviation of the lateral position (SDLP) of the vehicle per five kilometre segment. Measured values of skin temperature were averaged over each segment and changes over segments were calculated.

Results: Temperature and driving performance data of 44 participants with narcolepsy type 1 ($n = 32$), narcolepsy type 2 ($n = 7$) or idiopathic hypersomnia ($n = 5$) was included for analyses. There was a strong negative association between proximal skin temperature and SDLP and a positive association between DPG and SDLP. Subsequent linear mixed model analyses revealed significant predictive value of proximal skin temperature changes over 2, 3, 4 and 5 segments. An increase of one degree Celsius in proximal skin temperature over 2 to 5 segments was associated with a mean SDLP decrease of 4.04–2.78 cm, respectively. Moreover, main effects of gender and time revealed higher SDLP values for men compared to women and an increase in SDLP over time.

Conclusions: These results indicate promising value of proximal skin temperature monitoring for real-time assessment of driving performance in patients with central disorders of hypersomnolence.

Disclosure: No

P467 | Are unrefreshing naps associated with abnormal sleep architecture in idiopathic hypersomnia?

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Objectives/Introduction: Idiopathic hypersomnia (IH) is a poorly defined nosological entity with an important phenotype heterogeneity, which reduces diagnostic abilities and prevents more targeted therapy. Unrefreshing naps are reported by >50% of IH patients but are not mandatory for the diagnosis. Yet, the physiological mechanisms behind unrefreshing naps are not understood, and whether patients with and without unrefreshing naps constitute two IH subtypes is unknown. This study aimed at comparing the clinical profile and sleep architecture of IH patients with and without unrefreshing naps.

Methods: We selected158 IH patients aged 18 to 60 years old (73% females, 35.0 ± 10.3 years) who underwent a full night of in-laboratory polysomnography (PSG) followed by a multiple sleep latency test (MSLT, 4 naps) in our sleep clinic between 2000 and 2019. Exclusion criteria were: psychiatric, neurologic, or other sleep disorder diagnoses. They all had MSLT < 8 min and < 2 sleep onset in rapid-eye-movement sleep. They filled out questionnaires on excessive daytime sleepiness, mood, and sleep quality. Medication was stopped for the polysomnographic recording, except for use of antidepressants that was documented. Groups were compared using

Student's t-tests or Mann-Whitney tests (not normal distributions) for continuous variables, and Fisher exact or $\chi 2$ tests for categorical variables. Analyses were controlled for age and sex.

Results: 97 patients (61%) reported unrefreshing naps. This subgroup was younger (32.7 ± 9.5 vs. 38.5 ± 10.5 years old, $p = 0.001$), included more females (79% vs. 62%, $p = 0.02$) and showed lower body mass index (24.5 ± 4.0 vs. 27.2 ± 6.0, $p = 0.005$) compared to the refreshing nap subgroup. No group differences were found for medication use. There were also no group differences on questionnaires, MSLT results, or any sleep macro-architecture variables (sleep latency, sleep efficiency, sleep stages, microarousals, etc.)

Conclusions: IH patients with unrefreshing naps are younger, more often females, and have lower body mass index compared to other IH patients. Surprisingly, these patients do not report more sleepiness, depression, or anxiety symptoms. They also do not have more objective sleepiness or altered sleep architecture. Based on sleep and excessive daytime sleepiness, IH patients with and without unrefreshing naps do not constitute two subtypes.

Disclosure: No

P468 | Actigraphy in the assessment of excessive daytime sleepiness

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Introduction: Excessive daytime sleepiness (EDS) is a frequent presenting symptom among patients referred to sleep disorders centers. The most commonly used clinical tools to assess EDS are patient-completed questionnaires such as the Epworth Sleepiness Scale (ESS), and the multiple sleep latency test (MSLT) which provides an objective evaluation. Actigraphy is a cost-efficient method to estimate sleep-wake patterns over long periods during an individual's daily routine and is therefore of interest in the study of EDS.

Objectives: To evaluate how actigraphy data may relate to the values obtained through MSLT and ESS and its usefulness in the investigation of EDS.

Methods: Adult patients referred to our sleep medicine center with EDS completed the ESS and wore a wrist actigraph for two weeks prior to the MSLT. Statistical analysis was performed using SPSS v.26.

Results: 130 adult patients were enrolled, of which 53.1% were female, had a median age of 43 years (min. 18, max. 73) and a median body mass index of 27.2 Kg/m^2. 36.9% of patients were on psychotropic medication.

Mean MSLT sleep-onset latency (MSLT-SOL) was significatively correlated with total sleep time (TST) (rho = 0.314; $p < 0.001$) and time in bed (TIB) (rho = 0.276; $p < 0.001$) assessed via actigraphy. In the subgroup of patients with mean latency on MSLT ≤8 min, TST (p 0.014) and TIB (p 0.025) showed statistically significant lower values. We also found a statistically significant impact of the use of psychotropic drugs, leading to longer TST (p 0.012) and TIB (p 0.014). There was a negative correlation between ESS and mean sleep latency from actigraphy data (rho = −0.218; p 0.013).

Conclusions: Actigraphy total sleep time and time in bed may be valuable evaluating insufficient sleep prior to MSLT.

Psychotropic drugs may cause increased drowsiness and can explain the results regarding longer TST and TIB assessed by actigraphy.

Actigraphy provides complementary information and may also corroborate the data obtained from MSLT in the EDS investigation.

Disclosure: No

P469 | Norwegian narcolepsy registry finds low use of sodium oxybate in post-H1N1 (Pandemrix-vaccinated) Narcolepsy type 1

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Objectives/Introduction: The Norwegian Narcolepsy Registry is a medical quality registry established by request of the Norwegian health authorities. Some of the main aims are to survey the quality of diagnostics and treatment of CNS hypersomnias in Norway, with a special priority on post-H1N1 (Pandemrix)-vaccinated Narcolepsy type 1(NT1). We here report the first register data on the post-H1N1 NT1 patient group.

Methods: After informed consent, patients were included at the Norwegian Centre of Expertise for Hypersomnias: NevSom, Oslo University Hospital, from 2015 to 2020. All diagnoses were according to ICSD-3. Data were collected via semi-structured interview, validated questionnaires and patient journals.

Results: 80 NT1 patients (61% women) were included. Median age at inclusion was 21 years (range 8.3–62). Median age at disease onset was14 years (range 4,5–54). Median age at time of diagnosis: 18 years. Diagnostic Delay: 4 years (range 0–9).CSF-hypocretin was measured in 76/80 and low CSF hypocretin-1 levels were found in all 76. Epworth Sleepiness Score was 18/24. 78/80 had cataplexy, 68/80 had hypnagogic hallucinations, 64/80 had sleep paralysis. Regarding occupation, 45 were students, 10 worked full time and 25 had sick-leave, sick-pension or similar. Regarding treatment, 11/80 patients were unmedicated while69/80 were medicated: 68/69 on stimulants (44/68 on monotherapy stimulants), 25/69 on TCA/SSRI/SNRI, and 12/69 on sodium oxybate.

Conclusions: The typical Norwegian post-H1N1(Pandemrix)-vaccinated NT1 patient has cataplexy and severe excessive daytime sleepiness. It is therefore notable that >50% of patients are on monotherapeutic stimulants and the use of anticataplextic treatment, especially sodium oxybate, is limited. As sodium oxybate has been shown

to improve several phenotypical aspects of NT1 as well as patients quality of life, we find a need to further investigate reasons for and consequences of its limited use in Norway.

Disclosure: Yes

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P470 | Gender differences in young patients with narcolepsy type 1

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Introduction: Narcolepsy is a chronic and disabling disorder manifesting with excessive daytime sleepiness cataplexy, hypnagogic/hypnopompic hallucinations, sleep paralysis, and disrupted night-time sleep, more frequent in adolescents and young adults, with potential differences between male-female patients, more evident in the first decades of their lives.

Objective: To analyse whether there are significant differences (symptoms, sleep studies values) in terms of gender in a sample of young narcoleptic patients with narcolepsy type 1 (NT1) in a referral Spanish Sleep Unit.

Methods: This was a retrospective study of 27 patients (12 males, 15 females) with NT1, aged 15–27 yo evaluated since childhood. We assessed demographic and clinical data and completed specific scales and questionnaires. Night-time PSG and MSLT were performed in all patients (including quantification of N1/W transitions to REM in MSLT performed in our hospital). HLA-DQB1 × 0602 typing, blood test including ASLO and cerebrospinal fluid hypocretin-1 measurements were also conducted.

Results: The mean age of the male patients was 19.1 ± 3.8 yo, whereas female patients was 20.5 ± 4.4 yo ($p = 0.5$). In this sample, excessive daytime sleepiness (Epworth/adapted Epworth score), daily cataplexy, hypnagogic or hypnopompic hallucinations, sleep paralysis or fragmented night-time sleep were not statistically different in both groups ($p < 0.05$) but Ullanlinna score was higher in females (20.2 ± 4.1vs 26.6 ± 13.3, $p < 0.05$). Polysomnography (PSG) and multiple sleep latency test (MSLT) values showed non significant differences, except nocturnal sleep latency (M/F: 6.5 ± 5.6 min vs 11.2 ± 11.1 min, $p < 0.05$) and arousal index (M/F: 16.8 ± 12.8/h vs 29.3 ± 13.5/h, $p < 0.05$). Low Hypocretin in CSF was detected in all tested patients except one of them (Prader-Willy syndrome). HLA typing was negative in 4 cases (but cataplexy was present).

Conclusions: In our study, though clinical manifestations were more severe (Ullanlinna score) in young female NT1 patients, PSG and MST values were not quite different except sleep stability and nocturnal sleep latency, with a better sleep quality in the male group. The ability of biological sex to impact in sleep may contribute to gender disparities in sleep disorders like NT1, with more severe clinical manifestations and more fragmented sleep in female patients.

Disclosure: No

P471 | Sphyncs: the Swiss primary hypersomonlence and narcolepsy cohort study

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Background and aim: Central disorders of hypersomnolence (CDH) are a heterogeneous group of disorders characterized mainly by excessive daytime sleepiness (EDS) and/or hypersomnolence. While Narcolepsy type 1 (NT1) is well characterized, other disorders such as Narcolepsy type 2 (NT2), idiopathic hypersomnia (IH) and insufficient sleep syndrome (ISS) lack clear diagnostic biomarkers, which often limits diagnosis and treatment decisions. SPHYNCS addresses this lack of knowledge on CDH and aims at identifying new biomarkers for narcolepsy and its borderland (NBL).

Patients and methods: Over 4 years, 7 Swiss sleep centers plan to enroll patients with the recent onset of excessive daytime sleepiness/hypersomnia and the suspected diagnosis of a CDH controls will be healthy subjects and patients with SDB and EDS and the follow-up will extend for 1–3 years. Clinical data and data from electrophysiological examinations (polysomnography, multiple sleep latency test, maintenance of wakefulness test, psychomotor vigilance and sustained attention to response task), actigraphy and long-term monitoring with Fitbit are collected. Blood, cerebrospinal fluid (CSF) and stool samples are collected for quantitative spectrometric assessments of hypocretin and to search for new biomarkers using proteomics/peptidomic, immunological, genetic and microbiota studies.

Results: So far, 77 patients and 12 controls were included, and the actual inclusion rate is 10 participants/month. 65 (73%) are female and the mean age is 28.8 (SD 9.51) years. The mean BMI is 24.4 (SD 4.4). Initial diagnoses in the patient group are: 20 NT1 (26%), 5 NT2 (6.5%) and 52 narcolepsy borderland (67.5%; IH, ISS and hypersomnia associated with psychiatric disorders). All participants underwent clinical and electrophysiological assessments. In addition, serum ($n = 78$), stool ($n = 65$) and CSF ($n = 52$) was also collected and a total of 71 participants wore the Fitbit for a year.

Conclusions: This preliminary report shows the feasibility of the ongoing multicenter study which will include international sites from Q3–

Q4 of 2022. As the inclusion rate increases, hypothesis and data driven (e.g., unsupervised patient clustering) analyses will be explored. Preliminary results will be presented at the meeting.

Disclosure: No

P472 | Phenotypical worsening after COVID-19 vaccination in a patient with pre-existing narcolepsy

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Introduction/objective: Narcolepsy is believed to be caused by several autoimmune attacks ("hits") resulting in gradual loss of hypocretin neurons in the brain. Besides known genetic predisposing and environmental factors like upper airway infections, the Influenza A/H1N1-vaccine Pandemrix has been proposed as an autoimmune trigger of disease onset. Phenotypical worsening in pre-existing narcolepsy has also been reported after Pandemrix-vaccination, but to our knowledge not after COVID-19 vaccination. We here report a case of debut of cataplexy and abrupt worsening of sleep-related symptoms after mRNA COVID-19 vaccination in a young man with pre-existing narcolepsy type 1 (NT1).

Method: The patient was included in the ongoing national narcolepsy project at our centre after written informed consent. Semi-structured interviews, validated questionnaires, HLA-testing, clinical examination, and sleep investigations (actigraphy, polysomnography (PSG), multiple sleep latency test (MSLT)) were conducted.

Results: The patient was a 27-year-old man with NT1 (cerebrospinal fluid hypocretin-1: 71 pg/mL,*HLA-DQB1* × *06:02*-positive) who prior to COVID-19 vaccination worked full time and solely experienced mild and stable excessive daytime sleepiness (EDS) (Epworth Sleepiness Scale (ESS) 9/24). In September 2021, within 2 weeks after the 1stmRNA COVID-19 vaccination dose, he experienced abrupt onset of cataplexy, fragmented sleep, and worsening of EDS. We examined him 3 months after vaccination and found an ESS of 12/24, multiple daily cataplectic attacks, and debut of hypnopompic visual hallucination combined with sleep paralysis. PSG showed Sleep-onset rapid eye movement (SOREM) and frequent awakenings. MSLT showed SOREMs in 5/5 tests and mean sleep latency of 0.3 min. The patient subsequently refrained from any further COVID-19 vaccination. He was COVID-19 infected in February 2022 without any clinical change.

Conclusions: In hypocretin deficient NT1 without cataplexy, cataplexy has been reported to emerge in approximately 50 % of the patients years after the onset of daytime sleepiness. Phenotypical worsening in the presented case can therefore be co-incidental. However, the abrupt overall disease worsening closely after mRNA COVID-19 vaccination is striking, and reminds us of the phenotypical worsening we have seen in some NT1 cases after Pandemrix-vaccination. Hence, we believe it is important to report this case for discussion.

Disclosure: Yes

Conflict of interest statement: Stine Knudsen-Heier has been an expert consultant for the Norwegian state. Kristin Langdalen, Ragnhild B. Grande, Rannveig Viste and Janita Vevelstad, Hilde T. Juvodden and Berit H. Hansen report no conflicts of interest.

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P473 | Current pharmacotherapy of adult patients with narcolepsy type 1 in Slovenia

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Objectives: New European guideline for management of narcolepsy in 2021 provided clear pharmacologic treatment options for these patients. The aim of this cross-sectional study was to demonstrate what is the up to date profile of pharmacologic treatment of adult patients with narcolepsy type 1 in Slovenia. For the record, solriamfetol and clomipramine are not registered in Slovenia, and pitolisant was registered last year.

Methods: We reviewed all patients with narcolepsy that have been checked in outpatient clinic for Sleep disorders since 2017 from Slovenian national register of adult patients with narcolepsy.

Results: From all 113 patients with narcolepsy in national register, 40 of them (female 21, age 46 ± 18, min 20, max 83) visited the outpatient clinic in our Sleep centre in the last five years (the rest were followed by general neurologists or general practitioners). Almost two thirds of 40 patients were on sodium oxybate (63%), followed by modafinil (28%), pitolisant (15%), venlafaxine (10%), and methylphenidate (3%), either as monotherapy or in combination. 14 patients (35%) received combination therapy: sodium oxybate plus modafinil (20%), sodium oxybate plus pitolisant (2.5%), sodium oxybate plus venlafaxine (5%), modafinil plus venlafaxine (2.5%) and sodium oxybate plus modafinil plus venlafaxine (5%). There were six patients who received no pharmacological treatment, either due to their preference, dementia or breastfeeding.

Conclusions: Sodium oxybate is the most frequent symptomatic pharmacological treatment of narcolepsy type 1 in Slovenia, either as monotherapy or in combination therapy. This is in line with the guideline and a reflexion of our patient profile, since most of them have all three symptom categories (excessive daytime sleepiness, cataplexy and disturbed nocturnal sleep), which are best covered with this drug.

Disclosure: No

P757 | Automatic scoring of sleep stages with artificial intelligence and its use for differentiation of disorders of hypersomnolence

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Objectives/Introduction: Narcolepsy type 1 (NT1), narcolepsy type 2 (NT2) and idiopathic hypersomnia (IH) are the main subtypes of central disorders of hypersomnolence (DOH). While NT1 is a well characterized disorder, diagnosis and differentiation of NT2 and IH is difficult. Artificial intelligence (AI) algorithms to score sleep stages provide both hypnograms and hypnodensities, where each epoch is represented as a mixture of probabilities of sleep stages. Hypnodensity-derived sleep instability has been shown to be an accurate NT1 biomarker. In this study, we evaluated whether features obtained from automatic hypnograms and hypnodensity can differentiate DOH and whether such features are superior to the ones obtained from manually scored sleep stages for this purpose.

Methods: We included video-polysomnographies of 40 NT1, 26 NT2, 23 IH and 54 subjects with subjective excessive daytime sleepiness (sEDS, i.e., having normal multiple sleep latency tests). Sleep stages were manually scored and automatic hypnogram and hypnodensity were obtained with a previously validated AI algorithm. For each subject, 1003 features as measure of sleep disruption/instability/structure were extracted. After automatic feature selection, random forests were employed to differentiate groups pairwise (NT1-vs-NT2, NT1-vs-IH,...) and single groups from the remaining ones (NT1-vs-rest, NT2-vs-rest,...) with 5-fold-cross-validation.

Results: For each classification problem, a maximum of 50 features were selected with >50% obtained either from the automatic hypnogram or hypnodensity. In the test sets, the average accuracy/F1-score values were: 0.74/0.79 (NT1-vs-NT2), 0.89/0.91 (NT1-vs-IH), 0.93/0.91 (NT1-vs-sEDS), 0.88/0.80 (NT1-vs-rest), 0.65/0.70 (NT2-vs-IH), 0.72/0.60 (NT2-vs-sEDS), 0.54/0.38 (NT2-vs-rest), 0.57/0.35 (IH-vs-sEDS), 0.71/0.35 (IH-vs-rest) and 0.76/0.71 (sEDS-vs-rest).

Conclusions: As in each classification problem most of the selected features were obtained from automatic hypnogram/hypnodensity, AI-based scoring was superior to manual scoring for differentiation of DOH. The results confirm that NT1 patients are characterized by specific sleep structure allowing their identification with excellent performances. NT2 and IH could be differentiated with moderate performances, indicating that the two disorders might be characterized by different sleep structure. However, the low F1-score obtained for NT2-vs-rest and IH-vs-rest could not identify any precise sleep biomarker of NT2 and IH. Future studies should combine AI-based analysis of sleep structure with other measures for better differentiation of DOH.

Disclosure: No

P758 | Relationship of introversion to excessive daytime sleepiness and cataplexy in narcolepsy type 1

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Introduction: Narcolepsy type 1 (NT1) affects significantly the patient's overall functioning, interfering with social, work, and affective life. Thus, NT1 may affect personality, especially introversion and neuroticism.

Methods: This study deals with excessive daytime sleepiness measured by Epworth sleepiness scale (ESS) and frequency of cataplexy and the degree of introversion and neuroticism measured by NEO Five-Factor inventory (NEO-FFI). We gathered data from 38 adult NT1 patients. The average age of women was 34,8 ± 11,5 ($N = 22$, 58%) and that of men was 37,5 ± 13,9 ($N = 16$, 42%). The range value of ESS is 0–24 and range value of NEO-FFI scales is 0–48. Cataplexy frequency assessment: >1 episode a day; >1 episode a week; >1 episode a month; >1 episode a year; < 1 episode a year; never, no cataplexy. Spearman correlation was used to assess association between introversion and ESS and frequency of cataplexy. Mann-Whitney test was used to assess association between introversion and ESS: ≤15 and >15. Wilcoxon signed-rank test was computed to assess whether patient's personality scores differed from the normative median of the Czech population.

Results: The mean value of introversion was 27,0 ± 5,8 and the mean value of ESS was 17,2 ± 4,7. There was no difference between female and male patients. None of the examined correlations reached statistical significance. ESS and introversion score: $p = 0{,}54$. Frequency of cataplexy and introversion score: $p = 0{,}81$. We also compared introversion score with regard to ESS: ≤15 and >15 and we found no difference between these two groups in introversion. Compared to Czech normative values, the NT1 patients reported higher introversion ($p < 0{,}001$, effect size $r = 0{,}60$) and higher neuroticism ($p = 0{,}006$, effect size $r = 0{,}45$).

Conclusion: We are quite certain that NT1 patients have a higher rate of introversion than the median of the Czech normative data, and they may appear to have a higher rate of neuroticism. We did not found the association between introversion and ESS and cataplexy frequency in NT1 patients.

Keywords: narcolepsy type 1, personality, introversion, excessive daytime sleepiness, Epworth sleepiness scale, NEO Five-Factor inventory

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Disclosure: No

P759 | Use of opioids and effects on symptom severity in narcolepsy type 1: a systematic literature review and questionnaire study

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Introduction: Narcolepsy type 1 (NT1) is a primary sleep disorder characterised by excessive daytime sleepiness (EDS), cataplexy, and deficient hypocretin transmission. Opioids have been shown to (i) increase the number of hypocretin-immunoreactive cells in human and mouse brains and (ii) reduce cataplexy in an NT1 mouse model. The objective of this study was to assess opioid use and its subjective effect on symptom severity in people suffering from NT1, by conducting a literature review and questionnaire study.

Methods: The literature on opioid use in narcolepsy was first systematically reviewed. For the questionnaire study, we recruited 139 NT1 patients (ICSD-3 diagnosed) from a tertiary referral centre. An online questionnaire was completed by 100 participants on opioid use, the indication for use, and the possible effects on symptom severity. In the subset of patients that reported opioid use in the past three years while continuing their NT1 treatment, a structured follow-up interview was conducted on the possible effects on symptom severity.

Results: Through the literature review, seven original studies were identified that discussed opioid use in narcolepsy. Mainly improvements in narcolepsy symptom severity have been published. In our questionnaire, opioid use in the past three years (duration [median, IQR]: 14, 5–70 days) was reported by 16 out of 100 patients with NT1, resulting in 20 descriptions of opioid use (codeine: 7/20, tramadol 6/20, oxycodone 6/20, fentanyl 1/20). Opioids were generally subscribed for chronic pain relief. Symptom severity changes were reported in 11/20 cases (9 positive, 1 negative, 1 mixed effects). Positive effects on disturbed nocturnal sleep (8/20), EDS (5/20), hypnagogic hallucinations (3/20), cataplexy (2/20), and sleep paralysis (1/20) were most pronounced in cases of oxycodone, followed by moderate effects in cases of codeine.

Conclusions: Opioid use is relatively frequently seen in NT1. Patients report oxycodone, and to a lesser extent, codeine, to exhibit positive effects on subjective symptom severity. The clearest effects were reported on disturbed nocturnal sleep and EDS, while effects on cataplexy were less pronounced. It remains unclear whether reported effects are facilitated through opioid-hypocretin interactions, but improvement, in particular of nocturnal sleep, may also be mediated via pain reduction.

Disclosure: Yes

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P760 | HLA phenotype distribution among narcolepsy patients in Armenia: the first report

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Background: Narcolepsy is an immune-mediated sleep disorder. Narcolepsy is classified into type 1 (NT1) and type 2 (NT2). Among the most associated human leukocyte antigens (HLA) are HLA DQB1*06:02, HLA DQB1*03:01 and HLA DRB1*15:01. The distribution differs depending on the population studied. Until now there was no information regarding HLA phenotypes among Armenian patients with narcolepsy. The aim of our study was to summarize the available data on the distribution of HLA phenotypes known to be associated with narcolepsy in Armenian patients.

Methods: Patients admitted to a tertiary sleep centre with complaints suggestive of narcolepsy were directed to polysomnography (PSG) combined with a next-day multiple sleep latency test (MSLT). As the cerebrospinal fluid (CSF) hypocretin test is yet to be implemented in Armenia the diagnosis of NT1 was confirmed by the presence of unequivocal cataplexy and two sleep-onset REM periods (SOREMPs) on MSLT (or 1 MSLT and 1 PSG SOREMPs). Patients were referred for HLA DQB1*06:02, DQB1*03:01, DRB1*15:01 testing using the PCR SSP method. Descriptive statistical analysis was performed.

Results: Twenty-one patients with narcolepsy were included in our study (mean age 24.5 ± 8.6 years, age range 8–42 years, females – 57.1%), with 33.3% NT1 (mean age – 23.4 ± 11.3 years, female – 57.1%) and 66.7% NT2 (mean age - 25.1 ± 7.3 years, female - 57.1%). In the total sample, narcolepsy-associated HLAs were positive in 61.9%, for NT1 – 71.4%, and for NT2 - 57.1%. The HLA distribution follows: DQB1*06:02 - 33.3% (in 7/21, 53.85% among all positives, NT1 – 80%, NT2 – 37.5%); DRB1*15:01 - 43.75% (in 7/16, 63.6% among all positives, NT1 – 75%, NT2 – 57.1%); DQB1*03:01 – 40% (in 4/10, 66.7% among all positives, NT1 – 33.3%, NT2 –100%). The co-occurrence of two HLA-positive phenotypes in a single patient was 57.1% in NT1 and 14.3% in NT2.

Conclusion: This is the first report on HLA phenotype distribution among narcolepsy patients in Armenia. We found a high prevalence of HLA positivity in our sample. DQB1*06:02 was seen more among NT1 patients and it was associated with DRB1*15:01. While DQB1*03:01 was mostly observed in NT2 patients. NT1 was associated with a higher probability of two co-occurring HLA alleles.

Disclosure: No

P761 | Long term reliability of multiple sleep latency test in narcolepsy type 1 and narcolepsy type 2: a longitudinal study of two South Korean sleep center

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Objectives: The diagnosis of hypersomnia may be changed by the repeated multiple sleep latency test (MSLT). We investigated the long-term reliability of MSLT in diagnosing narcolepsy type 1(NT1) and 2 (NT2).

Methods: We reviewed the data of patients with NT1 and NT2 who underwent MSLT at least twice between 2008 and 2020. The clinical information and polysomnography/MSLT data were thoroughly assessed, and two sleep experts evaluated the consistency and reliability of the diagnosis independently.

Results: Seventy-four patients (58 with NT1 and 16 with NT2 as a final diagnosis) were included in this study. During the second MSLT, 6.9% ($n = 4$) patients with NT1 and 50% ($n = 8$) patients with NT2 did not satisfy the diagnosis of narcolepsy. When we included 9 more patients from another sleep center to validate the results, 52% of the initial NT2 ($n = 13$) patients were excluded from the initial NT2 group. The characteristics of the patients who sustained NT2 diagnosis after second MSLT were as follows: *Positive Hypnagogic hallucination, positive sleep paralysis, larger BMI, shorter mean sleep latency, and more SOREMPs in MSLT.*

Conclusions: The reliability of MSLT was not robust in the diagnosis of NT1 and NT2 in this long-term follow-up study. Narcolepsy type 2 covers patients with clinical and test variability over time, thus bringing into question the usage of the term "narcolepsy" to label these patients. Therefore we need to repeat MSLT and interpret the result of it more carefully.

Disclosure: No

20: NEUROLOGICAL DISORDERS AND SLEEP

P163 | Focal epilepsy impacts REM sleep microstructure

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Objective: Epileptic activity was shown to impact the structure of non-rapid eye movement (NREM) sleep. In this study, we hypothesize that epilepsy has effects beyond epileptic activity, and that REM sleep microstructure is impaired despite sparsity of interictal epileptiform discharges (IEDs). Using high-density electroencephalography (HD-EEG), we assessed global and focal disturbances of saw tooth waves (STW) as hallmark of REM sleep in patients with focal epilepsy.

Methods: Twenty-two patients with unilateral drug-resistant focal epilepsy (13 females; mean age, 32.6 ± 10.7 years; 12 temporal lobe epilepsy) underwent combined overnight HD-EEG and polysomnography. Data were compared to 12 healthy controls (3 females; 24.5 ± 3.3 years). STWs, bursts of REM, and IEDs were marked manually in a bipolar montage. Electrodes were grouped into 11 regions. STW rate, duration, frequency, power, spatial extent, IED rate and homeostatic properties (first vs. last REM cycle) were analysed.

Results: STW rate and duration were reduced in patients with focal epilepsy compared to healthy controls (rate: 0.64/min ± 0.46 vs. 1.12/min ± 0.41, $p = 0.005$, Cohen's d = -0.98; duration: 3.60s ± 0.76 vs. 4.57 ± 1.00, $p = 0.003$, d = -1.01). These reductions were mostly driven by extra temporal/temporal plus epilepsy patients (rate: 0.45/min ± 0.31 vs. 1.12/min ± 0.41, $p = 0.0004$, $d = -1.35$; duration: 3.49s ± 0.92 vs. 4.57 ± 1.00, $p = 0.017$, $d = -0.99$). The effect of the decrease of STW rates and duration was stronger in the beginning of the night compared to the end of the night (STW rate: $d = -0.90$ vs. $d = -0.62$, duration: $d = -1.01$ vs. $d = -0.80$). There was no significant difference of STW activity comparing the region with the epileptic focus to the homologous contralateral side in patients (all ps > 0.5). Rates of bursts of REMs and their duration were not different between patients with epilepsy and controls (rate: 1.13/min ± 0.38 vs. 1.10/min ± 0.38, $p = 0.80$, $d = 0.09$, duration: 7.53s ± 1.55 vs. 7.98s ± 1.61, $p = 0.4$, $d = -0.29$). IED rates were not correlated with the STW rate ($p > 0.05$).

Conclusion: Focal epilepsy patients and in particular extra temporal/temporal plus patients show a global reduction of STW activity in REM sleep with a stronger reduction in the first half of the night sleep. This suggests that epilepsy impacts brain physiology even outside epileptic activity assessed on scalp EEG.

Disclosure: No

P164 | Inter-rater agreement and sleep spindles assessment in developmental and/or epileptic encephalopathy with spike-wave activation in sleep

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Introduction: Epileptic encephalopathy with continuous spike-wave in sleep (CSWS) or electrical status epilepticus in sleep (ESES) is a clinico-electroencephalographic syndrome characterized by (1) new-onset regress in developmental, cognitive, speech or motor functions associated with (2) seizures and/or (3) prominent epileptiform activity on sleep EEG (ESES/CSWS) (Belousova, 2012). Multiple studies show contradictory data for spike-wave index (SWI) criteria. Various approaches in SWI assessment lead to low inter-rater agreement (IRA) levels and different treatment strategies in similar patients. In this terms tools for automatic calculation of SWI can possibly help to unify its assessment. Moreover, recent evidence shows, that not only quantity of epileptiform activity plays a role in overall clinical picture, but quality of sleep and memory consolidation processes within it, and sleep spindles (SS) can be used as additional biomarkers. The aim of the study was (1) to evaluate IRA and machine-counted SWI efficiency and (2) find out interplay of epileptiform activity and SS in ESES/CSWS.

Methods: Study was performed on 30 minute samples of 1st NREM cycle of sleep EEGs of children between 2.9 to 9.3 y.o with ESES/CSWS ($n = 10$), where SWI was evaluated independently by 3 experienced raters. Epileptiform activity detected by Persyst14 software assessed with two counting methods. SSs were counted for each sample. Statistical analysis was made in Statistica12 and Jamovi, Cohen's cappa used for IRA evaluation and Spearmen's analysis for correlations between SWI and SSs number.

Results: Cohen's cappa was 0.05 which represent slight IRA. Average experts SWI had scarcely higher agreement with software assessed SWI (0.09). SWI measured with all three counting methods negatively correlated with number of SS, most strongly for average expert's SWI (rho $= -0.727$, $p < 0.02$).

Conclusions: (1) Data shows slight IRA between experts, as well as between their average and machine-counted SWI, that underpins the importance of SWI counting criteria development. (2) Strong negative correlation between SWI and number of SS shows that sleep patterns assessment should be considered in these criteria. Using sleep spindles assessment may help to improve IRA.

Disclosure: No

P165 | Auditory slow wave activity enhancement during sleep in patients with Parkinson disease

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Introduction: Phase targeted auditory stimulation (PTAS) has emerged as a promising non-invasive tool for enhancing sleep slow waves. Recent studies have shown that PTAS can even be successfully applied in real-life settings, also in a healthy older population. Slow wave activity (SWA) enhancement is of particular interest for clinical populations that show a high prevalence of sleep-wake disturbances, such as Parkinson disease (PD). However, it is still largely unknown whether PTAS also works in these patient groups.

Methods: Thirteen PD patients (44–75 years) reporting disturbed sleep underwent three consecutive nights of PTAS and three nights of sham stimulation at home, in a double-blinded, randomized crossover trial. Sleep electroencephalography recordings and PTAS were performed using a portable system (MHSL-SleepBand). Stimulation throughout the night was applied in an alternating pattern of 6-second stimulation ON- and OFF-windows. During sham nights, tones were muted. We compared low frequency SWA (0.75–1.25 Hz) and subjective estimates of sleep quality, sleepiness and mood (assessed by visual analogue scales) across both conditions (stim vs. sham). We also explored potential associations of SWA enhancement with changes in sleep architecture and subjective estimates.

Results: Mean SWA was significantly increased in ON-windows during stim nights compared to OFF-windows within the same nights ($+25.9 \pm 2.3\%$, $p < 0.001$, $N = 13$) and to sham nights ($+13.2 \pm 4.2\%$, $p < 0.01$, $N = 13$). Subjective estimates of sleep quality, sleepiness and mood showed no significant difference across conditions (all $p > 0.1$, $N = 11$). Interestingly, a higher increase in SWA in the stim relative to sham nights significantly correlated with a decrease in rapid eye movement sleep (REMS) duration ($r = -0.67$, $p < 0.05$, $N = 11$). Reduced REMS in turn was significantly associated with worse mood the next day ($r = 0.73$, $p < 0.05$; $N = 11$).

Conclusions: Here we demonstrate for the first time that PTAS during sleep can be successfully applied to enhance SWA in a PD patient population. As pharmacological SWA enhancement has been shown

to improve objective measures of sleep-wake disturbances in PD, PTAS may offer a promising non-pharmacological alternative, which should be further investigated in future studies. However, potential effects on REMS and consequences thereof also need to be carefully monitored and, if possible, minimized.

Disclosure: No

P166 | Sleep quality factors and wake-up stroke: is there a connection?

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Introduction: Wake-up stroke (WUS) occurs when a patient awakens with clinical manifestations of stroke that were absent prior to falling asleep. The physiopathology of this type of stroke is not completely understood but previous studies reported a possible association between WUS and sleep.

Objective: We aimed to assess the clinical characteristics and sleep quality of patients with WUS and non-wake-up stroke (NWUS) to evaluate possible connections between WUS and sleep quality.

Methods: A prospective observational study was conducted. All patients admitted to the neurology department of a single tertiary centre with the diagnosis of acute stoke during a 4-months period were included. Of the initial 302 patients, 221 were excluded due to hemorrhagic stroke, impaired language function or patients in disagreement with the written consent. 81 selected patients were screened about vascular risk factors, quality of sleep was assessed using a self-fulfilled questionnaire, *STOP-BANG Sleep Apnea Questionnaire*, Epworth *Sleep Scale*, and *Insomnia Severity Index*. Data on demographics, clinical presentation, complementary diagnostic tests, and therapeutic approach were collected. Statistics using SPSS included univariate and multivariable analysis; statistical significance was set for $p < 0.05$.

Results: The sample included 81 patients (43 men) with a mean age of 73.7 ± 12.9 years at symptoms' onset; 18,52% patients ($n = 15$) were diagnosed with WUS. NIHSS score was higher in WUS group (9.73 ± 4.25 vs. 6.65 ± 4.81, $p = 0.013$) when compared to NWUS patients. Cervical perimeter showed a mean of 39.8 ± 3.64 cm; it was found to be significantly higher in patients with WUS (43.6 ± 2.44 vs. 39.0 ± 3.32, $p < 0.001$). There was also a statistically significant difference between patients with WUS and NWUS regarding daytime sleepiness (53.3% vs. 25.8%, $p = 0.037$). No statistically significant difference was found regarding different sleep characteristics assessing pre-stroke condition. Logistic regression analysis showed a significantly higher cervical perimeter in patients with WUS (OR = 1.586, 95% CI = 1.21–2.08, $p < 0.001$).

Conclusion: We found a significant association between WUS and cervical perimeter and daytime sleepiness, possibly revealing that sleep disorders are underdiagnosed in patients with WUS. Understanding the physiopathology and possible risk factors associated with WUS might contribute to optimize prevention strategies.

Disclosure: No

P167 | Sleep study findings in rett syndrome cases from the literature

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Objectives: Rett Syndrome (RTT) is a progressive and rare neurodevelopmental disorder mainly occuring in females. Impaired sleep pattern is one of its supportive diagnostic criteria, but findings on the sleep structure and respiratory events during sleep have been scant in RTT. We aimed to delineate their sleep by consolidating RTT case data from published polysomnographic (PSG) studies.

Methods: Data of RTT cases were collected as a part of our meta-analysis series (PROSPERO: CRD 42020198099). Stratifications per RTT-related genetic and clinical characteristics were applied. PSG data were compared within stratification per Kruskal-Wallis ANOVA tests by ranks and to typically developing (TD) population per standard mean difference tests. Spearman's correlation was performed to assess the association with age at PSG.

Results: Seventy-four RTT cases were collected from eleven studies up until 6 February 2022. Generally, the sleep macrostructure in RTT cases was characterized by longer wake after sleep onset (WASO), enhanced non-rapid eye movement stage 3 (N3%) and attenuated rapid eye movement (REM) sleep. In stratifications, we found longer total sleep time (TST), higher N1% but lower N3% in *CDKL5* mutant RTT cases compared to the*MECP2*mutant cases and TD population. Severe sleep disordered breathing was confirmed by an abnormal apnea hypopnea index in RTT strata. No association with age was found.

Conclusion: This review suggests abnormal sleep macrostructure and disturbed sleep breathing in RTT. But in particular, N3% was opposite in *MECP2* versus*CDKL5*mutations. Severe reduction of REM sleep propensity was detected in all RTT strata. Therefore, aberrant sleep cycling proposed in RTT is possibly characterized by a poor REM-on switch and preponderance in slow and of high voltage sleep.

Disclosure: No

P168 | Relationships among sleep regulatory neuropeptides in cerebrospinal fluid of patients with hypersomnia

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Objectives/introduction: Sleep is a highly regulated state, although its regulatory system is not well-elucidated. Recently, we have shown specific neurons for switching NREM and REM sleep in mice. A subset of these neurons produces neurotensin, contributing to the suppression of REM sleep. In contrast to animal studies, only a few clinical studies on revealing the relationship between sleep and neuropeptides are reported. Here, we analyzed neuropeptide concentrations in the cerebrospinal fluid (CSF) of dementia patients with hypersomnia and investigated how the profiles of these neuropeptides are related.

Methods: All of the participants provided written informed consent to this study. This retrospective multicenter observational study received approval from the Ethical Review Board at Akita University and University of Tsukuba. Patients' data were deidentified before analysis. All CSF samples were collected by lumbar puncture. CSF levels of orexin, neurotensin, and melanin concentration hormone were measured by radioimmunoassay, while corticotropin-releasing hormone was determined by enzyme-linked immunosorbent assay. Besides neuropeptides profiles, the dataset included the patients' age, gender, and mini-mental state examination scores (MMSE). The statistical analysis was conducted with SPSS (ver. 28.0, IBM). The correlation coefficients were Spearman's rank correlation coefficients, and p-values were shown in the correlation test. The significant difference was considered when p-values were less than 0.05.

Results: Ninety-two patients, including 59 with Alzheimer's disease (AD), 18 with dementia with Lewy body, and 15 other types of dementia patients, were analyzed. We found a positive correlation between the concentration of orexin and neurotensin. This positive correlation was observed in male AD patients but not in female patients. Additionally, a positive correlation was detected between orexin concentration and MMSE scores in male AD patients.

Conclusions: The positive correlation between orexin and neurotensin in hypersomnia patients suggests that orexin and neurotensin collaboratively reduce REM sleep. Neurotensin could be a potential target for curing sleep impairment. We also found a correlation between cognitive decline and orexin reduction, consistent with previous studies. Given the significant loss of orexin neurons in AD patients, the magnitude of the correlation between CSF orexin and cognitive levels may help to suspect the amount of neuronal loss.

Disclosure: No

P169 | Survival after ischemic stroke depending on sleep-disordered breathing

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Background: Ischemic stroke is one of the leading causes of mortality and disability worldwide. The identification of potential modifiable prognostic factors is of great importance in stroke patients.

Objective: To assess the outcome of patients with ischemic stroke depending on the presence of sleep-disordered breathing.

Design and methods: We enrolled 281 patients with supratentorial ischemic stroke admitted to the Stroke unit within 24 h after symptom onset, mean age 67 (30; 89) years, 146 males. All of patients underwent sleep study in the acute phase of stroke (1–3 days within admission). The follow-up phone visits were performed annually with the assessment of the following endpoints: death of any cause, recurrent stroke or transient ischemic attack, myocardial infarction, emergent hospitalization. Kaplan-Meyer survival curves were analyzed.

Results: Based on sleep study, sleep-disordered breathing was diagnosed in 186 patients (66%), the mean apnea-hypopnea index was 11.8 (0;88)/h. In total, follow-up phone visits were performed in 154 patients (55%), (mean age 68 (33; 89) years, 88 males). The average follow-up period comprised 586 (1; 1437) days. Endpoints were registered in 51 patients: 30 patients died (mean age 69 (36; 85) years, 17 males, $\chi^2 = 0.01$; $p = 0.92$), recurrent stroke or transient ischemic attack was registered in 12 patients (mean age 57 (36; 84) years, 8 males, $\chi^2 = 0.18$; $p = 0.7$), and 2 males developed myocardial infarction. Eight patients required emergent hospitalization (mean age 65 (36; 78) years, 3 males, $\chi^2 = 1.4$; $p = 0.3$). The patients with and without achieved endpoints were comparable by sex, age and sleep-disordered breathing parameters. Kaplan-Meyer analysis did not show any differences in survival depending on the presence of sleep-disordered breathing (LogRank = 1.88; $p = 0.17$).

Conclusion: At long-term follow-up, sleep-disordered breathing is not associated with the worse outcome in ischemic stroke survivors.

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Disclosure: No

P171 | Altered visuospatial attention predicts conversion to neurodegeneration in isolated rapid eye movement sleep behavioral disorder

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Objectives: It has been reported absence of inhibition of return (IOR) in isolated REM sleep behavior disorder (iRBD). The present study was aimed to investigate underlying neurophysiological mechanisms of absence of IOR in iRBD and to test whether visuospatial attention during a Posner's cueing paradigm can predict synucleinopathy in patients with iRBD.

Methods: 29 patients with iRBD and 15 age matched healthy control subjects were participated in the study. Mean duration of follow-up after the study enrollment was 4.27 ± 1.27 years. At follow-up, 13 (44.8%) patients with iRBD developed neurodegenerative diseases (NDs); 7 patients converted to PD and 6 patients converted to DLB. All participants were performed event-related potentials (ERPs) with Posner's visuospatial cueing task. Target-elicited N2 and cue-elicited P2, P3 component were evaluated. alpha-band oscillation after *cue* stimulus onset was measured.

Results: Between iRBD converters and nonconverters, there was no significant difference in age at baseline, sex, and education. Neural activity underlying IOR effect was absent in RBD patients at baseline assessments regardless of conversion to NDs. More importantly, impaired IOR effect appears more severe in RBD patients who developed NDs. The abnormalities of P2, P3 component, and alpha-band oscillation after*cue* stimulus onset were also pronounced in RBD with phenoconversion.

Conclusion: Our results demonstrate that impaired early perceptual processing and inhibitory control in iRBD predict phenoconversion to PD or DLB.

Disclosure: No

P172 | Preliminary results of a study on sleep and circadian rythme disorders in alternating hemiplegia of childhood (AHC)

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Objectives/introduction: AHC is a rare encephalopathy with infantile/pediatric onset characterized by the resolution of paroxysmal events (dystonia, plegia, abnormal eye movements etc) upon sleep. Recent data support that AHC patients suffer from sleep disorders. At the same time, many other features of the disease (specific triggers, medications, epilepsy, neurodevelopmental & neuropsychiatric disorders) are known predisposing factors for sleep and circadian cycle disorders. Circadian rythme disruption has been shown in animal models with ATP1A3 mutations but not yet investigated in humans. The aim of this study is to evaluate the frequency of sleep disorders along with the evaluation of circadian rythme cycle functioning in AHC.

Methods: We prospectively included 21patients with AHC after informed consent [mean age 15,41 years (min 1,77 years, max 39,91 years), male 61,9%]. Prelimenary analysis of sleep-related questionnaires ($n = 18$), actigraphy($n = 10$), polysomnography ($n = 14$) and urinary melatonine cycle ($n = 15$) along with clinical details from patients' medical records was performed. SPSS 27.0 was used for statistical analysis.

Results: According to sleep questionnaires, 52,9% of patients with AHC have a morning circadian phenotype; 28,6% were under regular melatonine treatment and polysomgnography (PSG) was suggestive for a sleep pathology in 85,7% of patients (obstructive apneas = 5, central apneas = 2, altered sleep architecture = 3, upper airway resistance syndrome = 2). Low melatonine urinary secretion was found in 46,7% of patients. Actogram non-parametric circadian rhythm comparisons with healthy population have shown a delay of 2 h in L5 (onset of the least active 5 h) in children and a high intra-daily variability (IV) (0.80, $p = 0.04$) in adults.

Conclusions: The preliminary results of our study show alterations of the rest-activity cycle in AHC, in particular a delayed cycle in children and a higher fragmentation in adults. We have also shown a low melatonine secretion and a high percentage of sleep disorders found in PSGs. These results should however be taken with caution given the limited number of our patients. Further analysis and patient inclusion is in progress in order to confirm the results in a larger population and correlate them with the phenotype/genotype characteristics of AHC.

Disclosure: No

P173 | A preliminary study of the association between sleep slow waves and grey matter volume following moderate to severe traumatic brain injury

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Objectives/Introduction: Electroencephalographic (EEG) slow waves (<4 Hz) are non-rapid eye movement (NREM) sleep oscillations that play an important role in restorative sleep. Slow-wave amplitude and density are shown to be positively associated with cortical grey matter volume and thickness in healthy adults. These associations remain to be investigated in patients with moderate to severe traumatic brain injury (TBI), a condition that results in an extensive loss of grey matter, particularly in the fronto-thalamic network that is important for the generation and propagation of slow waves. We aimed to characterize the association between grey matter volume and slow-wave characteristics in the chronic stage of

moderate to severe TBI and in healthy control participants. We hypothesize that TBI patients with a more severe loss of grey matter in brain regions that are important for the generation and propagation of sleep slow waves will produce fewer and smaller slow waves.

Methods: Twenty-seven chronic moderate to severe TBI patients (31.3 ± 11.7 years old, 19 men) and 32 healthy participants (28.7 ± 11.6 years old, 23 men) were tested with MRI and polysomnography. Slow-wave characteristics including amplitude, frequency, slope, duration, and density were computed during NREM sleep on frontal, central, parietal, and occipital EEG derivations. Voxel-based morphometry analysis was conducted using the Computational Anatomy Toolbox of SPM 12. Whole-brain regression analyses were performed for grey matter volume and slow-wave characteristics while controlling for age and the total intracranial volume. At the cluster level, the statistical significance was set at $p < 0.05$ with a family-wise error (FWE) correction.

Results: Only in TBI patients, slow-wave amplitude on central EEG derivations was positively correlated with grey matter volume in the precuneus and in the mid-cingulate gyrus ($p_{FWE\text{-}corrected} = 0.022$). No other association was observed in TBI patients or in healthy controls.

Conclusions: Grey matter loss is associated with smaller slow waves in chronic moderate to severe TBI patients. Because EEG slow waves travel along the anterior-posterior axis of the brain through the cingulate and parietal regions, future studies should assess whether grey matter loss following TBI could disrupt the propagation of slow waves throughout the brain.

Disclosure: No

P174 | SLEEP COMPLAINT LOAD MAY INFLUENCE THE SEVERITY OF DEPRESSION AND ANXIETY IN EPILEPSY

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Introduction: Accumulating evidence on the importance of comorbidities in epilepsy points on bidirectional role between sleep disorders and epilepsy. The majority of known sleep disorders are observed in adults with epilepsy (AWE). On the other hand, epilepsy is also associated with higher incidence of depression and anxiety compared to the general population. Our study aimed to elucidate the role of sleep complaints and their quantity in relation to depression and anxiety among AWE.

Method: AWE from tertiary sleep and epilepsy centers underwent detailed sleep interview using a sleep complaint checklist (17 items), referring to insomnia, sleep-disordered breathing, sleep-related movement and behavioral disorders. Hamilton depression (HAMD) and anxiety (HAMA) rating scales were utilized, with higher scores implying on the presence of more severe mood disturbances, also cut-off scores for discriminating between presence and absence of respective conditions were utilized. We calculated the absolute number of subjective sleep complaints for each participant, and divided participants into those with (sleep complaint group, SC) and without (no sleep complaint group, NSC) any sleep complaints. Mann-Whitney U test, Chi-squared test, and Spearman's correlation analysis were used for statistical calculations.

Results: We involved 169 AWE (mean age – 34.9, females - 46.75%). Descriptives for groups: SC, mean age – 36.3, females – 43.7%; NSC, mean age – 31.5, females - 54%. In SC 119 patients presented at least one sleep complaint (70.4%). Moderate-to-severe depression and anxiety (HAMD, HAMA) were recorded more in participants with sleep complaints. NSC/SC: HAMD – 4.0%/42.0%, HAMA – 6.0%/47.1%, $p < 0.05$ for both comparisons. Also, higher HAMD and HAMA mean values were obtained in those with sleep complaints. NSC/SC: HAMD – 6.6/14.96 ($p < 0.01$), HAMA – 7.8/17.45 ($p < 0.01$). We found significant positive correlations between the absolute number of sleep complaints and HAMA and HAMD values: HAMA – $r = 0.590$, HAMD – $r = 0.621$ ($p < 0.001$). Mean sleep complaint numbers are presented for each group as follows: anxiety – 6.0, no anxiety 2.7 ($p < 0.01$); depression – 6.1, no depression – 2.9 ($p < 0.01$).

Conclusion: Our data suggest that the presence of any sleep complaint in adults with epilepsy was significantly associated with higher depression and anxiety rates. Also, high number of sleep complaints was associated with more severe depression and anxiety.

Disclosure: No

P175 | Excessive daytime sleepiness and obstructive sleep apnea in myotonic dystrophy type 1 with CPAP treatment

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Introduction: Myotonic dystrophy type 1(DM1), the most common muscular dystrophy in adults, is a progressive, multisystem disorder. DM1 is often characterized by sleep disturbance in the form of sleep apnea, excessive daytime sleepiness(EDS), and rapid eye movement(REM) sleep irregularities, including sleep-onset rapid eye movement(SOREM).

Case: A 39-year-old man with a prior diagnosis of DM1 and type 2 diabetes was referred to our sleep clinic due to recurrent brief

changes in consciousness and EDS. Brain magnetic resonance imaging, 24 h video-electroencephalographic and electrocardiographic monitoring were unremarkable. He had also preserved cardiac and pulmonary function. The electromyogram indicated muscle damage with excessive myotonic discharge. His genetic testing showed an over 150 CTG repeat expansion in the DMPK gene on chromosome 19q13.2-3, confirming the diagnosis of DM1. Overnight polysomnography demonstrated mildly decreased sleep efficiency of 89.4%, increased REM sleep of 33.9%, sleep onset latency of 4.6 min, and REM sleep latency of 2 min. Severe OSA was found with an apnea-hypopnea index(AHI) of 67.3 events/h and the lowest oxygen saturation of 62%, more aggravated in the supine position or REM sleep. On the following day, MSLT confirmed EDS. The patient fell asleep in all four tests with a mean sleep latency of 7.8 min. Three tests showed SOREM. By validated questionnaires (PSQI, ISI, BDI, ESS), sleep quality, insomnia, and depressive mood were improved, but EDS tended to persist even 6 months later after CPAP treatment. A follow-up overnight polysomnography with CPAP titration showed normal sleep efficiency of 92.5%, increased REM sleep of 29.3%, sleep onset latency of 0.6 min, and REM sleep latency of 0. Negligible OSA was shown with an AHI of 4.0 events/h during CPAP titration with a suggestive optimal level is 7 cmH2O. On the following day, MSLT still showed significant EDS with a mean sleep latency of 4.5 min and all SOREMs out of four naps.

Conclusions: This finding suggests EDS and REM sleep dysregulation based on a primary central nervous system disturbance including circadian and ultradian timing abnormalities in DM1. Therefore, clinicians need a more careful approach and treatment for EDS and sleep apnea in DM1 patients.

Disclosure: No

P177 | Restless leg and spinal pathology

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Material and methods: From the database of 239 876 health examinations collected between 2004 and 2022 in the health examination centers of the CPAM in the Gironde, we looked for the links that may exist between sleep complaints, drowsiness, existence of a spinal pathology (neck pain, back pain, low back pain) and restless legs. The data was analyzed using the Chi2 method.

Results: A significant association ($p < 0.0001$) was found between the presence of restless legs and sleep complaints. Surprisingly there is no association between sleep complaint and neck pain ($p < 0.60$)but, there is an association between sleep complaint and back pain ($p < 0.0001$), low back pain ($p < 0001$). restless legs being associated with a complaint of neck pain ($p < 0001$) and unrelated to complaints concerning the dorsal ($p = 0.94$) or lumbar ($p = 0.25$) spine. The observed prevalence of the neck pain-restless legs association is 4.5 times higher than expected.

Discussion: restless legs, the prevalence of which is between 2% and 10% of the general population, is usually considered either as symptomatic (inflammatory syndrome, iron deficiency, etc.) or idiopathic. The results observed point in the direction of a central subcortical or high medullary origin as mentioned by Kaplan(1) or Kumru(2).

A previous report was performed in 2017 with less records. Most of the results found in 2022 confirm those already identified in 2017.

Conclusion: The association cervicalgia with restless legs is in favor of a high medullary origin

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Disclosure: No

P476 | Development of a mouse model of anti-iglon5 disease: a pilot study

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Objectives/Introduction: Autoimmune encephalopathy with parasomnia and obstructive sleep apnea (anti-IgLON5 disease, ORPHA:420789) is a rare late-onset neurological disorder associated with autoantibodies against IgLON5, a cell-surface protein of unknown function. Patients with anti-IgLON5 disease show respiratory and motor alterations, poorly structured episodes of non-rapid-eye-movement sleep with excessive muscle activity, rapid-eye-movement sleep behavior disorder and obstructive sleep apneas. Moreover, post-mortem studies have shown neuronal accumulation of phosphorylated Tau protein (p-Tau) in brainstem and hippocampus. We performed a pilot study to understand whether chronic intra cerebro ventricular (ICV) infusion of anti-IgLON5 antibodies from patients with anti-IgLON5 disease (Pt-IgG) in mice may recapitulate the neuropathological and clinical features of anti-IgLON5 disease.

Methods: The study was performed on 12 female and 7 male humanized transgenic hTau mice, expressing human Tau protein, and in 8 female wild-type (WT) control mice. Mice were implanted with electrodes for electroencephalographic and electromyographic recording

and with an ICV cannula to perform chronic infusion with Pt-IgG or with antibodies from a control subject (Ctrl-IgG) for 14 days. Sleep, respiratory (whole-body plethysmography), and motor (ataxia phenotype scoring system and licking behavior) phenotype was evaluated at the end of the 14-day antibodies infusion and at least 30 days after the end of the infusion, followed by immunohistochemical assessment of p-Tau deposition. Data were analyzed with Mann-Whitney test and ANOVA as appropriate with significance at $p < 0.05$.

Results: No differences were found in sleep amount, architecture, electromyographic activity, and apneas in mice infused with Pt-IgG vs Ctrl-IgG. However, female WT and hTau mice treated with Pt-IgG showed a diffused p-Tau deposition in the brainstem and hippocampus, increased ventilatory period during sleep and decreased inter-lick interval during wakefulness. These findings were not confirmed in male hTau mice.

Conclusions: These preliminary results suggest that chronic ICV infusion of Pt-IgG in mice may produce neuropathological, respiratory, and motor alterations. Considering the complexity of this disease, the results should be replicated in larger samples, taking account of potential sex-related differences in mice.

Disclosure: Yes

Conflict of Interest statement: F. Graus holds a patent licensed to Euroimmun for the use of IgLON5 in an autoantibody test, for which he receives royalties, and receives honoraria from MedLink Neurology for his role as associate editor. The other authors declare no conflict of interest.

P477 | Psychobehavioral profile in narcolepsy type 1 with and without rem sleep behavior disorder

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Introduction: Narcolepsy type 1 (NT1) is caused by orexin deficiency in hypothalamic neurons involved in vigilance states regulation, but also in addictive behaviors through their projections towards the mesolimbic reward system. REM Sleep Behavior Disorder (RBD) is common in NT1. Interestingly, higher risk of impulse control disorder is observed in patients with Parkinson's disease with versus without symptomatic RBD. The aims of our study were to assess the psycho behavioral profile of NT1 patients compared to healthy controls (HC) and to investigate whether RBD in NT1 patients is associated with altered reward system.

Methods: 40 NT1 (55% males, mean±SD age: 37.7 ± 14.0 years) were compared with 20 matched HC (55% males, 38.9 ± 14.7 years). All NT1 patients underwent a video-polysomnography including a quantitative measure of REM sleep without atonia (RSWA) using the Atonia Index (AI). The following variables were assessed: apathy (SAS), depression (BDI), cognition (MoCA), subjective attention (QAA), objective attention (D2), impulsivity (UPPS), sensation-seeking (SSS), and behavioral addiction (MIDI). Groups were compared with the Mann-Whitney test and correlations were assessed with the Spearman test.

Results: patient population included 22 NT1+RBD (72% males, 38.2 ± 15.0 years) and 18 NT1-RBD (33% males, 37.1 ± 12.9 years). As compared to HC, NT1 patients had a lower score in MoCA (27.6 ± 1.9 vs 28.7 ± 1.4, $p = 0.0172$), higher scores of apathy (11.42 ± 4.94 vs 6.7 ± 4.33, $p = 0.0027$), depression (12.75 ± 9.13 vs 3.25 ± 4.10, $p = 0.0001$), "urgency" (29.48 ± 5.94 vs 24.4 ± 6.39, $p = 0.0053$) and "lack of perseverance" (20.23 ± 5.70 vs 17.45 ± 4.33, $p = 0.0418$) impulsivity subscales, and showed a poorer self-perception of attention (93.53 ± 37.36 vs. 64.15 ± 25.49, $p = 0.0007$). We found an impaired objective attention in NT1+RBD (11.3 ± 10.8 vs 3.9 ± 3, $p = 0.0084$). In NT1 patients, AI was inversely correlated with apathy ($r = -0.420$; $p = 0.05$) as well as with "lack of perseverance" impulsivity subscale ($r = -0.379$, $p = 0.05$). Within NT1+RBD subjects, AI negatively correlated with depression ($r = -0.683$, $p = 0.01$) and with "compulsive shopping" among behavioral addictions ($r = 0.525$, $p = 0.05$).

Conclusions: NT1 patients show higher apathy, impulsivity and depression scores compared to HC. These measures correlate with the severity of RSWA, suggesting trans diagnostic association between RBD and abnormalities of the reward system.

Disclosure: No

P478 | Baseline and longitudinal ^{123}I-FP-CIT SPECT imaging findings may predict phenoconversion from isolated REM sleep behavior disorder to an overt synucleinopathy

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Objective/introduction: Isolated REM sleep behavior disorder (iRBD) patients are known to be at high risk for developing an overt synucleinopathy – particularly Dementia with Lewy Bodies (DLB) and Parkinson's Disease (PD). Reduced nigrostriatal uptake on 123I-FP-CIT SPECT reflects dopamine deficiency. We sought to assess whether (1) an abnormal 123I-FP-CIT SPECT scan at baseline and (2) the slope

of change on longitudinal 123I-FP-CIT SPECT findings in iRBD precedes and predicts future transition to an overt synucleinopathy.

Design/methods: Participants were required to meet the following criteria: (1) polysomnography confirmed iRBD, (2) followed in the Mayo Clinic Alzheimer's Disease Research Center ± North American Prodromal Synucleinopathy (NAPS) Consortium for at least 24 months, (3) and 2 or more FP-CIT SPECT scans 12 or more months apart. Nigrostriatal dopamine transporter uptake was evaluated semi-quantitatively with 123I-FP-CIT SPECT using DaTQUANT 2.0 software (GE Healthcare) to calculate *z*-scores of putamen uptake.

Results: Thirty-four iRBD participants were identified (30 male/4 female), of whom 16 (47%) developed an overt synucleinopathy (pheno converters; 13 to DLB, 3 to PD) and 18 (53%) remained as iRBD (stable iRBD). Follow-up years did not differ between pheno converters and stable iRBD (5.4 ± 2.3 vs 5.7 ± 1.8 years, $p = 0.6$). At baseline, pheno converters were older (69.1 ± 6.1 vs 63.2 ± 6.3 years old, $p = 0.009$), had lower DaTQUANT putamen z-scores at baseline (−2.10 ± 1.57 vs −0.26 ± 1.19, $p < 0.001$), and shorter reported duration of RBD (6.9 ± 4.2 vs 16.9 ± 12.4 years, $p = 0.004$) than stable iRBD. Putamen *z*-score declined faster in pheno converters than in stable iRBD (*z*-score slope −0.27 ± 0.29 vs −0.05 ± 0.23, $p = 0.016$). Among pheno converters, 11 (69%) had one or more DaTQUANT putamen z-scores of <−2.0 prior to phenoconversion, and the time from initial putamen *z*-score of <−2.0 to phenoconversion was 3.1 ± 2.2 years.

Conclusions: These findings suggest that lower baseline and faster decline in putamen uptake on 123I-FP-CIT SPECT, and shorter duration of RBD, are associated with progression from iRBD to DLB or PD.

Disclosure: Yes

Conflict of Interest statement: This work was partially supported by GE Healthcare; the staff at GE Healthcare was not involved in the analysis and interpretation of the data, nor in the preparation of this abstract.

P479 | H1N1-(Pandemrix)-vaccinated narcolepsy type 1 patients have increased muscle activity during REM and nrem sleep compared with their non-narcoleptic siblings

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Study objectives: Narcolepsy type 1 (NT1) is characterized by instable sleep-wake and muscle tonus regulation during wakefulness and sleep. We here explore if known NT1 risk factors are associated with increased muscle activity during sleep in NT1 patients (i.e., a more severe sleep motor phenotype) and in their non-narcoleptic siblings (i.e., indicating a phenotype continuum).

Methods: After written informed consent, polysomnography was performed in 140 consecutively included post-H1N1 NT1 patients and 114 non-narcoleptic siblings. Electromyography signals from m. tibialis anterior was divided into long (0.5–15 s) and short (0.1–0.499 s) muscle activations per h per REM and non-REM (NREM) sleep respectively. Associations with core narcolepsy symptoms, HLA-DQB1*06:02-positivity, and H1N1 (Pandemrix) vaccination were tested.

Results: REM and NREM long muscle activity indices and REM short muscle activity index were significantly increased in NT1 patients versus siblings (all $p < 0.001$). NT1 patients with undetectable CSF hypocretin-1 levels (<40 pg/ml) had significantly more NREM long muscle activations than patients with low but detectable levels (40–150 pg/ml). In siblings, REM and NREM sleep muscle activation indices were not associated with HLA-DQB1*0602-positivity. H1N1 (Pandemrix) vaccination status did not predict REM and NREM muscle activity indices in neither NT1 patients nor siblings.

Conclusion: Increased REM and NREM sleep muscle activity is characteristic for NT1 but is not predicted by H1N1 (Pandemrix) vaccination status. We confirm that hypocretin-1 deficiency severity predicts NREM sleep muscle activity severity in NT1. In the patients´ non-narcoleptic siblings, NT1 risk factors are not associated with muscle activity during sleep, hence not supportive of a phenotype continuum.

Disclosure: No

P481 | Clinical impact and polysomnographic features of sleep disturbances in multiple sclerosis

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Introduction/Objectives: Multiple sclerosis (MS) represents a risk factor for sleep disorders, especially insomnia and restless legs syndrome (RLS). Despite this, only few studies have evaluated

sleep by polysomnography (PSG). This study aimed to estimate prevalence, polysomnographic features and clinical impact of sleep disturbances in MS. It also tried to define the overlaps between three key symptoms of MS, namely fatigue, drowsiness and depression.

Methods: Cross-sectional, controlled, polysomnographic investigation. Eighty-six patients with a diagnosis of MS were subjected to a sleep check and fulfilled clinical questionnaires. Seventy-six patients also underwent home PSG and maintenance of wakefulness test (MWT). One hundred five healthy controls (HC) and 35 patients with idiopathic RLS (iRLS) were recruited to compare sleep architecture, respiratory parameters and sleep related leg movement activity (LMA) with patients affected by MS. Frequency and reciprocal overlap of sleepiness, fatigue and depression in MS were expressed by Eulero-Venn diagrams.

Results: MS patients had worse polysomnographic sleep quality compared to healthy controls. Prevalence of RLS in MS group was of 32.9%. PLMS in RLS secondary to MS were fewer, shorter, less periodic and bilateral when compared to iRLS. RLS and PLMS were independently correlated to fatigue. The frequency of sleep-related breathing disorders (SRBD) was comparable in MS patients and HC, also in the subgroup with brainstem lesions. There was a high percentage of fatigued (70%), somnolent (45%) and depressed (27%) MS patients. Somnolence and depression were nearly always accompanied by fatigue and were well differentiated from each other by MWT.

Conclusions: In comparison to healthy patients, MS is a risk factor for RLS, PLMS, lower sleep quality. MS seems to be a candidate pathological model of dissociation between the sensory and motor component of RLS, with possible treatment implications. MS is not associated to both central and obstructive apneas, even in the presence of brainstem lesions The subjective and objective tools are not able to clearly distinguish fatigue from sleepiness and depression, while only a test of vigilance can be helpful in separating somnolence and depression from each other.

Disclosure: No

P482 | Cognitive and non-motor phenotypes in Parkinson's disease with REM sleep behaviour disorder: data from the PPMI study

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Introduction/objectives: Emerging evidence indicates that Parkinson's disease (PD) with REM sleep behaviour disorder (RBD) might represent a subtype of PD with different neuropathology and consequently different clinical motor and non-motor profile, disease progression and possibly therapeutic outcome.

In a previous study from our group using data from the Parkinson's Progression Markers Initiative (PPMI), we highlighted the association between RBD and cognitive decline over 36 months in PD patients. The current study uses a multimodal multivariate analysis to characterize cognitive and non-motor phenotypes in patients with probable RBD at the time of PD diagnosis.

Methods: We recovered PPMI data ($n = 414$) of idiopathic PD patient at the time of PD diagnosis. Available measurements included blood analysis, cerebrospinal fluid, imaging biomarkers as well as multiple motor, non-motor and cognitive scales such as the UPDRS, SCOPA-AUT, and multiple non-motor scales such as the Montreal Cognitive Assessment (MoCA), the Benton Judgement of Line orientation (BJLOT), the Semantic Fluency Test (SFT), the Letter-Number Sequencing (LNS), the Geriatric Depression Scale (GDS) and the Epworth Sleepiness Scale (ESS). Univariate analyses included Independent Samples Mann-Whitney U tests, whereas multivariate analyses were performed via backwards conditional logistic regression controlling for baseline patients' characteristics. For all tests, a p-value of <0.05 was considered statistically significant.

Results: Out of 414 idiopathic PD patients, 173 presented with probable RBD based on the RBD score (cut off: 5). Combining univariate and multivariate analyses, we found that SFT(Animal) [p = value = 0.027, OR: 0.974, 95% CI = 0.952-0.997], SDM [p-value = 0.037, OR: 0.973, 95% CI = 0.948-0.998] and SCOPA [p-value <0.001, OR: 1.070, 95% CI = 1.041–1.101] scales were independent predictors of probable RBD.

Discussion: Our findings indicate that the presence of RBD in PD patients at the time of PD diagnosis, is associated with distinct cognitive deficits and potential autonomic dysfunction.

Disclosure: No

P483 | Family functioning with an autistic child: a role for sleep

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Objectives/Introduction: Children with autism are known to present with sleep difficulties more frequently than their typically developing peers but, despite this, there is relatively little research looking at the impact of sleep on the family. To investigate the effect of sleep on families of autistic children and of typically developing (TD) children, we conducted a study of sleep disturbances among children, sleep quality of their parents in association with their family function.

Methods: Parents of autistic children ($N = 239$) and parents of TD children ($N = 227$) completed a survey about their child's sleep difficulties, their own sleep quality, and their family function, along with a series of demographic questions.

Results: Analyses indicated that autistic children experience more sleep difficulties than TD peers ($t(464) = 11.60$, $p < 0.001$), that parents of autistic children report decreased sleep quality compared to parents of TD children ($t(464) = 7.24$, $p = 0.004$). Parental sleep quality (b = −0.72, 95% BCa CI[−1.23, -0.30]), and child sleep difficulties ($b = -0.79$, 95% BCa CI [−1.46, −0.15]) were both found to partially

mediate the relationship between having a child with autism and family function.

Conclusions: Family functioning has been previously reported to be less healthy in families with an autistic child than in families with typically developing children. The current research highlights the importance of sleep in explaining this relationship and suggests a need to prioritise screening for and treatment of child sleep difficulties, particularly for autistic children.

Disclosure: No

P484 | Cognitive behavioral therapy for insomnia in mild cognitive impairment: a controlled trial on sleep and cognitive outcomes

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Objectives/Introduction: Insomnia is associated with faster cognitive decline in people with Mild Cognitive Impairment (MCI) and with worse quality of life for patients and caregivers. We examined whether Cognitive Behavioral Therapy for Insomnia individually (CBTi) or through dyad treatment with caregivers (CBTi-dt) improves sleep and delays cognitive decline in patients with MCI and insomnia.

Methods: Nineteen patients with MCI and insomnia, recruited through the Sleep & Memory Center at the Neurological Institute of Athens, were randomly assigned into three intervention groups (CBTi $n = 7$, age 67.3 ± 9.0 years old, education 15.3 ± 2.8 years, Insomnia Severity Index (ISI) 14.9 ± 5.5, Mini-Mental State Examination (MMSE) 28.2 ± 1.8; CBTi-dt $n = 7$, age 70.4 ± 6.0, education 11.9 ± 5.6, ISI 14.43 ± 4.3, MMSE 27.1 ± 2; Sleep Hygiene (SH) $n = 5$, age 67.2 ± 9.9, education 17.0 ± 3.9, ISI 15.2 ± 5.9, MMSE 28.4 ± 1.3). Cognitive and sleep assessments followed the Multidisciplinary Expert System for the Assessment & Management of Complex Brain Disorders Protocol by a board-certified Behavioral and Sleep Neurologist. CBTi and CBTi-dt interventions of 4-6 weekly session were implemented upon diagnosis by a trained sleep psychologist and repeat assessments of ISI and MMSE were repeated at 3 months. Group comparisons and within-subject effects were assessed through repeated measures general linear model analysis.

Results: ISI at 3 months was significantly improved in the CBTi (4.6 ± 4.9 $p = 0.0002$) and CBTi-dt (4.4 ± 3.2 $p = 0.0002$) groups, but not the SH group (12 ± 6.4 $p = 0.164$), supporting group effects on insomnia ($p = 0.006$). ISI improvement was not significantly different between CBTi and CBTi-dt, however, both groups improved by 7.4 ($p = 0.018$) and 7.6 ($p = 0.016$) points, respectively, compared to SH. Memory performance, as represented by differences in MMSE, did not significantly change at 3 months between the three groups ($p = 0.09$).

Conclusions: CBTi and CBTi-dt are effective in managing insomnia symptoms in people with MCI for at least 3 months, whereas sleep hygiene interventions are not. People with mild deficits can participate in individual treatment for insomnia and do not need the participation of a caregiver. If there are benefits to cognition by these interventions, then longer follow up periods or larger sample sizes will be required.

Disclosure: No

P485 | Sleep features and neuropsychological profile in sleep-related hypermotor epilepsy and disorders of arousal: a multi-modal analysis exploiting artificial neural networks computational adaptive systems

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Objectives/introduction: Increased sleep instability and reduced sleep quality are both features and promoting factors for sleep-related hypermotor epilepsy (SHE) and disorders of arousal (DOA). We aimed to assess the cognitive effect of sleep disruption in these patients, identifying discriminatory neuropsychological features with a multimodal analysis.

Methods: A total of 11 subjects with DOA (3 males mean age 32.3 ± 10.9 years) and 12 subjects with SHE (6 males 33.5 ± 15.2 years), not taking any medications, were enrolled at the Sleep and Epilepsy Center of the University of Cagliari together with 22 age- and sex-matched healthy control (HC) (5 males, 30.5 ± 7.5 years). All subjects underwent a full-night video-polysomnography together with a broad cognitive and behavioral assessment. A data mining approach with fourth-generation Artificial Neural Networks has been used to discover subtle trends and associations among variables.

Results: Among the cognitive parameters, the short-term memory and the verbal learning are the only two variables that differentiate the two clinical groups ($p < 0.008$). Interestingly, DOA patients did not differ from HC in any cognitive parameters whereas SHE subjects appeared different from HC in working memory ($p < 0.03$) and in semantic fluency ($p < 0.01$). No differences were found between patients with SHE and patients with DOA in polysomnography features. However, the subjective sleep quality significantly differs between SHE and DOA patients ($p < 0.002$) and between SHE and HC ($p < 0.001$). Moreover, only SHE patients showed depressive symptoms ($p < 0.013$).The artificial neural network methodology and the self-contracting map exploited the links of variables that reveal the complexity of a specific phenotype allowing to group SHE and DOA respectively.

Conclusions: SHE seems to be associated with decreased subjective sleep quality, worse cognitive profile and depressive symptoms compared to DOA patients. These results suggest a severer sleep disruption that might be associated with heavier burden of disease in terms of sleep-based health consequences, compared to DOA.

Disclosure: No

P486 | Restless legs syndrome in a group of relapsing-remittent multiple sclerosis patients - a monocentric cross-sectional update from the University of Pisa

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Introduction: Multiple sclerosis (MS) is a risk factor for Restless Legs Syndrome (RLS). Patients with MS (PwMS) have a mean higher prevalence of RLS compared to general population. Inconsistent correlations were found between RLS and demographic as well as MS related and sleep related parameters.

Methods: In this monocentric cross-sectional study we aimed at assessing the prevalence of RLS in patients with relapsing-remittent MS (PwRRMS) and assessing possible differences between PwRRMS with and without RLS. We recruited 92 consecutive PwRRMS, who underwent a clinical interview to diagnose RLS and were asked to complete a series of questionnaires including ones about MS related disability (Expanded Disability Status Scale, EDSS), sleep quality (Pittsburgh Sleep Quality Index, PSQI) and sleep disorders screening, fatigue (Fatigue Severity Scale, FSS) and mood disorders screening.

Results: Our population was made of 92 PwRRMS with a median age of 47 ± 19, 68,5% (63/92) of them females, with 9 ± 13 years since MS diagnosis. Patients' median EDSS scores were 2 ± 2 indicating mild disability. Sleep quality was borderline with a median PSQI score of 5 ± 4 and 45,7% PwRRMS (42/92) had poor sleep quality. Prevalence of RLS was 47,8% (44/92) and 63,6% (28/44) had persistent RLS whereas 36,4% (16/44) had intermittent RLS. Overall severity was moderate with a median RLS Rating Scale score of 11 ± 20. Comparing rates of pathological PSQI, PwRRMS with RLS had worse sleep quality than those without (56,6%, 25/44 vs 35,4%, 17/48, $p = 0{,}04$). However, comparing PSQI scores we found only a tendency to significance with patients with RLS having a median PSQI score of 6 ± 4 vs 5 ± 4 in those without RLS ($p = 0{,}09$). RLS patients suffered from mild fatigue whereas PwRRMS without RLS did not (median FSS scores of 36 ± 25 vs 26 ± 20 respectively, $p = 0{,}003$). Indeed, a much higher rate of patients with fatigue was found in patients with RLS (54,4% vs 22,7%, $p = 0{,}002$).

Conclusions: Our study confirms higher prevalence of RLS in MS patients compared to general population. We only found a tendency to worse sleep quality and but PwRRMS and RLS were significantly more likely to suffer from fatigue.

Disclosure: No

P487 | Retrospective case series of insomnia and hypnotics in epilepsy patients

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Objectives/Introduction: Epilepsy patients often complain of insomnia and depressive mood in concern of the recurrence of epileptic seizure, as the sleep deprivation is a well-known precipitant factor in epilepsy patients.

Methods: Consecutive patients who visited epilepsy outpatient clinic in a tertiary hospital in the year of 2021 were retrospectively enrolled. The medical records were reviewed on the history of seizures provoked by sleep deprivation and of hypnotics or anti-depressant medications prescribed in the year.

Results: Total of 962 patients were enrolled. There were 132 patients (13.7%) who were identified to have at least one seizure history from sleep deprivation at any point of the time in the clinical course. Out of 132 patients, 54 patients (40.9%) were prescribed for hypnotics or anti-depressant medications, while 78 patients (59.1%) were not.

The most commonly used medication is quetiapine, prescribed to 19 patients (31.1%). Other hypnotics or anti-depressant medications used were as following: trazodone to 16 patients (26.2%), alprazolam to 11 patients (18%), zolpidem to 11 patients (18.0%), and lorazepam to 2 patients (3.3%). Eight patients (14.8%) were on combination of the above drugs, while 46 patients (85%) were on single medication.

Out of those who were not prescribed for medication but with history of seizure triggered from sleep deprivation, 35 patients (44.9%) have more than or equal to 1 seizure attack per year. Medication applied group have 37 patients (68.5%) have more than or equal to 1 seizure attack per year, regardless of the provocation factor. As with the use of the drugs, frequency of seizure have been changed by −1.38 ± 4 attacks/month compared to the time without any medical intervention.

Conclusions: Among the patients with history of seizure triggered by sleep deprivation, seizure frequency group that is more than or equal to 1 attack per year is more prevalent in the medical intervention group than in the group without medication. Also, the frequency decreased after the hypnotics and anti-depressant medication use, while the caution with the interpretation is required for multiple factors affecting seizure provocation.

Disclosure: No

P488 | *status dissociatus* in multiple system atrophy

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Introduction: In*status dissociatus* (SD), elements of one sleep state persist or appear superimposed on another stage. SD can be associated with brain damage, rapidly progressive autoimmune or neurodegenerative diseases. Less frequently, it may occur in the context of synucleinopathies as a form of REM sleep behaviour disorder (RBD) progression.

Clinical case: An 81-year-old woman was referenced to a Neurology appointment due to a worsening gait disorder with frequent falls since the age of 79, and urinary incontinence and miccional urgency since the age of 80. The neurological examination revealed the presence of end-gaze nystagmus, decomposition of eye movements, dysphonia, generalized hyporeflexia, postural tremor and polyminimyoclonus, bilateral dysmetria, dysdiadochokinesia, ataxic gait (which was possible with unilateral support), and altered postural reflexes. MRI revealed cerebellar and brainstem atrophy and the hot cross bun sign. A diagnosis of probable MSA-C was established, and the patient was started on low doses of Levodopa. The patient experienced a rapid decline in the following year, with dysarthria, dysphagia, and loss of autonomous gait. She was evaluated in a sleep tertiary centre where she complained of nocturnal restlessness since the age of 78, with abrupt movements during sleep, vivid dreams of aggressive content, snoring and periods of apnoea. Video polysomnography (VPSG) was performed, which revealed*status dissociatus*, absence of N2 sleep phase elements, presence of REM in all sleep phases, vigorous RBD, violent movements mimicking RBD in other sleep phases (N2), inspiratory stridor and obstructive and central hypopneas (RDI 25/h) with associated oxygen desaturation (minimum of 80%). After multidisciplinary discussion, auto-BiPAP was initiated.

Conclusion: Progressive degeneration of brain structures related to the appearance of RBD in advanced stages can lead to the development of SD. The rapid evolution to SD in this case reinforces the need for VPSG investigation and early treatment in patients with MSA.

Disclosure: No

P489 | Screening for obstructive sleep apnea in three distinct neurological diseases

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Introduction: Screening for obstructive sleep apnea (OSA) in neurological patients remains a challenge. This study aims to explore screening parameters for OSA in ischemic stroke (IS), myasthenia gravis (MG), and multiple sclerosis (MS).

Methods: Seventy-two patients diagnosed with IS, MG, and MS were included in the study. Medical history and physical examination were performed on inclusion. Psychometric tools like the Epworth Sleepiness Scale (ESS), the STOP-BANG, and the Berlin questionnaire (BQ) were used for risk assessment. For the respiratory screening, a 3-channel portable recording device was used.

Results: Of the 72 neurological patients, 25 were with IS, 24 with MG, and 23 with MS. OSA was found in 80% of stroke patients, 33% of patients with myasthenia gravis and in 13% of patients with multiple sclerosis. In the stroke patients group, neck circumference (OR 1.43, 95% CI 1.063–1.950, $p = 0.019$) and the STOP-BANG questionnaire ≥4 (OR 3.239, 95% CI 1.099–9.543, $p = 0.033$) are significant predictors for the presence of OSA. A higher risk in the BQ is a significant independent predictor for OSA (OR 7.222, 95% CI 1.076–48.475, $p = 0.042$) in MG patients, whereas for those with MS, the body mass index (OR 1.297 95% CI 1.007–1.672, $p = 0.044$), the waist circumference (OR 1.148 95% CI 1.010–1.305, $p = 0.035$) and STOP-BANG ≥3 (OR 8.302 CI 1.012–68.095, $p = 0.049$) are significant independent predictors for the presence of OSA.

Conclusions: The implementation of various screening tools for OSA in neurological diseases is helpful for selecting patients for further diagnostic tests for sleep disordered breathing.

Disclosure: No

P490 | Narcolepsy: clinical features and treatment efficacy – case series

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Introduction: Narcolepsy is a rare chronic neurologic sleep disorder caused by dysfunction of the neural hypocretin/orexin pathways. The etiology is not yet well established, although recently studies suggest an autoimmune origin. Narcolepsy often manifests in adolescents/young adults and may present itself with excessive day time sleepiness (EDS), nocturnal sleep fragmentation, catplexy, sleep paralysis and hypnogogic and hypnopomping hallucinations. The diagnosis requires a multiple sleep latency test with an average sleep latency of <8 min and two or more REM-onset periods (SOREM). The treatment consists in non-pharmacologic and pharmacologic treatment depending on the main clinical features.

Objective: To describe the clinical and diagnostic features of patients with narcolepsy and the pharmacological treatment efficacy.

Methods: Retrospective study of diagnosed narcolepsy patients between 2012 and 2022 on the sleep consultation of the Hospital de Viseu. Patients with other causes of EDS were excluded.

Results: 7 patients were identified, one female and 6 males, median age 32,3 years and mean body mass index 24,8. All patients presented EDS (mean Epworth scale of 18,42). Only 2 patients presented cataplexy, sleep paralysis and hypnogogic and hypnopomping hallucinations.

All 7 patient underwent level 1 polysomnography with multiple latency test. The average sleep latency was 3 min and 48 seconds. 6 patients presented 3 SOREMs and 1 patent presented 2 SOREMs.
Non pharmacological treatment was encouraged to all 7 patients. Treatment with sodium oxybate was initiated to the two patients with narcolepsy and cataplexy with a subjective improvement of the cataplexy and EDS. Treatment with modafinil was proposed to 5 patients, although one refused the treatment. One patient suspended the treatment due to headache and anxiety as side effects. The remaining 3 patients had a subjective improvement of the EDS.

Conclusion: There was a higher prevalence of male patients and young adults with narcolepsy. EDS was the main symptom that caused the patients to seek medical care. All patients presented diagnostic criteria of narcolepsy. Treatment with sodium oxybate sodium is preferred in patients with cataplexy with good efficacy. Initiating the treatment with modafinil may be challenging in some patients, but with an improvement of EDS.

Disclosure: No

P768 | Dynamic daylight stimulation supports circadian rhythm entrainment in patients with disorders of consciousness

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Objectives: In post-comatose patients with disorders of consciousness (DOC), circadian (~24 h) rhythms are often altered with the degree of disturbance being related to the patients' clinical state. Light therapy has proven effective in ameliorating certain medical conditions (e.g., circadian rhythm sleep-wake disorders). However, its potential has not yet been evaluated systematically in patients with DOC, whose "light diet" is usually characterised by fairly low illuminance during the day and relatively high illuminance during the night. Consequently, daytime melanopic light exposure is mostly insufficient for an optimal modulation of the circadian system. Thus, the aim of the present study was to investigate if indoor room lighting, which mimics natural daylight regarding its spectral composition and changes in illuminance, can re-entrain circadian rhythms in patients with DOC and consequently improve their clinical state.

Methods: We recorded skin temperature over 7–8 consecutive days in patients with unresponsive wakefulness syndrome ($n = 15$) or minimally conscious state ($n = 2$) in each of two light conditions. In the habitual light (HL) condition, patients were in a room with standard lighting. In the dynamic daylight (DDL) condition, patients were in a room with "biodynamic" lighting that was characterised by overall higher illuminance and dynamic variations in the spectral composition as they occur in natural daylight. To detect rhythmicity in the patients' temperature data, we computed Lomb-Scargle periodograms (normalised power and period length), as well as *inter*daily stability and *intra*-daily variability, which provide information about rhythm entrainment and fragmentation. For statistical analyses, we used advanced non-parametric statistical tests as implemented in the "nparLD" package for R.

Results: In the DDL compared to the HL condition, patients' temperature rhythms deviated less from 24 h ($p = 0.037$), were more pronounced ($p = 0.066$), more stable ($p = 0.035$) and less fragmented ($p = 0.084$). Behaviourally, patients showed a higher reactivity to external stimuli as indicated by a higher sum score during assessments with the Coma Recovery Scale-Revised in the DDL condition ($p = 0.036$).

Conclusion: Our findings indicate that adequate room lighting in intensive care units and long-term care facilities may be a promising and easy to realize therapeutic approach that helps to improve rhythm entrainment in severely brain-injured patients.

Disclosure: No

P769 | Correlations between CSF cytokines, sleep macrostructure and cyclic alternating pattern in de novo relapsing-remitting multiple sclerosis: a controlled polysomnographic study

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Study objectives: To evaluate subjective and objective sleep measures in de novo relapsing remitting multiple sclerosis (RRMS) compared with healthy controls and CSF cytokines (CK) in RRMS.

Methods: Twenty-one patients affected by RR-MS underwent CSF levels of CK, overnight polysomnography and subjective evaluation of sleep and sleepiness. Twenty-one healthy controls(HC) underwent subjective scales and overnight polysomnography. Scoring and analysis of sleep macrostructure and cyclic alternating pattern (CAP) parameters were performed. Partial correlation adjusted for age, gender, disease duration was performed between CK and sleep variables.

Results: We found higher sleep period time (SPT), time in bed(TIB), REM sleep latency, N3 percentage; wakefulness after sleep onset (WASO), stage shifts/h (SS); lower sleep efficiency (SE) and REM sleep percentage (REM%)in RRMS vs HC. RRMS with OSA showed higher SPT; TIB, REM sleep latency; WASO; SS; lower SE and REM% when compared to HC.RRMS without OSA demonstrated higher N3%, WASO; lower REM% and SE. Regarding CAP, higher CAP time, CAP rate, CAP rate in N1 and N2, A3%, A,A1,A2 and A3 mean duration, A1 and A3 indices; lower A2%, phase *B* mean duration were evident in

RRMS vs HC.OSA-MS showed higher CAP rate, CAP time, CAP rate in N1 and N2, A3%; A, A1, A2 and A3 mean duration, A3 index; lower *B* mean duration. RRMS without OSA revealed higher CAP rate, CAP time, CAP rate in N2;A,A1,A2 and A3 mean duration, A1 and A3 indices; lower phase *B* duration.N3% was positively related with IL6, REM % negatively with IL8, lower REM latency and number of awakenings with IL2 and less stage shift/h with IL2, IL6, IL15 and IL1ra. We also demonstrated a positive correlation of A, A1, A2 mean duration with IL2, IL12 and IL15; of A3 mean duration with IL6, IL12, IL15 and IL1ra; of *B* phase mean duration withIL1b and IL10; of cycles duration with IL12, IL15 and IL10; a negative correlation CAP sequences duration and cycles per sequences with IL1b and IL10.

Conclusions: *De novo*RRMS is associated with sleep fragmentation as shown by CAP analysis more evident in RRMS with OSA. Inflammatory cytokines may influence sleep homeostasis by adaptive mechanisms in a vicious circle where sleep fragmentation may also modulate CK release.

Disclosure: No

P770 | North American prodromal synucleinopathy consortium: baseline characteristics in 251 patients with REM sleep behavior disorder

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Introduction: Rapid Eye Movement (REM) Sleep Behavior Disorder (RBD) is characterized by a lack of muscle atonia during REM sleep with dream enactment. RBD is regarded as a prodromal synucleinopathy as a high proportion of patients eventually phenoconvert to Parkinson's Disease and related synucleinopathies, suggesting RBD may be an early non-motor symptom of disease. Accordingly, patients with RBD are ideally situated to test potential therapeutic interventions to prevent phenoconversion to synucleinopathy. However, RBD itself, and associated patient registries, are rare. The North American Prodromal Synucleinopathy Consortium (NAPS) establishes a multisite registry of RBD patients with standardized neurological, neuropsychiatric, and neuropsychological assessments and biomarker collection. The present work reports baseline characteristics of this RBD patient database at its current state.

Methods: Participants >18 years of age with overnight polysomnogram-confirmed RBD by ICSD-3 criteria who did not meet criteria for the diagnosis of PD, dementia, MSA, or narcolepsy were enrolled from 10 sites across North America (8/2018 to 4/2021). Data collection included family and personal history of RBD and related symptoms, as well as standardized assessments related to cognitive, motor, sensory and autonomic function. Additionally, all subjects have contributed blood, and a subset of subjects have contributed cerebrospinal fluid samples to the National Centralized Repository for Alzheimer's Disease and Related Dementias for future analysis.

Results: A total of n = 251 participants were enrolled. Outcomes are reported based on sex (*n* = 202 male, n = 49 female). Data were further examined based on participants' history of antidepressant use (*n* = 142 with, n = 103 without) and based on participants' extent of synucleinopathy burden (*n* = 70 defined as isolated RBD, n = 181 defined as RBD+ [i.e., exhibiting ≥1 abnormality]). Any observed sex differences among the data did not persist after correction for antidepressant use. Family history was notable for higher proportion of Parkinson disease in male/paternal relatives, and dementia in female/maternal relatives.

Conclusions: This prospective, cross-sectional data on history, demographic, cognitive, motor, sensory, and autonomic function in n = 251 participants with RBD highlight the lack of sex differences and the high preponderance of concomitant neurological abnormalities with RBD, and provide a valuable registry for future longitudinal studies and neuroprotective clinical trials.

Disclosure: No

P772 | REM sleep behaviour disorder and obstructive sleep apnoea: The role of positive airway pressure therapy

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Introduction: REM sleep behaviour disorder (RBD) is a parasomnia characterized by loss of muscle atonia during REM sleep, resulting in dream enactment. This condition is more prevalent in individuals with synucleinopathies such as Parkinson's disease (PD). In patients with RBD, obstructive sleep apnoea (OSA) occurs as a comorbid condition. The main goals of this study were to determine the prevalence of OSA in isolated RBD (iRBD) patients or RBD plus synucleinopathy and to evaluate whether positive airway pressure therapy improved RBD symptoms in both groups.

Methods: Data on demographics, clinical presentation, body mass index (BMI), video-polysomnography (VPSG), medication and improvement in self-reported RBD symptoms following positive airway pressure therapy were collected. Patients from a tertiary sleep centre with RBD meeting ICSD-3 criteria, with concomitant OSA (defined as an apnoea-hypopnea index (AHI) ≥5/h) were included. For descriptive statistics, mean and standard deviation (SD) were used.

Chi-square and Mann-Whitney-U tests were used to compare categorical and continuous variables, respectively.

Results: The prevalence of OSA in 53 RBD patients was 73.6% ($n = 39$): 46.2% mild, 33.3% moderate and 20.5% severe. Out of the patients with concomitant RBD+OSA, 41.0% ($n = 16$) also had a diagnosis of synucleinopathy, the vast majority being PD (93.8%, $n = 15$). No statistically significant differences were found between iRBD+OSA and RBD+synucleinopathy+OSA regarding male sex, age at diagnosis of RBD, BMI, AHI, total sleep time, % of different sleep stages, REM-AHI, NREM-AHI and %supine. AutoCPAP, CPAP and BIPAP therapy were used by 48.7% ($n = 19$), 7.7% ($n = 3$) and 5.1% ($n = 2$) of patients, respectively. These therapies improved self-reported RBD symptoms in 72.7% of the iRBD patients and in 54.5% of RBD+synucleinopathy patients. The main subjective improvement was the reduction in abrupt movements (87.5% in iRBD and 100.0% in RBD+synucleinopathy). No statistically significant differences were found between patients with or without improvement in RBD symptoms regarding male sex, age at diagnosis of RBD, BMI, AHI, total sleep time, % of different sleep stages, REM-AHI, NREM-AHI and %supine.

Conclusion: Our findings suggest that, in this population of patients, OSA is a very common comorbidity of RBD. Positive airway pressure therapy may improve self-reported RBD symptoms, including in those with a synucleinopathy.

Disclosure: No

P773 | Cyclic alternating pattern in temporal lobe epilepsy with or without obstructive sleep apnea syndrome

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Introduction: To evaluate the differences of sleep macrostructure and cyclic alternating pattern in patients with temporal lobe epilepsy with(AHI≥5, TLE-OSA)or without OSA(AHI < 5, TLE).

Materials and methods: People with temporal lobe epilepsy who underwent overnight polysomnography were retrospectively recruited. Twenty-four patients with TLE-OSA and nineteen patients with TLE were included in the study. Scoring and analysis of sleep macrostructure and cyclic alternating pattern(CAP)parameters were performed. TLE-OSA group was divided into 2 groups by OSAS severity("milder" group AHI < 20/h $n = 12$,moderate-to-severe group AHI ≥ 20 $n = 12$).

Results: TLE-OSA group had statistically higher age and BMI than the TLE group while the remaining demographic and clinical variables were similar. Higher time in bed($p = 0.049$),WASO($p = 0.02$)and a trend toward a lower REM sleep percentage($p = 0.07$)was evident in TLE-OSA vs Teethe milder group compared to TLE controls had more WASO($p = 0.04$).CAP analysis showed higher CAP rate in N1($p = 0.02$), lower A2%($p = 0.046$), higher A3%($p = 0.005$),A3 index ($p = 0.013$), shorter duration of A($p = 0.008$), A1 ($p = 0.004$),A2 ($p = 0.033$) and A3($p = 0.046$) in TLE-OSA vs TLE. The "milder" group compared to TLE showed a shorter duration of A($p = 0.03$),while the AHI≥20 vs TLE group a higher A3%($p = 0.01$), shorter mean duration A1($p = 0.03$). Partial correlation adjusted for age, gender and BMI showed a positive correlation between AHI and CAP rate in N1($r = 0.34$ $p = 0.03$), percentage of A3($r = 0.46$ $p = 0.003$), the index of A3 ($r = 0.32$ $p = 0.04$) and a negative correlation with the percentage of A2 ($r = -0.32$ $p = 0.039$), with the mean duration of phase A($r = -0.31$ $p = 0.04$),with the average duration of phase A1($r = -0.43$ $p = 0.006$); a positive correlation of ODI with the percentage of A3($r = 0.35$ $p = 0.025$) and negative with the mean duration of A1($r = -0.37$ $p = 0.018$). Finally, the severity of hypoventilation (T90) showed a direct relationship with the average duration of phase *B* ($r = 0.32$ $p = 0.04$).

Discussion: Our study represents the first study to compare the CAP in TLE patients with and without OSAS and demonstrates more fragmented sleep in TLE-OSA also evident in "milder"group. CAP alterationa in TLE-OSA involves failure of adaptive mechanisms and maladaptive arousal processes (A3) mainly in moderate-to-severe OSAS. Severity of OSAS showed a marked relationship with cortical arousal while hypoventilation correlated with increasing phase *B* duration, a more vulnerable phase to upper airway collapse and attenuation of mechanisms in ventilator impulse control.

Disclosure: No

P774 | Long time polysomnographic sleep and breathing evaluations in children with CDKL5 deficiency disorder

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Introduction: Atypical Rett syndrome due to a mutation in the CDKL5 gene should be considered in children with refractory epilepsy and severe developmental delay in the first three months of life. As with Rett syndrome, children with a CDKL5 deficiency disorder (CDD) often have sleep (90%) and breathing disorders (50%). Sleep disorders have a significant impact on caregivers and are challenging to treat. As developmental delay improves over time, it is assumed sleep and breathing disturbances may also improve. The outcomes of these features are unknown in children with CDD.

Methods: We retrospectively evaluated sleep and respiratory function changes over 5–10 years in a small cohort of Dutch children with CDD, using video-EEG and/or polysomnography (3×24 h) and a parental questionnaire, the Sleep Disturbance Scale for Children (SDSC).

Results: Sleep disturbances persisted during the study period. All five individuals had long sleep latency and frequent arousals and awakenings (unrelated to apneas/seizures), corresponding to the SDSC findings. Low sleep efficiency was present and did not improve. In our

participants, total sleep time (TST) was short and remained so. Time in bed (TIB) was typical for children aged 2–8 years, but did not adjust with ageing. Low duration or even absent REM sleep persisted over time. No sleep apneas was noted. Central apneas due to episodic hyperventilation was reported during wakefulness in two of the five.

Conclusion: Sleep disturbances were present and persisted in all. The decreased REM sleep and sporadic breathing disturbances in wake may indicate failure of brainstem nuclei. Sleep disturbances severely affect the emotional wellbeing and quality of life of caregivers of children with CDD.

Disclosure: No

P775 | Sleep behaviors and sleep duration matter with wake-up ischemic stroke in non-snoring patients

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Study Objectives: To investigate the association between wake-up stroke (WUS) and sleep curtailment and weekend catch-up sleep (CUS) stratified by sleep apnea risk in patient with acute ischemic stroke.

Methods: A retrospective cross-sectional study consisted of 266 subjects with acute ischemic stroke that occurred within 1 month. Among them, we enrolled 250 individuals and excluded 16 people who had missing values for the following variables: shift workers without night sleep data ($n = 9$) and sleep profile ($n = 7$). A total of 250 subjects was included in the final analysis, using face-to-face interviews about sociodemographic characteristics, height, weight, habitual sleep duration, and time-in-bed at night on weekdays and weekend, sleep-related profiles, and comorbid-medical conditions. Weekend CUS was identified when nocturnal sleep extension occurred over the weekend, and this was quantified. Average sleep duration, and chronotype were determined. The association between sleep factors (including weekend CUS, average sleep duration, and chronotype) and WUS was analyzed.

Results: Among 250 patients, 74 (29.6%) were classified as low-risk group of obstructive sleep apnea (OSA) and 176 (70.4%) as high-risk group of OSA. And it was reclassified into WUS and non-WUS group. There was no statistically significant difference in age, gender, body-mass index and stroke-related risk factors between the two groups. The midpoint of sleep on free days corrected for sleep extension on free days (MSFsc) as well as the presence of weekend CUS were similar between the 2 groups. Only weighted total sleep time was the borderline of statistical significance ($p = 0.054$) in low-risk group of OSA between WUS and Non-WUS group. Sleep factors including lack of weekend CUS, weighted TST, and MSFsc were independently associated with WUS in low-risk group of OSA. There were statistically significant ($p = 0.047$, $p = 0.011$, $p = 0.041$, respectively).

Conclusions: Weekend CUS and longer sleep duration were associated with a low risk of hyperacute ischemic WUS among low-risk group of OSA.

Disclosure: No

P776 | Treatment-naïve patients with neurological form of wilson's disease show more sleep disturbance in videopolisomnography compared to healthy control

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Objectives/introduction: Wilson's disease is a disorder of copper metabolism which causes its accumulation in various organs – mainly in liver or brain. It is a liver as well as a neurodegenerative disorder and may lead to sleep disturbance (SD). It maybe be expected that SD will show similar prevalence among individuals with Wilson's disease as with other neurodegenerative disorders. However, there is limited data available on the physiological aspects of SD in this group.

Methods: 9 newly-diagnosed treatment-naïve patients with Wilson's disease (WD, neurological form classified according to predominant clinical symptoms) and 9 healthy controls (HC) matched for sex and age were assessed with videopolisomnography (vPSG). vPSG was performed between 8:00 p.m. and 6:00 a.m. using a Grass Comet USA system with 200 Hz sampling. Comparisons of sleep parameters were performed using the Mann-Whitney U test.

Results: Results showed that patients with WD spent more time in bed (486 ± 5.2 vs 479 ± 1.4 min, $p < 0.001$), had shorter total sleep time (344.5 ± 77.1 vs 452.4 ± 14.2 min, $p < 0.001$), larger N1 proportion (11.4 ± 4.6 vs 5.1 ± 4.6%, $p < 0.001$) and smaller N2 proportion (25.7 ± 9.1 vs 53.4 ± 5.8%, $p < 0.001$) as well as REM proportion (17.6 ± 7.9 vs 21.7 ± 4.2 percent, $p < 0.001$) than healthy controls. Moreover, they experienced more sleep interruptions (WASO, 126.5 ± 78.8 vs 4.3 ± 4.3 min, $p < 0.001$) and sleep latency (32.7 ± 19.7 vs 10.4 ± 3.1 min, $p < 0.001$). The two investigated groups differed in sleep efficiency (WD 71.0 ± 16.7 vs HC 93.8 ± 4.0%). There were no differences in proportion of N3, REM sleep latency, apnoea-hipopnea index and periodic leg movement in sleep.

Conclusions: This study is particularly important since it is the first one to examine sleep among a group of newly-diagnosed treatment-naïve WD patients. The results of this study illustrate how Wilson's disease may be associated with profound impairment to sleep length and quality.

Disclosure: No

P777 | Exploring the possibility to use local field potential signal for auditory slow-wave stimulation in parkinson's disease

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Introduction: Growing evidence suggests that deep sleep (i.e., slow-wave sleep, SWS) enhancement not only exerts immediate therapeutic effects upon poor sleep quality in patients with Parkinson's disease (PD) but also reduces disease progression. Phase-targeted auditory stimulation (AS), a new technique to boost SWS, relies on surface EEG signal. The new neurostimulator PERCEPT™ PC (Medtronic) for deep brain stimulation of the subthalamic nucleus (STN-DBS) allows real-time recording of the STN local field potential (STN-LFP). The objective of this study is to validate the STN signal for slow-wave detection for AS in PD patients.

Methods: In an ongoing study, we plan to collect data in 8 PD patients. After DBS implantation, each patient is participating in 2 full-night recording sessions: DBS OFF and DBS ON, separated by at least 3 days. Surface EEG is recorded using a 10–20 system (Brain Products DC amplifier). STN-LFP is recorded in a bipolar montage. During both nights, up-phase-targeted AS is applied during SWS. At the moment, one full dataset was collected in 1 patient.

Preliminary results: The preliminary analysis of the coherence between STN-LFP and the surface EEG has shown, that during both nights, the strongest coherence was in the low delta (0.5–2 Hz) and sigma (10–14 Hz) bands. The auditory evoked potential was present in STN-LFP and contained all main components, observed in the surface EEG: P200, N550 and P900. Furthermore, the time-locked spectral analysis of STN-LFP has revealed an evoked enhancement of theta power (3–6 Hz) and an increase in sigma power.

Conclusions: The preliminary coherence analysis has shown, that the bipolar STN recording can be potentially used to detect slow waves during AS. Importantly, DBS status (ON or OFF) did not affect coherence, and, thus, should not impact the detection of slow waves. Time-locked response in STN can be used to assess the effectiveness of AS to evoke slow waves and other associated oscillations (theta and sigma bursts). Together, our preliminary analysis suggests a possibility to use solely STN-LFP for AS in patients with PD.

Disclosure: Yes

Conflict of Interest statement: The study is an Investigator-Initiated Study. Funding for this study is provided by the Forschungskredit of the University of Zurich (grant no. FK-20-047) and by Medtronic. Medtronic has no role in the study design, data analysis and interpretation, and in writing the abstract.

P778 | The role of non-invasive ventilation in Steinert disease

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Objectives/Introduction: Steinert's disease is a rare multisystem disorder mainly characterised by skeletal muscle weakness and myotonia. Diagnosis is confirmed by the demonstration of an abnormality at the 19q13-2 locus and its transmission is autosomal dominant.

Methods: We report an affected family (father, 2 children and a grandchild) with multiorgan demage that combines various degrees of muscle weakness, cardiac conduction disorders, cataracts, endocrine demage and obstructive sleep apnea (OSA).

Results: 1. A 64-year-old man (father), oligophrenic, with previous history of severe OSA (AHI 40 events/h), diabetes and cataracts, presented with a 3-year history of muscle weakness and gait disturbance. The electromyography recorded myotonic discharges and the diagnosis of Steinert's disease was confirmed by molecular genetic testing. He had a peak cough flow of 266 L/min, a nocturnal oximetry dessaturation and did not collaborate in spirometry. Due to OSA and global respiratory failure, he underwent long-term oxygen therapy and BPAP titration, but with poor adherence.

2. A 43-year-old woman (child), with the diagnosis of Steinert's disease, cataracts, hypersomnia and mild OSA (AHI 17 events/h), had an hypercapnic respiratory failure (pCO_2 46 mmHg), a maximum inspiratory pressure of 27 cmH_2O, a maximum expiratory pressure of 72 cmH_2O and a forced vital capacity of 61% predicted. He underwent BPAP therapy with normocapnia (pCO_2 41 mmHg) and improvement in apneas and daytime sleepiness.

3. A 37-year-old man (child), oligophrenic, with previous history of Steinert's disease and mild OSA (AHI 20 events/h), presented with hypercapnic respiratory failure (pCO_2 48 mmHg). He underwent BPAP tritation with normocapnia (pCO_2 38 mmHg) and excellent adherence.

4. A 20-year-old man (grandchild), oligophrenic, with the diagnosis of Steinert's disease, obesity, atrial fibrillation and mild OSA (AHI 26 events/h), presented with diurnal hypercapnia (pCO_2 48 mmHg). He underwent BPAP therapy with normocapnia (pCO_2 35 mmHg) and excellent adherence.

Conclusions: Steinert's disease causes sleep disordered breathing and respiratory failure due to a combination of OSA, reduced central drive and respiratory muscle weakness. This family report illustrates the importance of a prenatal testing in an affected family member and the beneficial effects of non-invasive ventilation in myotonic dystrophies.

Disclosure: No

P779 | Fasciculations as initial symptom of IGLON5 antibody encephalopathy

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IgLON5 antibody encephalopathy is a rare but increasingly recognized disorder with a variety of clinical signs, due to deposition of neuronal tau protein. Most patients display a characteristic sleep disorder with severe insomnia, NREM parasomnia and sleep disordered breathing (stridor, obstructive sleep apnoea) but clinical spectrum has steadily expanded with brainstem, autonomic and neuropsychiatric disorders and, more rarely, peripheral symptoms with membrane hyperexcitability. Antibodies are present in both serum and CSF and there is a strong correlation with human leukocyte antigen (HLA) DRB1*10:01 and HLA-DQB1*05:01. Majority of cases respond partially to immunotherapy.

We report a clinical case of a 46-year-old male patient with IgLON5 antibody disease and insidious onset (June 2021) with stable course, in absence of associated antibodies (GAD, NMDAR, AMPA, GABA-A, GABA-B, mGluR1, mGluR2, mGluR5, DPPX, LGI1, CASPR2). First symptom the patient recognized was generalized fasciculations 24 h after SARS-COV2 vaccine (1st dose mRNA-Moderna®), without muscle cramps nor weakness, followed by a sleep disorder (severe insomnia and obstructive sleep apnoea) and bulbar dysfunction. Nine months after, he presented mild parkinsonism signs, mild cognitive impairment and acute bilateral L5-S1 denervation in electromyography with HLA DRB1*03 (DR17) and DRB1*13. He was subsequently treated with methylprednisolone and monoclonal antibodies (Rituximab), with a dramatic improvement of fasciculations.

A growing spectrum of clinical manifestations suggest that IgLON5-antibodies may play a minor but important role on peripheral nerves, as seen in very few cases in the literature[1],[2], thus a comprehensive investigation of peripheral and central nervous system should be done systematically. It should be discussed if the peripheral affection, that caused a hyperexcitability manifestation, was primarily or directly induced by IgLON5-antibodies. Whether the association between COVID- 19 vaccine (only 24 h before symptoms) and autoimmune manifestations is co-incidental or causal remains to be elucidated.

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Disclosure: No

P780 | Deep phenotyping for REM sleep behaviour disorder: Comparing the utility of wake and sleep physiological metrics as prognostic indicators

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Introduction: Over 70% of people with REM-Sleep Behaviour Disorder (RBD) go on to develop one of the neurodegenerative α -synucleinopathies, most commonly Parkinson's disease (PD). Symptom-tracking remains the dominant clinical approach to RBD prognosis, given sub-optimal specificity/sensitivity of pathology-detection methods and inadequate prognostic biomarkers of disease progression. Our overarching aim is to identify novel prognostic biomarkers of RBD phenoconversion, using group analyses and machine learning classifier models. Here, we test whether wake measures – which can be rapidly acquired during a clinic visit – or overnight sleep measures provide greater prognostic insights.

Methods: We present results from a prospective observational study combining 64-channel, at-home high-density sleep and wake EEG with electrocardiography (ECG), electrooculography (EOG), actigraphy and clinical assessments in idiopathic RBD ($n = 16$; 12.5% Female; mean age 64.6 ± 9.1 years), PD ($n = 17$, diagnosis < 3 years; 23.5% Female; mean 66.7 ± 9.3 years) and controls ($n = 19$; 26.3% Female; mean 69.6 ± 8.8).

Results: RBD and PD groups were significantly different from Controls in clinical measures of olfaction ($p < 0.001$; 1-way ANOVA), depression ($p = 0.004$; 1-way ANOVA), and attention ($p = 0.009$, Kruskal-Wallis). Neither waking autonomic function (inferred from ECG) nor EOG-derived measures of wake eye movements, including blink rate and blink duration, and were significantly different between groups. Preliminary analyses of sleep showed group differences in macroarchitecture, specifically for REM latency and percentage between Controls and RBD/PD groups ($p = 0.042$; Mixed Between Within Subjects ANOVA). A Random Forest classifier had the greatest accuracy for class prediction for Control & PD groups, and we present the most informative manual features for Control/PD classification and RBD prognostic classification.

Discussion: These initial results indicate that wake ECG/EOG measures alone are insufficient for identifying subtle changes in prodromal and early-stage PD. However, algorithms enabling integrated analyses of wake, sleep, brain and peripheral metrics hold promise as a route towards more sensitive and informative biomarkers based on non-invasive measures. The results presented form the baseline for a 12-month follow-up, which will further investigate longitudinal changes in the RBD cohort.

Disclosure: No

P781 | The effect of insomnia phenotypes on subjective sleepiness in patients with epilepsy

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Purpose: Sleep complaints and its disorders frequently accompany epilepsy. In recent studies, sleep-related movement disorders, especially restless legs syndrome and sleep bruxism are found to have a high prevalence among patients with epilepsy (PWE). In addition, excessive daytime sleepiness (EDS) and chronic insomnia are frequent observations in PWE having various contributing risk factors. Our aim was to study the role of insomnia phenotypes in formation of EDS in PWE.

Methods: PWE in the epilepsy group (EG) underwent somnological interview including subjective sleepiness complaint, as well as were assessed for insomnia and its phenotypes. EDS was measured by the Epworth sleepiness scale (ESS) using a cut-off of ≥9. Patients with no antiseizure medications (ASM) and those on stable ASM treatment were included in EG. uame evaluation was performed in a group of patients with primary insomnia and no epilepsy (insomnia group, IG). Insomnia was divided into two main phenotypes: sleep-onset insomnia (SOI) and sleep-maintenance insomnia (SMI). The diagnosis of insomnia was made according to the International Classification of Sleep Disorders 3rd Edition chronic insomnia diagnostic criteria. Only PWE having insomnia were included in the current analysis. Patients with probable other secondary causes of EDS were excluded (e.g., restless legs syndrome, sleep-disordered breathing, etc.). Chi-square test was used for statistical analysis.

Results: Sixty-three PWE with any phenotype of chronic insomnia were included in EG (mean age – 34.4, F-34.4%), while 31 patients with chronic insomnia disorder without epilepsy were included in IG (mean age – 41.1, F-61.3%). Insomnia phenotypes were distributed as follows: SOI/SMI ratio for EG – 36.5%/63.5% and for IG – 16.1%/83.9% respectively. Subjective sleepiness was more pronounced in the SMI of EG: SOI – 30.4%, SMI – 60.0%, ($p < 0.03$). Subjective sleepiness in IG was not different between the two phenotypes: SOI – 20%, SMI – 19.2% ($p > 0.05$). According to ESS, EDS tended to be associated with SMI in EG (9.5% for SOI vs. 29.3% for SMI), although lacking statistical significance ($p > 0.05$).

Conclusion: Our findings suggest PWE suffered more SMI than SOI. Also, SMI may play a role in the development of subjective sleepiness in epilepsy and it may contribute to the severity of the disease as well.

Disclosure: No

21: MEDICAL DISORDERS AND SLEEP

P179 | Echocardiographic changes in patients with coexisting obstructive sleep apnea and heart failure with different ejection fractions

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Objectives /introduction: Assesment of echocardiographic parameters in patients with coexisting obstructive sleep apnea(OSA) and heart failure(HF)

Methods: 143 OSA and HF patients were evaluated in a sleep labs in Timisoara. We collected socio-demographic data, neck/abdominal circumference (NC, AC), sleep questionnaires, comorbidities, blood test data, polygraphy, echocardiographic measurements (TDV-Telediastolic volum, TSV-Telesistolic volum, LA-left atrial surface, LA diameter, RV-right ventricle diameter, Pulmonary artery pressure-PAP).

Patients were divided depending on ejection fraction (EF): preserved EF≥50%(HFpEF), reduced EF< 50%(HFrEF). Each group was divided depending on apnea-hypopnea index (AHI): <30% (mild-moderate OSA), ≥30% (severe OSA). All data analyses were performed with Stata 15.1 (Statacorp, Texas USA) and p value < 0.05 was considered significant.

Results: HFrEF: 50(35%) patients, 18(36%) mild-moderate OSA vs 32(64%) severe OSA, male 14(77.7%) vs 23(71.8%), age 65(59–68) vs 63(59–73), BMI 31.5(29–36) vs 36(33–42)($p = 0.018$), NC 41.4 ± 5 vs 44.7 ± 3.9($p = 0.012$), AC 117.5(110–125) vs 125(115.5–130).

TDV160 (111–180) vs 130 (96–182.5), TSV 85 (65–115) vs 72 (53–121), LA surface 24.5 (21–28.7) vs 28 (25–32), LA diameter 4.75 (4.3–5.2) vs 4.9 (4.55–5.3), RV diameter3 (2.7–3.1) vs 3 (2.6–3.5), PAP44.5 (28.5–52) vs 45 (35–50), impaired heart parietal kinetics HPK15 (83.33%)vs 5 (18.52%) ($p < 0.001$)

HFpEF: 93(65%) patients, 27(29%) mild-moderate OSA vs 66(71%) severe OSA, male 18(66.7%) vs 44(66.7%), age 58(51-64) vs 61(58-67) ($p = 0.053$), BMI 34(29-37) vs 39(33-42) ($p = 0.025$), NC 40.9 ± 4.3 vs 44.4 ± 4.5 ($p < 0.05$), AC 115(105–123) vs 123(117–132) ($p < 0.05$).

TDV 130 (115–140) vs 130 (110–150), TSV 58 (50–64) vs 60 (45–66), LA surface 24 (22–25) vs 28 (23–30) ($p = 0.032$), LA diameter 4.3 (4–4.5) vs 4.2 (3.84–4.7), RV diameter 2.8 (2.4–2.9)vs 2.85 (2.6–3.2), PAP 30 (29–35) vs 40 (25–50), impaired HPK 19 (61.29%) vs 9 (13.85%) ($p < 0.001$)

Patients with HFrEF, regardless of OSA severity, had increased TSV, LA diameter and more frequent impaired HPK($p < 0.05$).

Patients with mild-moderate OSA, regardless of EF are more likely to have impaired HPK ($p < 0.001$).

In HFpEF, mild-moderate OSA patients have more aortic regurgitation (AR) (33.33% vs 15.15%) ($p < 0.05$).

In mild-moderate OSA, HFrEF patients have increased tricuspidian regurgitation (88.89% vs 55.56%) and in severe OSA, HFrEF patients have more AR (43.75%vs 15.15%) ($p < 0.05$).

Significant correlation was observed between AHI and AR (OR = 0.052, 95% CI) in the entire group.

Conclusions: Patients with coexisting HFrEF and OSA, regardless of AHI are more likely to have ecocardiographic anormality with increased mortality.

Disclosure: No

P180 | Sleep-wake changes in patients with post-COVID syndrome, fatigue and excessive daytime sleepiness

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Background: Post-COVID syndrome affects approximately 10% of patients with SARS-CoV2 infection. Its symptoms include headache, anosmia, dyspnoea, fatigue and sleep-wake disturbances. We aimed to objectively assess sleep-wake changes in post-COVID patients reporting fatigue and excessive daytime sleepiness (EDS).

Methods: Consecutive patients with Post-COVID-19, fatigue and EDS referred to our specialized clinic were included. Standardized assessment included questionnaires ($n = 37$, Fatigue Severity Scale(FSS), Epworth Sleepiness Scale(ESS), and Beck Depression Index(BDI)), video-polysomnography (PSG, $n = 24$), vigilance tests (multiple sleep latency test (MSLT), $n = 11$; maintenance of wakefulness test (MWT, $n = 7$) and actigraphy ($n = 35$)

Results: Patients were mostly female (70%), mean age 45 years and had mild acute SARS-CoV2 infection(88%). Mean scores were: FSS 5.9, ESS 13.1 (29/37 >10), and BDI 21.4 (26/34 >12). Mean apnoea-hypopnea index (AHI) was 17.2/h (9/24 > 20/h), mean sleep efficiency was 82% (12/24 < 85%), sleep duration 363.8 min and arousal index 30.8/h. Mean percentage of N1, N2, N3 and REM was 15.8%, 30.7%, 22.4% and 13.3%, respectively (14/24 REM < 15%). Mean sleep latencies were 11.0 min (2/11 < 5) on MSLT and 28.1 min (1/7 < 14) on MWT. No sleep onset REM episodes and no REM-sleep behaviour disorder were observed. On the actigraphy ($n = 35$), mean time in bed was 8.3 h (12>9 h) with a mean variability of 4.9 h. Inactivity index was 39.9% (31 > 33%). Non-parametric analysis showed mean relative amplitude of 0.9 (2 < 0.8) and mean interdaily stability of 0.5 (11 < 0.4).

Conclusions: These preliminary findings (polysomnographic data of the whole series will be presented at the conference) show that only a minority of post-COVID patients reporting fatigue and EDS had abnormal vigilance (MSLT, MWT) tests and/or clear-cut sleep disorders. Conversely, a mild acute SARS-CoV2 infection, female gender, depression, moderate SDB, sleep architecture changes are frequently found. In addition, the actigraphy findings of high inactivity index and high variability of the sleep-wake pattern during the monitoring suggest on one side clinophilia and on the other side poor sleep hygiene, which both contribute and be affected by the enhanced fatigue. Further data are needed to confirm these observations and to identify predictors of objective sleep-wake changes.

Disclosure: No

P181 | Impact of COVID-pandemic on sleep in medical students

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Introduction: SARS-CoV-2 infection and the imposed lifestyle changes have been implicated in causing insomnia and excessive daytime sleepiness. Medical students are among the risk groups exposed to higher incidence of developing COVID-related sleep disturbance. The objective of the present study is to assess the impact of the COVID-pandemic on sleep in this population.

Methods: An online-based survey comprised questions on basic anthropometrics, history of SARS-COV-2 infection affecting respondents or their families and standardized questionnaires, including Beck Depression Inventory (BDI), Pittsburgh Sleep Quality Index (PSQI), Epworth Sleepiness Score (ESS), Morningness-Eveningness Questionnaire (MEQ), Insomnia Severity Index (ISI). Ninety-seven individuals (57 males and 40 females, age = 22.6 ± 2.7 years) anonymously and voluntarily participated in the study. Results were analyzed on SPSS v21 applying independent samples t-test and Fisher's exact test.

Results: Forty-eight participants (49.5%) suffered from COVID-19 (COVID+) in the last 24 months (8.4 ± 7.2 months) and 49 (50.5%) did not have COVID-19 (COVID-). The two groups did not differ by age, sex, body mass index, or history of sleep disturbances. There were no statistically significant differences in MEQ, ISI, PSQI between COVID+ and COVID- groups. COVID+ respondents showed a trend towards higher ESS scores (7.8 ± 3.9 vs 6.3 ± 3.5, $p = 0.071$) and significantly higher BDI scores (13.7 ± 10.2 vs 10.1 ± 7.6, $p = 0.048$). Within the COVID+ group, 23 students reported disturbed sleep (Disturbed) at the moment of participation in the study, and 26 had no sleep-related complaints (Non-Disturbed). The participants within the Disturbed subgroup scored significantly higher on BDI (18.5 ± 11.2 vs 9.6 ± 6.9, $p = 0.03$), ESS (9.1 ± 4.3 vs 6.6 ± 3.1, $p = 0.029$), ISI (13.9 ± 4.7 vs 6.8 ± 4.3, $p < 0.001$) and PSQI (10.3 ± 4.1 vs 6.5 ± 3.5, $p = 0.001$) compared to the Non-Disturbed subgroup. The presence of sleep disturbance before COVID has a pronounced effect on the occurrence of disturbed sleep after the infection ($p = 0.011$).

Conclusions: COVID has a significant impact on sleep in medical students. Individuals with a history of disturbed sleep before the infection are prone to developing sleep disturbances after COVID. The sleep perturbations present commonly as insomnia and are more overtly manifested in individuals with depressive symptoms.

Disclosure: No

P182 | Sleep quality, insomnia, depression, and anxiety in atopic dermatitis: the mediation role of insomnia in the predisposition to psychological symptomatology

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Objectives/Introduction: Atopic dermatitis (AD) is a chronic skin disease typically associated with sleep and mental health problems. Recent literature proposed a key role of sleep disturbances in the occurrence of mood and anxiety disorders in AD patients. This study aimed

(i) to evaluate the impact of AD on sleep quality, insomnia, and psychological symptoms and

(ii) to estimate the contribution of insomnia to the vulnerability to depression and anxiety of AD patients.

Methods: 114 subjects were recruited from the General Dermatology and Oncology department of the San Salvatore hospital (L'Aquila, Italy). The sample included 57 adults diagnosed with AD (mean age ± standard deviation, 34.28 ± 13.07 years) and 57 healthy adults (34.39 ± 3.09 years). Through validated questionnaires, we evaluated sleep quality, insomnia, depression, and anxiety in both subsamples and the self-perceived severity of atopic eczema in the AD group. To evaluate differences in the examined variables between the two groups, the questionnaire scores were compared using independent samples *t*-Test. Moreover, we performed two mediation models to assess the mediation role of insomnia in the relationship between the subjective severity of AD and depressive and anxiety symptoms.

Results: The two groups significantly differed in sleep quality ($t_{112} = 3.16$, $p = 0.002$), insomnia ($t_{112} = 2.83$, $p = 0.006$), and depression ($t_{112} = 2.52$, $p = 0.013$). AD patients reported poorer sleep quality (7.58 ± 3.90), and more severe insomnia (8.39 ± 5.81) and depression symptoms (10.77 ± 8.41) than healthy participants (5.42 ± 3.37; 5.51 ± 5.04; 6.97 ± 7.73, respectively). Anxiety measure did not differ between AD (7.05 ± 4.58) and control groups (6.23 ± 5.28; $t_{112} = 0.89$, $p = 0.37$).

AD severity was positively associated with insomnia, depression, and anxiety (all $p \leq 0.002$). Insomnia fully mediated the effect of AD symptoms on depression ($\beta = 0.338$, 95% BootCI: [0.157, 0.501]) and anxiety ($\beta = 0.329$, 95% BootCI: [0.172, 0.503]). Specifically, insomnia explained 81.64% of the effect of AD severity on depression and 81.84% of the relationship between AD symptoms and anxiety.

Conclusion: AD patients experience more severe sleep disturbances and depressive symptoms than the general population. Moreover, insomnia plays a crucial role in the predisposition of AD patients to depression and anxiety. Therefore, we suggest strategic interventions aimed at treating insomnia to improve AD patients' well-being.

Disclosure: Yes

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Giulia Amicucci declare no other conflict of interest within the last year.

Federico Salfi declare no other conflict of interest within the last year.

Maria Esposito has served as a speaker/board member for Abbvie, Almirall, Biogen, Celgene, Eli Lilly, Janssen, Leo Pharma, Novartis.

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Michele Ferrara declare no other conflict of interest within the last year.

P183 | Characterization of sleep disorders in a cohort of patients with definite Meniere's disease

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Objectives/ introduction: Meniere's disease (MD) is a disabling chronic vestibular pathology. Obstructive sleep apnea syndrome (OSAS) may cause dysfunction of the vestibular system and effective treatment of concomitant sleep apnea syndrome could reduce vertigo severity and improve hearing loss. We characterized sleep, daytime vigilance (sleepiness, fatigue) and screened for sleep disorders in a cohort of patients followed up at the University hospital for definite MD.

Methods: Monocentric study evaluating in 26 patients with definite MM the severity of the disease (anamnesis, clinical evaluation and functional explorations of vertigo and hearing, functional handicap score for vertigo using AAO-HNS), comorbidities (cardiovascular, anxiety, depression, migraine, etc.), sleep disorders (anamnesis, ICSD-III classification, Pittsburgh PSQI sleep questionnaire, Epworth ESS sleepiness scale, Pichot PFS fatigue scale) and using respiratory polygraphy or polysomnography (apnea-hypopnea index, sleep fragmentation and architecture).

Results: 58% of patients said that they were dissatisfied with their sleep, whereas 76% had a pathological score on PSQI >5. 73% had insomnia (58%) and/or OSAS. 42% had moderate or severe OSAS, with continuous positive airway pressure treatment recommended in 38%. According to AAO-HNS, patients most disabled by MD were significantly more insomniac and fatigued, but not sleepy. Patients with moderate or severe OSAS had a significant hearing loss at 500Hz and had more intractable MD.

Conclusions: Bidirectional interactions have been described between inner ear and both sleep and biological clock. Nevertheless, the involved pathophysiology remains poorly understood. Study of sleep seems relevant in patients with MD, especially in case of intractable MD. Improved sleep could better quality of life and have a positive impact on MD's severity. Sleep disorders are particularly common and probably underdiagnosed in patients with MD. Further larger scale multicentric studies are needed to better understand the associations between sleep and MD.

Disclosure: No

P184 | Sleep after COVID-19 infection

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Objective/Introduction: Many people who have recovered from COVID-19 infection are reporting decreased sleep quality, sleepiness and insomnia symptoms. Current evidence suggests that sleepiness might be attributed to the infection per se, whereas insomnia might be related mainly to psychosocial factors.

Aim: Our study aimed to evaluate sleep disturbances, 3 months after hospitalization for COVID-19 infection, in Athens, Greece.

Methods: We assessed fifty-nine (59) patients regarding self-questionnaires focusing on sleep quality (Pittsburgh Sleep Quality Index, PSQI), insomnia symptoms (Athens Insomnia Scale, AIS) and daytime sleepiness (Epworth Sleepiness Scale, ESS).

Results: The mean age of our population was 60 ± 8 years old, with mean Body Mass Index (BMI) of 28,6 ± 3,2 kgr/m^2. The majority of the patients were male (71,42%) and the mean length of hospitalization was 12 ± 3 days. PSQI total score >5 reported 35,71% of patients, AIS score >6 24,14%, and ESS >10 11,86%. PSQI score correlated positively with both AIS ($r = 0{,}798$, $p < 0{,}001$) and ESS scores ($r = 0{,}365$, $p < 0{,}005$). Sleepiness was more prominent in younger compared to older patients ($r = -0{,}324$, $p = 0{,}012$). (Figure 1).

Conclusion: Sleep disturbances were common among patients 3 months after COVID-19 infection and hospitalization.

Disclosure: No

P185 | A multidisciplinary initiative for screening and treating sleep disorders in the only tertiary centre in North-Eastern Mexico

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Introduction: Globally, sleep disorders are a public health epidemic that is often unrecognized, under-reported, and that has high economic costs [1]. The International Classification of Sleep Disorders (ICSD-3) includes seven major categories of sleep disorders: insomnia, sleep-related breathing disorders, central disorders of hypersomnolence, circadian rhythm sleep-wake disorder (CRSWDs), sleep-related movement disorders, parasomnias, and other sleep disorders [2,3].

The University Hospital "Dr. José E. González" is the only tertiary centre in the northeast of Mexico for patients without social health insurance, and has been workings towards recognizing the importance of unreported sleep disorders in their broad patient population.

Methods: Patients attending the outpatient clinic whose medical query wasn't disrupted sleep were screened using the following clinical tools: the Pittsburgh Sleep Quality Index (PSQI), the Patient Health Questionnaire (PHQ-9), the STOP-BANG Questionnaire, and the Epworth Scale.

A full clinical history was also taken, focusing on sleep habits and risk factors that could contribute to sleep difficulties.

Results: A total of 96 patients that attended the outpatient clinic were screened for sleep disorders.

Using the PSQI we identified 79 patients (88.7%) with low quality sleep (defined as a score of 5 or higher).

With the PHQ-9 we identified 65 patients (67.7%) with high risk of depression, none of which were receiving treatment.

Sixty-four patients (66.6%) were identified with at least 3 risks factors for obstructive sleep apnoea with the STOP-BANG questionnaire and were ordered polysomnography.

The Epworth Scale helped us identify 35 patients (36.4%) with a possible pathological hypersomnia, none of them diagnosed.

Conclusion: Sleep disorders are highly prevalent in our patients. With this initiative, we present our experience and results incorporating routine screening for these disorders in a clinical setting outside of a sleep clinic. Integrating this information can be helpful for working in multidisciplinary teams aimed at reducing the burden of chronic diseases and mortality in these patients. This is a multidisciplinary approach that will continue in our institution.

Disclosure: No

P186 | Sleep disorders effect to metabolic and cardio-vascular disease

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Objectives: Sleep disorders may have adverse effects on the metabolic and cardiovascular system. We investigated the prevalence ofsleep disorders and relation with metabolic and cardio-cerebral disease in the Korean population.

Methods: A stratified random population sample of Koreans adults was selected and evaluated using a semi-structured interview. The

questionnaire included basic demographics, Berlin Questionnaire, and Insomnia Severity Index.

Results: 1300 persons were interviewed. The snoring persons have more hypertension (18.2% vs. 8.9%), diabetes mellitus (7.3% vs. 3.7%) and hyperlipidemia (4.5% vs. 2.5%) but similar rate for cardiac disease (3.0% vs. 3.9%) and stroke (1.2% vs. 0.9%). Insomnia persons have more hypertension (18.6% vs. 12.2%), diabetes mellitus (8.1% vs. 4.5%), hyperlipidemia (9.8% vs. 2.5%), cardiac disease (7.5% vs. 2.3%) and stroke (1.8% vs. 1.0%).

Conclusions: Snoring and insomnia is related to the prevalence of metabolic diseases and cardio-vascular diseases.

Disclosure: No

P492 | Relation between symptoms of insomnia, depression, and disrupted circadian clock gene's expressions in inflammatory bowel disease

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Introduction: Inflammatory bowel disease (IBD) patients often complain of low sleep quality and insomnia. Such sleep impairments might originate in disruption of circadian rhythm, regulated by the expression of genes, such as Circadian Locomotor Output Cycles Kaput (CLOCK), Neuronal PAS Domain Protein 2 (NPAS2), Nuclear Receptor Subfamily 1 Group D Member 1 (NR1D1). Proinflammatory cytokines might disturb the transcription of mentioned genes, contributing to sleep disorders.

Aim of the study: The study aimed to compare expressions of chosen circadian clock gens: CLOCK, NPAS2, NR1D1 between IBD patients and healthy controls in peripheral blood leukocytes (PBLs) and assess the association between levels of selected genes' expressions and disease severity, sleep quality, and depression.

Materials and methods: The study group consisted of 44 IBD patients (13 ulcerative colitis (UC), 31 Crohn's disease (CD)), and 19 healthy controls. Participants filled following questionnaires: Athens Insomnia Scale (AIS), Harvey-Bradshaw index, partial Mayo score (disease activity assessment), Beck's Depression Inventory (BDI), and had venous blood drawn. The expression of studied genes was determined by qRT-PCR, following RNA isolation and cDNA synthesis. Genes' amplification was compared to the reference gene β-actin. Relative expression was calculated using $\Delta\Delta$Ct method. Funded by the Program of the Polish Ministry of Education and Science "Student science clubs create innovations" (SKN/SP/536070/2022) and National Science Centre, Poland (2018/31/N/NZ5/03715).

Results: IBD group showed a decreased expression of CLOCK mRNA ($p < 0.001$), NPAS2 mRNA ($p = 0.001$), NR1D1 mRNA ($p < 0.001$) compared to the healthy control. Circadian rhythm genes did not correlate with the severity of the disease but negatively correlate with BDI and AIS. TNF mRNA was positively correlated with CLOCK mRNA and NR1D1 mRNA ($r = 0.58$, $p < 001$; $r = 0.60$, $p < 0.001$), but not with NPAS2 mRNA.

Conclusions: IBD might be associated with decreased expression of clock genes which might be associated with insomnia and depressive symptoms. Reduced clock genes' expression can be related to the severity of inflammation but not the symptoms of the disease.

Disclosure: No

P493 | The association between insomnia, sleep duration and infections among patients in general practice

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Objective/Introduction: There is emerging evidence, both from controlled laboratory and epidemiological observational studies, that sleep disturbances and short sleep increase the risk of infection. The aim of this study was to assess whether chronic insomnia disorder (based on the Diagnostic and Statistical Manual for Mental disorders (DSM)-version-5), self-reported chronic sleep problems, sleep duration and chronotype were associated with risk of infections among patients visiting their general practitioner (GP).

Methods: A cross-sectional study of unselected patients visiting their GP in the spring or fall of 2020. The patients completed a one-page questionnaire while waiting for the consultation, that included the validated Bergen Insomnia Scale (BIS), questions on self-reported sleep problem, sleep duration (<6 h, 6–7 h, 7–8 h, 8–9 h, >9 h) and chronotype (morning type, neither a morning nor an evening type, evening type) and whether they have had any infections during the last three months. Associations were estimated using a modified Poisson regression model.

Results: The sample included 1848 patients (response rate 85.2%). The prevalence of chronic insomnia, chronic self-reported sleep problem (sleep problem of ≥3 months) and any type of infection was 48.3%, 46.9% and 53.9%, respectively. The risk of infection was 15% higher in those with chronic insomnia (Relative risk (RR) 1.15, 95% confidence interval (CI) 1.05–1.27) and 13% higher in those with a chronic self-reported sleep problem (RR 1.13, 95% CI 1.03–1.24) when adjusting for season of data collection, sex, age, educational level, and children living at home. Compared to those who reported a sleep duration of 7–8 h, patients with less than 6 h or more than 9 h had a 27% (RR 1.27, 95% CI 1.11–1.46) and 44% (RR 1.44, 95% CI 1.12–1.84) higher risk of infection, respectively. Risk was higher in evening compared to morning types, but this association was not statistically significant (RR 1.09, 95% CI 0.99–1.21).

Conclusions: Among patients visiting their GP, chronic insomnia, chronic self-reported sleep problem, and both short and long sleep duration were associated with higher prevalence of infection. This supports the notion of a strong association between sleep and infection.

Disclosure: No

P494 | Investigating the relationship between objective measures of sleep and self-report sleep quality in stable COPD patients: Implementation of casis questionnaire

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Objectives: Patients with chronic obstructive pulmonary disease (COPD) have poor sleep quality as a result of various alterations in oxygenation parameters and sleep macro- and micro-architecture. The aim of our study was to investigate the relationship between objective measures of sleep and self-report sleep quality in COPD patients.

Methods: This was a prospective, cross-sectional study enrolling a sample of 118 COPD subjects. All patients completed the COPD and Asthma Sleep Impact Scale (CASIS) to assess sleep impairment and underwent an attended overnight polysomnography. We tested for associations of sleep impairment with objective parameters of sleep quality after adjusting for age, gender, BMI, smoking status apnea-hypopnea index, nocturnal desaturation, sleepiness (Epworth sleepiness scale - ESS), depression symptoms (Beck Depression Inventory - BDI), insomnia symptoms (Athens Insomnia Scale - AIS) and comorbidities.

Results: The severity of COPD was widely distributed in the sample (post-bronchodilator FEV_1 ranging from 17% to 104% of predicted): mild COPD (15%), moderate COPD (64%), and severe-very severe COPD (21%). PSG showed a high proportion of obstructive sleep apnea (79%) and significant nocturnal desaturation (mean pulse oximetry nadir 78% ± 9). CASIS-7 mean score was 41 ± 21. After adjustments, sleep quality (CASIS-7) was significantly associated with TST [$\beta = -0.375$, (95% CI, -0.659, -0.091); $p = 0.022$] and Sleep efficiency [$\beta = -2.363$, (95% CI, -3.095, -1.630); $p = 0.001$].

Conclusions: Our study suggests that subjective poor sleep quality in COPD patients is associated with objective measures of sleep. The CASIS-7 questionnaire could be an appropriate tool for COPD patients to measure sleep quality abnormalities in clinical practice.

Disclosure: No

P495 | High incidence of obstructive sleep apnea in long COVID-19 patients

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Introduction: There is a physiological plausibility for obstructive sleep apnoea (OSA) being a factor to long COVID-19 symptoms: OSA activates the renin-angiotensin-aldosterone system and angiotensin-converting enzyme 2, which is the entry receptor SARS-CoV-2 in the cells.

The aim of this study is to identify the incidence of obstructive sleep apnea in long COVID-19 patients.

Methods: Observational cohort, cross-sectional study of post-COVID-19 symptomatic patients, admitted in the out patient post COVID-19 clinic in Portimão Hospital (Portugal), from july 2021 to december 2021.

Inclusion criteria: ≥18 years; previous COVID-19 at least six months before the initial study protocol evaluation, confirmed by a positive real-time reverse-transcription polymerase chain reaction on a nasopharyngeal swab.; persistent symptoms after cure criteria defined by WHO.

Exclusion criteria: patients who had a concomitant neurological disorder; patients who were on invasive mechanical ventilation and patients with persistent fatigue symptoms in the 6 months before SARS-CoV 2 infection.

The OSA diagnosis was assessed using portable monitoring device type III (in-home polygraphy), between the 6–7th months after the diagnosis of COVID-19. The OSA severity was performed using the American Academy of Sleep Medicine scoring criteria.

Results: A total of 88 patients attended the post-COVID-19 consultation, 24 patients meet the exclusion criteria and 64 patients were enrolled: 28,1% (18) had mild COVID-19, 17,2% (11) moderate and 54,7% (35) severe acute disease. The average age was 56 years, the BMI was 29 Kg/m^2 and 56% were men. We found a OSA incidence of 75% (48). The distribution of OSA severity was: 50% (24) mild, 29% (14) moderate and 21% (10) severe. In this group of post COVID-19 patients with OSA, the median age and BMI was the same of the total enrolled patients, and 58% were men.

Conclusions: There is a high incidence of OSA, in long COVID-19 patients. The knowledge of this risk is essential to establish the follow up and investigation protocol for postcovid-19 patients.

Disclosure: No

P496 | Awakening hypercapnia: Non-invasive ventilation with PSV-ST and PSV auto-ST in patients with obesity hypoventilation syndrome (OHS) and sleep obstructive apnoea (OSA)

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Background: Obesity hypoventilation syndrome (OHS) is a combination of obesity, daytime hypercapnia and sleep related disorderedand may present with acute hypercapnic respiratory failure (AHRF). Non-invasive ventilation (NIV) is effective in patients, who have concomitant sleep disorder as severe obstructive sleep apnoea (OSA). We have evaluated the acute effect of NIV using either pressure support ventilation spontaneous temporized (PSV-ST) or pressure support ventilation spontaneous temporized auto-bilevel (PSV auto-ST) to awakening hypercapnia in naive OHS patients hospitalized for AHRF.
Patients and Methods: We have retrospectively studied 20 patients (BMI > 35 kg/m^2),affected da naive OHS with associated severe obstructive sleep apnea (AHI > 30/h)and without significant chronic obstructive pulmonary disease (COPD)[H1]. The patients were evaluated at baseline and after the use of either PSV-ST ($n = 9$) or PSV auto-ST ($n = 11$). We have measured arterial blood gas analysis (IL GEM Premier 4000) at hospitalization (T0), at awakening of day two of hospitalization (minimum 12 h of the NIV use) (T1)and before hospital dismission (T2). We accepted as control of nocturnal respiratory failure, values of SaO2 < 90 % for < 10% and ODI < 10/h (oximeter Convidien Nellcor oximax N-65)
Results: The mean PaCO2 was 60 ± 9 mmHg (T0), 49 ± 6 mmHg (T1) and 46 ± 4 (T2) after PSV-ST, (always $p < 0.001$). The mean PaCO2 was 62 ± 5 mmHg (T0), 50 ± 4 mmHg (T1) and 47 ± 5 (T2) after PSV-auto ST, (always $p < 0.001$). The mean PH was 7.30 ± 0.23 mmHg (T0), 7.35 ± 0.15 mmHg (T1) and 7.38 ± 0.12 (T2) after PSV-ST, (always $p < 0.001$). The mean PH was 7.31 ± 0.20 mmHg (T0), 7.34 ± 0.18 mmHg (T1) and 7.37 ± 0.14 (T2) after PSV-auto-ST, (always $p < 0.001$).
Conclusions: Both PSV-ST and PSV auto-ST non invasive ventilation were effective in the improvement of awakening hypercapnia and in the management of the acute respiratory failure in patients OHS with severe OSA.
[H1]
Disclosure: No

P497 | Effect of obstructive sleep apnea in patients undergoing bariatric surgery

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Objectives: The prevalence of obstructive sleep apnea (OSA) and its association with perioperative comorbidities in bariatric surgery patient is not well studied in the South Korea. We analyzed prevalence of OSA in patients who underwent bariatric surgery, and evaluated their association with metabolic parameters.
Methods: We retrospectively reviewed one hundred forty-four patients who underwent bariatric surgery. Ninety-eight of them also performed sleep study and was included in this study. The subjects were classified into two groups based on apnea-hypopnea index (AHI) of 15/h cut-off.
Results: Overall, 52 (53.1%) of the subjects had AHI≥15/h. The subjects had larger neck circumference (43.0 ± 4.7 vs 40.5 ± 3.6, $p = 0{,}0.005$) and higher prevalence of diabetes (65.4% vs 45.7%, $p = 0{,}0.049$) than those with AHI < 15/h. Those with AHI≥15/h showed higher fasting glucose (134.7 ± 50.5 vs 114.8 ± 34.3, $p = 0.028$) and lower high-density lipoprotein (46.8 ± 9.9 vs 52.8 ± 13.3, $p = 0.013$) than the AHI < 15/h group.
Conclusions: More than half of the patients undergoing bariatric surgery had moderate to severe OSA. Those with moderate to severe OSA showed higher metabolic comorbidity than those without. Screening for OSA may be valuable in evaluating metabolic complications in morbid obesity.
Disclosure: No

P499 | Impact of metabolic factors in patients with obstructive sleep apnea disorder

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Obesity is a worldwide epidemic that is a known risk factor for obstructive sleep apnea syndrome (OSAS). Patients with OSAS are often obese and have an increased prevalence of numerous other cardiovascular risk factors through adverse effects on lipids, insulin resistance, and other cardiometabolic processes, including type 2 diabetes mellitus. Studies show that there is an independent association between OSA and metabolic dysfunction and self-reported sleep duration with glycemic status.
In order to determine such association we selected patients who underwent specific obesity consultations, between 2016 and 2021, with OSAS who underwent a sleep study during the follow up period. Age, gender, body mass index (BMI), AHI (apnea hypopnea index), fasting glucose and HbA1c were evaluated. Patients undergoing bariatric surgery, under hypoglycemic therapy, corticosteroid therapy or non-invasive ventilation were excluded. Patients were divided between normoglycemia and prediabetes according to the HbA1c value, according to the ADA 2022 criteria.
Results: 62 patients were included. They presented with AHI 31.20 ± 26 events/h (5.0–98.4), BMI 45.38 ± 7.8 kg/m2 (31.0–66.7) and HbA1c 5.6 ± 0.35% (4.8–6.4). AHI was significantly correlated with BMI ($r = 0.341$, $p = 0.007$) and HbA1c ($r = 0.341$, $p = 0.009$). Patients with prediabetes had a higher AHI than normoglycemic patients (40.39 ± 30.52 vs 21.61 ± 18.43, $t(56) = -2.756$, $p = 0.009$).

Multiple linear regression was applied to test whether BMI, HbA1c and age were significant predictors of AHI. BMI ($\beta = 0.353$, $p = 0.006$) and HbA1c ($\beta = 0.347$, $p = 0.005$) were significantly predictors of AHI (R2 = 0.231, Z(3.54) = 5.407, $p = 0.003$).

In conclusion we noticed that in this group of patients glycated hemoglobin (HbA1c), even in the normoglycemia range, was a independent predictor of OSAS, regardless of BMI. The same was observed in patients with intermedia hyperglycemia. This association with OSAS is also observed in patients with pre-diabetes. These results suggest that HbA1c positively affects the AHI and therefore the severity of OSAS.

Disclosure: No

P500 | Considerations regarding sleep quality in post-COVID-19 patients

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Introduction: The Covid Pandemic 19 also meant a change in daily routine, fear of illness and its consequences, anxiety, stress. All of them also caused sleep disorders and consequently a further decrease in immunity, sleep being the basis of the triangle of healthy living along with physical activity and nutrition.

Materials and methods: The present study aims were to analyze the pattern of sleep in post-COVID patients who were addressed to a pulmonologist for evaluation.

Patients signed consent at the time of the consultation and responded to a modified Pittsburg Sleep Quality Index (PSQI) questionnaire for this patient category.

Results: The study group included a number of 65 patients who came for consultation between December 2021 and February 2022.

The distribution by sex was relatively equal 52.3%women and 47.7% men with an average age of 57.72 years ± 13.69 years in urban areas 80%. The vast majority of patients were unvaccinated with SARS-COV2 69.2% and mild COVID19-67,3%.30% of them reported a sleep period of 8 h/night and 40% had disturbed sleep, especially patients with mild forms due to difficult breathing16.2% or cough28%. Patients with moderate and mild forms of COVID assessment restless sleep. And the score of the PSQI questionnaire that analyzes several aspects of sleep quality: duration, latency, efficiency, sleep disturbances, use of hypnotic medication and the impact on daily activities was 5 ± 3.2(the threshold level is 5 points for sleep disorders).And the presence of snoring and pauses in breathing as possible markers of obstructive sleep apnea was reported in 44.1% and 20% of patients, respectively.

Discussion: Previous studies have shown a high prevalence of sleep disorders among patients with COVID19 both during the active and post-COVID period. Cough, dyspnea, stress induced by the disease may induce a higher frequency of sleep disorders. Insomnia and sleep apnea syndrome are the most commonly diagnosed. They can induce further degradation of the patient through both the immunological disorders and the hypoxemia it generates.

Conclusions: The investigation and treatment of sleep disorders in the patient after COVID should be part of the routine of pneumological control, these associated pathologies can slow down the evolution towards cure of the disease

Disclosure: No

P788 | Nocturia in obstructive sleep apnea

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Objectives: About half of obstructive sleep apnea (OSA) patients complain of nocturia. Despite this relevance, there is little published information about the predictive index of nocturia in patients with OSA. We investigated the prevalence of nocturia in patients with OSA and aimed to determine the possible predictive factors of nocturia in these patients.

Methods: We included 1264 untreated patients with OSA (Apnea-Hypopnea Index, AHI ≥5/h on polysomnography [PSG]) from January 2017 to January 2020 and conducted retrospective cross-sectional study. All patients underwent Beck Depression Inventory-II (BDI-II), Pittsburgh Sleep Quality Index (PSQI), Insomnia Severity Index (ISI), and Epworth Sleepiness Scale. Patients were first classified according to gender, and then reclassified according to the presence of nocturia. Patients who responded that they had two or more urinations during sleep were included in the nocturia group. In this study, we compared clinical factors and sleep parameters of nocturia and non-nocturia group using the *t*-test or chi-square test.

Results: Among OSA patients, 35.2% (337/958) of men and 59.8% (183/306) of women had nocturia. The nocturia group was older, had higher scores in the BDI-II, PSQI, and ISI, and had more underlying diseases regardless of sex. The AHI did not differ between the nocturia and the non-nocturia group, however, 90% oxygen desaturation index (90% ODI) and wakefulness after sleep onset was higher and N3 sleep was lesser in the nocturia group in male OSA patients. In the female patients, the comparison between the two groups was not significant. Results of multivariate logistic analysis showed that 90% ODI was an independent risk factor of nocturia in male OSA patients.

Conclusions: Our study suggested that nocturia might be associated with hypoxia and sleep quality in male OSA patients. And 90% ODI is a possible risk factor of nocturia among them.

Disclosure: No

P789 | Impact of sleep disturbances in juvenile fibromyalgia syndrome

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Objectives: The aim of this study is to investigate sleep quality in juvenile fibromyalgia syndrome (JFS) and its impact on the global burden of the disease.

Methods: Consecutive JFS patients who have performed a full-night polysomnography (PSG) were included in this cross-sectional study. JFS related symptoms, neuropsychiatric features, and sleep quality were assessed using self-report measures. PSG parameters, including the "N3 distribution index", defined as ([number of epochs of N3 in the first half of Sleep Period Time (SPT) – number of epochs of N3 in the second half of the SPT] / Total number of N3 epochs), were obtained from patients and age-matched control subjects.

Results: We included 25 patients (20 females, 5 males, median age 15.7 years). Nonrestorative sleep was reported by 22/25 (88%) patients. JFS patients showed a significantly longer Sleep Period Time ($p = 0.004$) and an increased wake time after sleep onset ($p = 0.026$) compared to healthy peers. N3 sleep distribution index was significantly lower in JFS patients than in controls ($p = 0.018$). Subjective poor sleep quality was related to the Widespread pain index (WPI) (r_s-0.65), symptom severity scale (r_s-0.64), depressive symptoms (r_s-0.58), fatigue (r_s-0.44), and symptoms severity upon awakening (r_s-0.65). N3 distribution index correlated to depressive symptoms (r_s 0.41), and irritability (r_s 0.40). Based on multiple regression analysis, WPI was predicted by subjective poor sleep quality ($\beta = -0.322$, $p = 0.035$), whereas depressive symptoms were predicted by both subjective poor sleep quality ($\beta = -0.317$, $p = 0.04$) and PSG measures (N3 min: $\beta = -0.065$, $p = 0.032$).

Conclusions: Sleep disturbances are key hallmarks of JFS and have a significant impact on other clinical domains of the disease, such as pain and depression. Despite patients' poor subjective sleep assessment, however, sleep macrostructure is preserved when compared to healthy subjects and only few polysomnographic variables are significantly different; more specifically, N3 sleep distribution is significantly altered in JFS patients, with a higher representation during the second part of the night, thus suggesting an impairment in the physiological release process of homeostatic drive to sleep. Elucidation of the influence of sleep disorders on disease severity might provide insight for the development of targeted therapeutic strategies in JFS.

Disclosure: No

P790 | Effect of COVID-19 pandemic on sleep quality, sleep duration and acute stress in Indian young adults

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Introduction: SARS-CoV-2 pandemic is affected sleep in several ways. Even in those unaffected by the disease, the lockdown led to changes in lifestyle. Our study reports the effect of SARS-CoV-2pandemic lockdown on sleep quality, sleep duration, physical activity and acute stress in young adults.

Method: As part of an ongoing longitudinal study, 128 young adults participated in a self-administered questionnaire survey. Sleep quality and duration were assessed by Pittsburgh sleep quality index (PSQI) global score. Severity of Acute Stress Symptoms was analysed using American Psychiatry Association-National Stressful Events Survey Acute Stress disorder Short scale (APA-NSESS). Social jet lag was calculated as the difference between the mean of average bedtime and average wake-up time on weekends and on weekdays. BMI was calculated using the self- reported height and weight.

Result: During the lockdown, average sleep duration on weekdays and weekends were 6.49 +/− 0.80 and 7.17 +/− 0.61 h respectively. 14.3% participants had a social jet lag > = 2 h, and 41.7% had a social jet lag of 1-2 h. Significant correlations ($p < 0.001$) were present between severity of acute stress symptoms and PSQI global score (Pearson's correlation coefficient (r) = 0.324), Sleep duration-weekdays ($r = -0.214$), Sleep latency ($r = 0.208$), Sleep Efficiency ($r = -0.205$). Significant correlations ($p < 0.05$) were present between severity of acute stress symptoms and screen time ($r = 0.100$), social jet lag ($r = 0.106$), sleep duration-weekends/holidays ($r = -0.14$). Physical activity was not significantly associated with sleep quality.

Conclusion: Increased latency of sleep, social jet lag, decreased sleep efficiency and lesser duration of sleep were associated with higher levels of acute stress following lockdown due to SARS-CoV2 pandemic. Longer sleep duration during both weekdays and weekends were associated with lower acute stress levels. Sleep duration during weekdays was more significantly associated with acute stress than sleep duration during weekends/holidays.

Disclosure: No

P791 | Sleep disturbances in craniopharyngioma: a challenging diagnosis. A case series and review of the literature

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Introduction: The hypothalamus plays a crucial role in regulating vital functions, and it is a critical component of the sleep-wake regulatory system. The tumor involving the hypothalamic area and its treatment can lead to hypothalamic dysfunction. We describe two patients with craniopharyngioma who came to our attention due to the occurrence of episodes characterized by psychomotor slowing and afinalistic limb movements, temporal and spatial disorientation, psychomotor agitation, and oneiric stupor like episodes. We conducted a systematic review of the literature to provide an overview of the current knowledge on sleep disorders in patients with craniopharyngioma to unravel their underlying mechanisms and identify possible therapeutic strategies.

Methods: We performed a diagnostic workup using polysomnography, multiple sleep latency test, and actigraphy. A comprehensive electronic literature search in accordance with the PRISMA® statement has been conducted.

Results: The diagnostic workup led to a diagnosis of secondary narcolepsy in Patient 1, and treatment with pitolisant was initiated with clinical improvement and reduced daytime sleepiness. A severe sleep-disordered breathing, destruction of the wake-NREM sleep-REM sleep boundaries, episodes of undetermined state of vigilance and the concurrence of elements typical of different sleep stages were noticed in Patient 2. Thirty-two articles were included in the review; a high prevalence of excessive daytime sleepiness with wide variability (25%–100%) depending on the diagnostic method (25%–43% by subjective measures, 50%–100% by objective investigations) was reported. Secondary narcolepsy was documented in 14%–35% and sleep-disordered breathing in 4%–46%. Moreover, sleep-wake rhythm dysregulation has been notified. Possible mechanisms underlying these disorders are discussed, including damage to the suprachiasmatic nucleus, low melatonin levels, hypocretin deficiency, and hypothalamic obesity.

Conclusion: We aim to focus on sleep disorders as a possible complication of tumors involving the hypothalamic region. Our cases highlight that the clinical manifestation of these dysfunctions can be challenging to diagnose and lead to misdiagnosis and inappropriate treatment that can harm patients' health and the quality of life of patients and their families. The literature review summarizes the pathophysiology of sleep disorders in childhood-onset craniopharyngioma and the main treatment options. Finally, a possible diagnostic algorithm to accurately identify and treat these disturbances is proposed.

Disclosure: No

P792 | Reduction of antalgic medication intake for chronic pain associated with CPAP therapy in patients with obstructive sleep apnoea

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Introduction: Continuous positive airway pressure (CPAP) therapy is the mainstay of treatment for obstructive sleep apnoea syndrome (OSAS). Individuals with OSAS suffer from sleep fragmentation. This is often compounded by painful morbidities, which aggravate the quality of sleep. Reciprocally, reduced sleep efficiency has also been linked to heightened neuralgic sensitivity, propagating the cyclicity between poor sleep and greater pain.

Methods: A longitudinal prospective study design was employed. A sample of 82 subjects was obtained by convenience at a dedicated Sleep Medicine Centre of a central hospital. Inclusion criteria were suffering from OSAS, irrespective of CPAP treatment and (2) suffering from chronic pain requiring chronic analgesics and/or analgesic adjuvants intake. Following enrollment, patients with and without CPAP treatment were monitored regarding type, frequency and dosing of painkiller intake.

Results: The majority of patients were female ($n = 50$) of age 50–70. The pain aetiology was predominantly neurosurgical ($n = 18$) or orthopaedic ($n = 28$), whilst in a minority it was due to an auto-immune condition or deemed secondary to a psychiatric disorder. Most patients were under partial opioid agonists and non-steroid anti-inflammatory drugs, whilst 10% required high-dose opioid treatment.

A strong correlation was found between CPAP use and a reduction in daily analgesic intake ($r = 67.3$; $p < 0.001$). This improvement was independent of follow-up in Chronic Pain Consultations or opioid treatment.

Interestingly, patients treated with analgesic adjuvants (e.g., pregabaline, gabapentine) correlated negatively ($r = 42.91$; $p < 0.001$) with improvement under CPAP.

A lack of improvement was observed in pain of psychogenic aetiology.

Conclusions: There appears to exist a beneficial effect of CPAP therapy in patients suffering from chronic organic pain and OSAS, suggested by a reduction in painkiller intake. This may be substantiated by sympathetic nervous system activation amplification of neuralgic afferent signaling pathways.

Patients under analgesic adjuvants, who may possess an intrinsic beneficial effect in sleep improval per se, appeared to benefit less form CPAP, which may be related to the severity or underlying aetiology (e.g., nevralgic) of pain *n* patients medicated with these drugs.

Disclosure: No

22: PSYCHIATRIC AND BEHAVIOURAL DISORDERS AND SLEEP

P187 | Psychiatric comorbidities in patients with obstructive sleep apnea: Evidence from a nationwide healthcare system data in South Korea

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Objectives: Previous studies have reported that there are elevated rates of psychological symptoms such as depression, anxiety and insomnia in patients with Obstructive Sleep Apnea (OSA). The aim of this study is to confirm the association between psychiatric disorders and OSA using a large-scale epidemiological study based on Korean health insurance data. We also examined the effects of age and sex on the association between OSA and psychiatric disorders.

Methods: We conducted a nationwide, population-based, retrospective study in South Korea from 2010 to 2019 using the National Health Insurance (NHI) claims database. The patients in the OSA group were selected based on diagnosis with OSA according to the International Classification of Diseases, 10th revision (ICD-10), and the control group was based on the patients who underwent appendectomy from 2010 to 2019, except for OSA patients. The crude hazard ratio (HR), the adjusted hazard ratio (adjusted HR) corrected by covariates, and 95% confidence interval (CI) for the effects of OSA on the incidence of the psychiatric disorders were estimated by the Cox proportional hazard ratio model.

Results: Total 311,355 patients were reviewed, of which 103,785 in the OSA group and 207,570 in the control group, respectively. The adjusted HR for the incidence of depression was 1.615 (95% CI, 1.598–1.633), the incidence of anxiety disorder was 1.560 (95% CI, 1.543–1.578), and the incidence of insomnia was 2.582 (95% CI, 2.536–2.628) for the OSA group. In subgroup analyses, female showed a stronger association with the incidence of depression (adjusted HR, 2.609; 95% CI, 2.488–2.736), anxiety disorder (adjusted HR, 2.174; 95% CI, 2.056–2.298), and insomnia (adjusted HR, 3.356; 95% CI, 3.048–3.694). However, age group showed inconsistent effects on the association between OSA and psychiatric disorders.

Conclusions: We found that the OSA group had a higher risk of psychiatric disorders such as depression, anxiety disorder, and insomnia compared to the control group. Subgroup analysis showed that female group had higher risk of psychiatric disorder. Especially, this study is significant in that it is Korea's first large-scale study using the NHI claim database.

Disclosure: No

P188 | Investigating potential alterations in markers of sleep homeostasis in patients with major depressive disorder

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Introduction: Sleep disturbances are a common feature in major depressive disorder (MDD). Alterations in REM sleep and a decrease in slow-wave sleep have been reported, however findings have varied amongst studies. As sleep homeostasis is proposed to be a critical mechanism of sleep deprivation (an effective and rapid-acting treatment for MDD) we re-analysed baseline polysomnography data from patients and healthy controls to assess potential alterations in markers of sleep homeostasis (e.g. slow-waves, slow-wave sleep/activity/energy).

Methods: We compared data from 28 psychiatric inpatients with MDD (age 37.4; 20 m) and 28 age-and gender-matched healthy controls (age 37.4; 20 m). Half of the sample ($n = 14$; age 36.0; 7 m) was medicated and the other half was medication-free ($n = 14$; age 38.7; 13 m) for at least 7 days prior to the assessment. We analysed sleep architecture, EEG power spectrum (NREM), and slow-waves for the first h of sleep and for the whole night for the entire sample and the medicated and unmedicated subsample separately. Statistical analysis was performed using a general linear model.

Results: For the patient group (entire sample) we found a significant increase in REM ($p = 0.004$; effect size (η^2):0.14), a decrease in N2 ($p = 0.050$; η^2:0.07) and reduced theta ($p = 0.038$; η^2:0.08) and alpha power ($p = 0.041$; η^2:0.08). Additionally, patients showed a trend towards a reduction in beta power ($p = 0.082$; η^2:0.06), spindle power ($p = 0.056$; η^2:0.07) and slow-wave energy ($p = 0.095$; η^2:0.05). The unmedicated subsample had significant less alpha power ($p = 0.043$; η^2:0.15), and a trend towards more REM ($p = 0.073$; η^2:0.12) and a reduction of N1 ($p = 0.080$; η^2:0.12), N2 ($p = 0.061$; η^2:0.13), spindle power ($p = 0.070$; η^2:0.12) and delta power ($p = 0.095$; η^2:0.10). In the medicated subsample, only a significant increase in REM ($p = 0.032$; η^2:0.17) and a trend towards reduced theta power ($p = 0.096$; η^2:0.10) was found compared to controls.

Conclusion: Data of our MDD patients did not show significant alterations in markers of sleep homeostasis (e.g. slow-waves, slow-wave sleep/activity/energy). However, changes in REM and in other spectral components were observed (medium to large effect sizes). These changes appear to be mainly driven by alterations found in the unmedicated patient group. However, heterogeneity and sample size of the subgroups have to be taken into account.

Disclosure: No

P189 | Maternal experiences of discrimination during pregnancy are associated with maternal poorer sleep health

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Introduction: Poor sleep can have long term consequences on maternal physical and psychological health as well as mother-infant bonding. Experiences of racial/ethnic discrimination are known predictors of poor sleep in the general population and recent findings have highlighted the potential detrimental effect on maternal and infant sleep. Less is known about the effect of discrimination in other domains (gender, age etc) on sleep in the perinatal period, thus, we aimed to investigate the effects of discrimination across several domains on mother and infant sleep.

Methods: The cohort comprised 526 mother-child dyads recruited among the customer base of the Nanit Smart Baby Monitor. At 6–12 months postpartum, questionnaires were administered to assess maternal stress (Perceived Stress Scale), maternal sleep (Pittsburgh Sleep Quality Index), infant sleep (Brief Infant Sleep Questionnaire-R) and maternal experiences of discrimination (Everyday Discrimination Scale). This scale asks participants how often they experience acts of discrimination (highest score for "almost every day", the lowest score for "never"). The scores are summed to get the total discrimination score. Participants indicated what they believed to be the main reason for these experiences (Ancestry/National Origins, Gender, Race, Age, Religion, Height, Weigh, other Aspect of Your Physical Appearance, Sexual Orientation, Education/Income). Objective measures of child sleep were obtained using the Nanit Smart Baby Monitor. Logistic/linear regressions estimated the associations between maternal and infant sleep and discrimination, with unadjusted and fully adjusted models (i.e., infant age, infant sex, household income, infant sleep quality and duration).

Results: Women reported gender ($N = 167$,32%) and age ($N = 80$, 15.2%) as primary reasons for discrimination. Increased overall experiences of discrimination were significantly associated with more perceived stress ($\beta = 0.38$, CI = 0.27–0.48), worse sleep quality (odds ratio (OR) = 1.05, 95% confidence intervals (CI) = 1.02–1.09), shorter sleep duration (OR = 1.04, CI = 1.01–1.08), and more sleep disturbances ($\beta = 0.13$, CI = 0.08–0.20). Maternal experiences of discrimination were not significantly associated predict infant sleep.

Conclusions: Maternal experiences of discrimination are associated with increased maternal perceived stress and poorer sleep health, suggesting that sleep could be a pathway through which discrimination affects maternal health. Meanwhile, maternal discrimination did not influence infant sleep at 6-12 months, indicating potential pathways of child resilience.

Disclosure: No

P190 | The self-report sleep profile of bipolar disorder: results from the UK sleep census

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Sleep disruptions are core symptoms of bipolar disorder (BD), important to patients and clinicians. However, their assessment in BD is often poor, relying on small samples or single items from mood questionnaires. The aim of this study was to characterise the self-report sleep profile in a large community sample of people with BD.

Data were extracted from the UK Sleep Census, an online survey about sleep in the UK commissioned by the BBC, in April 2022. Out of 275,050 responders, 1,072 reported a diagnosis of BD made by a mental health professional (mean[sd] age: 45.56 years[13.80], 52.05% female). Two comparison groups were derived, matched with the BD group on gender, age, education and occupation. These groups were: healthy controls with no mental health diagnosis (HC; $n = 1,072$), and people with a self-reported diagnosis of unipolar depression (UD; $n = 1,072$).

Compared to HC, the BD group scored higher on insomnia ($d = -0.73$, $p < 0.001$) and depression ($d = 1.10$, $p < 0.001$), reported more frequent cognitive complaints ($d = 0.85$, $p < 0.001$), reduced quality of life ($d = -0.59$, $p < 0.001$), shorter sleep duration ($d = -0.21$, $p < 0.001$) a need for more h of sleep ($d = 0.16$, $p < 0.001$) and a tendency for evening chronotype ($d = -0.40$, $p < 0.001$). People with BD reported more cognitive complaints than people with UD ($d = 0.14$, $p = 0.003$), but the two groups did not differ significantly on any other measure. For those meeting insomnia "caseness" according to the Sleep Condition Indicator, only 15.11%, 7.49% and 3.23% of the BD, UD and HC participants, respectively, had received a diagnosis of insomnia. The three groups reported comparable social jet lag (BDvsHC $d = 0.04$, $p = 0.557$; BDvsUD $d = -0.10$, $p = 0.132$), frequency and timing of exercise, alcohol, caffeine consumption and device use before bed. The BD and UD groups reported more frequent use of prescription medication for sleep (weekly use; BD: 26.09%, UD: 14.93%, HC: 4.59%), longer and more frequent napping (weekly or biweekly napping[≥40 min]; BD: 75.13% [54.82%], UD: 76.70%[54.92%], HC: 60.83[34.33%]), were more likely to have received sleep psychotherapy (BD: 18.99%, UD: 14.85, HC: 3.26%), but were more dissatisfied with their sleep (BD: 63.54%, UD: 64.9%, HC: 42.03%).

These findings confirm These findings confirm the presence of frequent and severe disruptions in BD.

Disclosure: No

P191 | Mental health in Belgian hospital workers during the first wave of COVID-19

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Objectives: Exploring anxiety, depression, and insomnia as a network of symptoms and their intensities among hospital workers after the first wave of COVID19.

Methods: 907 hospital workers have completed the survey including 442 Frontline Workers and 465 Hospital Workers. Online surveys were performed in two hospitals from June 6, 2020, and August 8, 2020, in Belgium. Anxiety, depression and insomnia was assessed by the GAD-7, PHQ-9 and ISI, respectively. We estimated a Directed Acyclic Graph for the items of these questionnaires and networks were compared and described in terms of true positive (connection between two nodes present in both networks), falls positive (connection between two nodes present among Frontline network) and falls negative (connection between two nodes present among Hospital Workers network). Finally, intensity of symptoms was calculated using the total mean score and severity frequency of the three questionnaires.

Results: For both groups, the anxiety, depression, and insomnia items are independent: the three symptomatologies form clusters and do not seem to interact with each other, in both groups. Network comparison revealed 9 true positives, 11 false positives, and 9 false negative. Most of the different connections are found within the symptoms of insomnia. The insomnia symptom network in the Hospital group is characterized by "Difficulty maintaining sleep" as the initiating symptom that results to "Worry". In the Frontline group, "Interference" seems be the initiating symptom, which leads to the Early morning awakening. About intensity of symptoms, Frontline showed a significant higher intensity than Hospital Workers for anxiety, depression, and insomnia. Moreover, there were significantly more workers with moderate symptoms among Frontline than Hospital workers in comparison with "no symptoms" for our three scales.

Conclusion: The network of anxiety and depression are similar between Frontline and Hospital, but not the insomnia network characterized by different initiating symptoms and leading to a different final symptom. In addition, Frontline have significantly higher complaints of anxiety, depression, and insomnia than Hospital workers, which is consistent with the plethora of studies on this topic. These differences in networks should be considered to developing specific treatment of insomnia in these two populations.

Disclosure: No

P192 | Sleep disorders in children with autism spectrum disorder: an online survey

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Introduction: Sleep disorders (SDs) have a high incidence in children with Autism Spectrum Disorder (ASD), impacting their daytime behavior and worsening the typical symptoms of ASD, and the quality of life of children and their families.

Objective: To investigate the prevalence of SDs, the related comorbidities, treating interventions and the impact on the quality of life on the children with ASD and their family

Methods: An anonymous online survey was electronically sent to families belonging to the Italian ANGSA association (National Association of parents of subjects with autism). The questionnaire was appointed for two groups: subjects with ASD who previously suffered from insomnia and subjects with ASD and current insomnia.

Results: 151 parents answered to the questionnaire: 13/151 (9%) denied SDs and were excluded. 86 patients presented current SDs (curr_SDs) and 52 reported previous SDs (prev_SDs).

The most frequently reported SDs were difficulty falling asleep (69.7% in curr_SDs and 61.5% in prev_SDs), nocturnal awakenings (48.8% in curr_SDs and 57.7% in prev_SDs) and difficulty falling asleep (58,1% in curr_SDs and 50% in prev_SDs). Sleep restlessness was reported in 34.9% of curr_SDs and 25% in prev_SDs.

The onset of SDs for most subjects was at 1 year of age in the curr_SDs group (40.7%) and in the prev_SDs group (42.3%). The most common comorbidity was ADHD in both groups (respectively 51.8% vs. 41.5%) The rules of sleep hygiene have been scarcely used and often ineffective. The most used treatments were melatonin (61.6% vs. 59.6%) and prolonged release melatonin (20.9% vs. 19.2%). Any therapy for sleep was used in 5.8% of curr_SDs and 11% of prev_SDs. SDs have been reported to affect the child's behavior in 84.9% of curr_SDs and 25% in prev_SDs. The mood of the parents was affected in 91.8% of curr_SDs and 96.2% of prev_SDs.

Conclusions: SDs are extremely frequent in children with ASD, are already present at a very early age and have a strong impact on children's behavior and on the quality of life of their parents. The rules of sleep hygiene are not very effective, and the most used therapy is melatonin.

Disclosure: No

P193 | Caught in a continuous loop? An investigation of the temporal associations between sleep and stress in adolescence

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Introduction: As suggested by evidence from animal models, stress negatively affects sleep and is associated with both diminished sleep quality and reduced sleep duration. At the same time, alterations in sleep behavior can result in more stress. However, in humans, the temporal relationship between sleep and stress is still poorly understood. Therefore, the current longitudinal study aimed to investigate the associations between sleep and stress in both healthy and depressed adolescents.

Methods: The sample studied consisted of thirty-two adolescents, thirteen of which were diagnosed with Major Depressive Disorder (MDD), and nineteen healthy controls aged 14 to 17 years (mean = 15.13 (±1.13); 19 girls). Stress and sleep quality were assessed monthly using the Perceived Stress Scale (PSS) and the Pittsburgh Sleep Quality Index (PSQI), respectively. The sum score of the PSS and subjective sleep quality and duration derived from the PSQI were used as outcome variables. On average, 10.41 months of data on sleep and stress were available across participants (range = 2 to 15 months). To study the association between stress and sleep over time, cross-lagged panel analysis was performed.

Results: Stress and sleep duration were bi-directionally associated, with higher stress levels in the past month predicting shorter sleep duration in the following month (β −0.04, $p < 0.001$), and conversely, reduced subjective sleep duration predicting higher stress ($\beta = -0.06$, $p < 0.01$). In contrast, the association between stress and subjective sleep quality was uni-directional: Higher stress scores predicted lower subsequent subjective sleep quality ($\beta = 0.03$, $p < 0.001$), but lower reported sleep quality did not predict perceived future stress.

Conclusions: Stress and sleep seem to be reciprocally associated over time, and this relationship transcends psychiatric diagnosis. The bidirectional associations between sleep duration and stress are consistent with prior findings in animal models. As compared to a cross-sectional study design, our longitudinal approach helps to elucidate associations between sleep and stress that last over time. Given the reciprocity and persistence of this relationship as well as the critical role of sleep and stress in mental health, both these variables seem attractive targets for prevention and intervention.

Disclosure: No

P194 | Is there a longitudinal relationship between sleep and depressive symptoms in adolescence?

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Introduction: Disrupted sleep is common in individuals with major depressive disorder (MDD), and disrupted sleep has been shown to be a risk factor for the onset of mental health problems, including depression. The aim of the present study was to assess the temporal association between sleep and depression in a sample of adolescents with and without MDD using a longitudinal design.

Methods: Twenty-nine adolescents with and without MDD between the age of 14 and 17 years (mean 15.1, SD = 1.7; 17females; 11 with MDD) were included. For 12-months, participants wore an actigraph continuously and filled out questionnaires once per month via a secure online platform. Sleep was assessed using the Pittsburg Sleep Quality Index (PSQI) and depressive symptoms were assessed using the Center for Epidemiological Studies -Depression Scale (CES-D). A cross-lagged panel design was used to assess the longitudinal relationship between sleep and depressive symptoms. One model was run for each of the following sleep measures: sleep onset latency (SOL); wake after sleep onset (WASO); total sleep time (TST) measured via actigraphy and PSQI.

Results: We found a bi-directional relationship between depressive symptoms and subjective as well as objective sleep measures, with depressive symptoms in the past month being a predictor for objectively ($\beta = 0.53$, $p < 0.001$) and subjectively ($\beta = -0.02$, $p < 0.05$) measured TST in the following month. Depressive symptoms in the past month also predicted subjective SOL ($\beta = 0.03$, $p < 001$) and subjective sleep quality ($\beta = 0.02$, $p < 0.001$) in the following month. Conversely, objectively ($\beta = 0.27$, $p < 0.05$) and subjectively ($\beta = 0.48$, $p < 0.001$) measured SOL in the past month was a predictor for depressive symptoms in the following month.

Conclusions: In many cases, sleep disturbances are viewed as a symptom or a consequence of a mental illness and are treated as such. Using a longitudinal approach, our findings show a bi-directional relationship between depression and sleep in adolescents where sleep problems are a risk factor for mental health problems and mental health problems exacerbate sleep difficulties.

Disclosure: No

P195 | Sex and age-related differences of the risk of depression, anxiety and insomnia in obstructive sleep apnea: a nationwide population-based cohort study

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Objective: Despite the high prevalence of comorbid depression, anxiety and insomnia in obstructive sleep apnea(OSA) patients, reports of a large real-word data analysis on this critical relationship are scarce. We aimed to explore the sex and age-related differences of the risk depression, anxiety and insomnia in OSA patients.

Methods: A nationwide population-based retrospective cohort study design using the Korean National Health Insurance(KNHI) claims database from 2010 to 2019 was adopted. Depression, anxiety, insomnia

diagnoses were defined according to the International Classification of Diseases, 10th version(ICD-10). Incidence rates of depression, anxiety and insomnia according to different sex and age were estimated. Cox proportional-hazard regression analyses were conducted to evaluate the risk of depression, anxiety and insomnia in different sex and age groups.

Results: Increased risk of depression (adjusted hazard ratio; 95% confidence interval CI: 1.615, 1.598-1.633), anxiety (1.560, 1.543–1.578), and insomnia (2.582, 2.536–2.628) was observed in OSA patients. Depression, anxiety and insomnia risk was consistently higher in female OSA patients. Depression, anxiety and insomnia risk were higher in middle-age and elderly OSA groups compared with younger age group.

Conclusion: There was a disparate sex and age-related patterns of increased risk of depression, anxiety and insomnia in OSA patients. Special clinical attention to these differences is warranted when diagnosing and treating depression, anxiety and insomnia in OSA patients.

Disclosure: No

P501 | Differential effects of COVID-related lockdown on sleep-wake rhythms in adults with autism spectrum disorder compared to the general population

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Introduction: COVID-related lockdown led to a radical modification of daily activities and routines which are known to affect sleep. Compared to the general population, participants with autism may be particularly vulnerable to the repercussions of lockdown on sleep, given their intrinsic inflexible adherence to routines and the high overall prevalence of sleep disturbances in this population.

Methods: The study is a French nation-wide online survey assessing sleep-wake rhythms and behaviours known to affect sleep (daily screen time, daylight exposure, physical activity), before and during COVID-related lockdown. Respondents were 207 adults with autism (56% female) and 1652 adults of the general population (77% female), with a mean age 35.3 years (SD 11.3). Between group comparison (before, during and difference between before and during lockdown) were conducted using logistic regressions adjusted on age and sex. Within group comparison (comparing before and during lockdown) were conducted using paired analyses (Mantel–Haenszel or Wilcoxon rank test accordingly).

Results: Before lockdown, the adults with autism displayed on average later chronotype, lower sleep quality, more evening screen time, less exposure to daylight and less exercise (all $p < 0.01$). Lockdown affected all studied measures of sleep and related exposures in a similar way in both groups: poorer self-rated sleep quality as well as a less regular and delayed sleep-wake rhythm, longer screen time in the evening and less exposure to daylight (all $p < 0.001$). However, modification in sleep duration was not linear, with an increase of extremes (less than 6 h and more than 10 h) in both groups.

Conclusion: Adults with autism displayed significantly higher levels of sleep and circadian rhythm disturbances and less favourable daily routines known to regulate sleep. While the effect of confinement on sleep and sleep related behaviours was similar in both groups, the results highlight that the pre-existing shift in circadian rhythms and lifestyles in adults with ASD further deteriorated during lockdown.

Disclosure: No

P502 | Sigma power associated with bedtime procrastination using electroencephalographic spectral analysis in clinical insomnia patients

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Objectives/Introduction: Bedtime Procrastination (BP) is defined as the behaviour of going to bed later than intended, without external reasons for doing so. According to prior studies, BP has a negative effect on sleep, health and mood. In addition, BP has also been associated with insomnia symptoms. The current study investigates physiological correlates of BP in a clinical insomnia sample.

Methods: Participants consisted of 94 individuals (71% females, mean age 54.62 ± 9.83 years) diagnosed with insomnia in a sleep clinic sample. Participants were categorized into the high BP group ($n = 47$) and low BP group ($n = 47$) using median splits on Bedtime Procrastination scale (BPS). All participants completed self-report questionnaires on BPS, Korean version of Beck Depression Inventory II (K-BDI-II) and underwent one night of polysomnography (PSG) of 6 EEG channels (F3, F4, C3, C4, O1, O2) according to the international 10/20 system. The EEG data were filtered using 1-40 Hz bandpass and sampled at 200 Hz. Removal of artifacts was performed by visual inspection. EEG spectral analysis was conducted to estimate the relative power values in EEG standard frequency bands on all 6 channels. Data was analyzed using partial correlation and analysis of covariance (ANCOVA).

Results: High BP and low BP groups showed significant differences in sex, with the high BP group having higher proportions of females ($=4.663$, $p < 0.05$). Relative power spectral density value in sigma power (12–15 Hz) at C3 (left central region) was higher in the high BP compared to the low BP group after controlling sex [$F(1,37) = 5.101$, $p < 0.05$]. Additionally, relative power spectral density value in sigma power at C3 positively correlated with BPS scores in all participants after controlling sex ($r = 0.238$, $p < 0.05$).

Conclusions: Sigma-band power may correspond to subsequent sleep spindles, which are thought to reflect ongoing sleep-protective mechanisms and help maintain sleep. Moreover, insomnia patients often believe that they will not be able to fall asleep early, so they may use bedtime procrastination to de-arouse prior to bedtime. We propose that insomnia patients may make attempts to satisfy the desire for sleep and facilitate de-arousal by delaying bedtime.

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Disclosure: No

P503 | Relationship between sleep-wake behaviour, light and depression status of inward-patients over 7 weeks

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Introduction: Circadian rhythms and sleep are sensitive indicators for changes in health status. In depression, abnormal circadian and sleep patterns can occur as comorbidities or part of the disorder by being temporally and causally linked with symptoms and overall mental health status. Due to this complex interplay, a network perspective on psychiatry has emerged in recent years which understands mental disorders as dynamic fluctuations of symptoms over time. Networks can visualise those changes and suggest causal dependencies over the course of illness and treatment. This can be useful for applied clinical research to generate hypotheses and help targeted intervention.

Methods: To further investigate the interaction between sleep-wake behaviour, light and depression status, the current study analysed actimetry, psychotherapy and pharmacotherapy data of $N = 237$ patients ($M_{age} = 42.89$, $SD = 13.73$, 54% female) with a primary diagnosis of major depression using regression and network analyses. The participating patients received treatment as part of a 7-week randomised controlled trial for depression in an inpatient ward in Munich, Germany. Continuous activity and light recordings and derived circadian variables were collected using actimeters during the 7-week intervention period.

Preliminary results: Preliminary results showed an overall reduction in depression severity over time, indicating a success of treatment. This reduction of depression was associated with an overall increase in physical activity and number of antidepressant medications taken but was unrelated to total sleep time, gender or age. Network analysis for pre- and post-treatment showed an increase in connectivity between nodes over time, suggesting a therapeutic effect of psychotherapy resulting in strengthened interactions between depression severity, medication intake, physical activity and total sleep time. Further analyses concerning sleep, light and activity variables are currently ongoing.

Conclusion: Continuous locomotor activity recordings lend themselves beautifully to network analyses due to their longitudinal and high-resolution data sampling. We want to make use of this strength and explore the dynamic temporal and potential causal changes that occur in sleep and circadian variables in patients suffering from depression.

Disclosure: No

P504 | Improving university students' mental health using cognitive behavioural therapy for insomnia and sleep-focused interventions: a systematic review and meta-analysis

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University is a time of significant transitions during a young adult's life, with delayed and shortened sleep a common occurrence. Poor sleep in turn has been closely linked to poor mental health. The primary aim of this systematic review and meta-analysis was to examine the effect of cognitive behavioural therapy for insomnia (CBT-I) and other sleep-focused interventions on improving university student sleep and mental health.

Five bibliographic databases (MEDLINE, PsycINFO, Embase, CINAHL and Cochrane Library) were searched for relevant literature in May 2020. Studies including university students between 18-24 years, participating in a CBT-I or other sleep-focused intervention (i.e., sleep psychoeducation) were eligible. Comparator groups could include alternative interventions, waitlist control, treatment as usual or other control group, with study outcomes to include measures of sleep and mental health, specifically anxiety and/or depression. A narrative synthesis provided a text-based summary, with quantitative synthesis performed via random effects meta-analyses.

Of 3435 references screened, 11 studies, six randomised controlled trials (RCTs) and five non-RCTS, involving 5267 participants were included for a narrative synthesis, with focus on intervention designs and methodology. Six studies ($n = 4394$) were eligible for meta-analysis examining depression outcomes and five studies ($n = 4271$, $n = 4249$) were eligible for meta-analyses examining anxiety and sleep outcomes. CBT-I interventions showed a small effect in improving anxiety (standardised mean difference [SMD] $= -0.233$) and depression (SMD $= -0.295$), and a moderate effect in improving sleep disturbance (SMD $= -0.603$) at post-treatment. Meta-regression examining intervention characteristics explained 61% of the variance in effects between studies for sleep outcomes. Both moderators made a significant contribution (delivery format; $p = 0.008$, intervention

duration; $p = 0.015$), with in-person interventions and longer intervention durations showing larger effects. Significant moderator variables were not identified for anxiety and depression outcomes.

Both assessment of sleep and introducing sleep-focused services for students at university may be beneficial to both their sleep and mental health. University settings can offer unique opportunities for prevention and treatment of sleep disturbance amongst their students. Possible avenues include adding to existing well-being services and providing services through university apps and/or campus accommodation.

Disclosure: No

P505 | Objective measures of sleep architecture in adults and older adults with depression: a systematic review and meta-analysis

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Depression is intrinsically, bidirectionally linked to sleep, however, the exact nature of sleep macro- and microarchitectural disturbances has been poorly defined, especially for older adults over 50 years with depression. We examined published articles with electroencephalography (EEG) recordings from polysomnography in adults with and without depression to determine if objective measures of sleep macro and micro architecture differ. We also examined differences in these outcomes in older adults.

A total of 2135 papers were identified through PubMed, Scopus, Web of Science and Embase databases. Two independent reviewers used the PICO structure to remove 2062 papers at abstract review and 58 articles at full text review. Fifteen articles met inclusion criteria, with all reporting macro architectural outcomes and three reporting microarchitectural outcomes. A random effects model meta-analysis was conducted using RevMan 5.4 software. NICE case-control guidelines manual was used for risk of bias.

Sleep data from 838 participants (406 depression and 432 control) was assessed. Out of the fifteen studies, two examined sleep EEG in sixty-two older adults (31 depression and 31 control). Within the total population ($n = 838$) adults with depression had less total sleep time (TST) (mean difference (MD) −33.78 min), lower sleep efficiency (SE) (MD −7.88%), delayed sleep onset latency (SOL) (MD 8.96 min), higher wake after sleep onset (WASO) (MD 14.59 min), shorter rapid eye movement latency (ROL) (MD −10.36 min) and greater REM density (MD 0.58 n/min) than controls. No difference in stage 1 sleep (N1), stage 2 sleep (N2), stage 3 sleep (N3) or rapid eye movement sleep (REM) was observed. In older adults, not all variables could be compared due to limited reporting however the depressed group had greater N1 (MD 6.85%), less N2 (MD −14.08%), shorter ROL (MD −25.45 min), greater REM density (MD 0.23 n/min) and no difference in SE or in REM sleep duration. Microarchitecture outcomes could not be analysed due to differing variable definitions.

Compared to controls, shorter REM latency and greater REM density were consistent across older and younger depressed groups, whereas younger adults with depression had worse sleep continuity. The difference in sleep phenotype may relate to underlying neuropathological and neurophysiological changes.

Disclosure: No

P506 | *Become your own sleepexpert*: development and evaluation of a web application to support a pragmatic behavioral treatment program for insomnia in inpatient psychiatric care

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Introduction: Mental disorders are among the leading causes for reduced quality of life due to illness worldwide. The majority of patients with mental disorders suffer from insomnia, associated with adverse health outcomes. However, the first-line treatment, cognitive behavioral therapy for insomnia (CBT-I), is often too complex for patients with acute mental disorders and is not systematically implemented in inpatient psychiatric care. Rather, insomnia often remains untreated or treated with hypnotics, related to the risk of adverse effects and dependency. *Become your own SLEEPexpert* aims to empower patients with acute mental disorders to take care of their own sleep health based on a pragmatic behavioral treatment program.

Methods: *SLEEPexpert* was developed in collaboration with inpatients and health care providers and centers on the sleep/circadian science- and evidence-based treatment components bedtime restriction and circadian adaptation in three phases: therapist-guided treatment initiation, self-management with nurse support, and self-management. We further developed and tested the usability of a web application based on questionnaires and systematic interviews with qualitative-quantitative text analyses in 15 inpatients across diagnostic entities (8F, 4M, 26.7 ± 7.8) and 12 health care providers on psychiatric wards.

Results: Evaluative pre-post assessments demonstrated feasibility of the web application in an acute psychiatry setting in the hospital (average System Usability Scale value 84.7, range 67.5; 97.5, indicative of "ok" to "best imaginable"). Data show heightened interest from patients and health care providers and a willingness to use a web-based form of the *SLEEPexpert* program.

Conclusions: We present a novel sleep-centered intervention (*SLEEPexpert*) that has the potential to be implemented and disseminated in routine clinical care for patients with severe mental disorders and comorbid insomnia. A current randomized controlled trial aims to further test for efficacy. Given the substantive

burden of insomnia and mental disorders, the proposed developments are expected to improve the care for patients with comorbid insomnia.

Funding source: This clinical project was funded by intramural funds of the University Hospital of Psychiatry and Psychotherapy, Berne.

Disclosure: No

P507 | Headband EEG in a mixed psychiatric sample: Home-based objective measurement of potential trans diagnostic sleep disruption

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Introduction: Sleep disruption in psychiatric conditions seems to be a trans diagnostic factor that has been mostly considered as a secondary-symptom. However, recent studies indicated that sleep disturbances play a prominent role in mental health complaints and targeted treatment of sleep problems can have highly beneficial effects on wake symptomatology. But are there any objective physiological markers that can be used to characterize this trans diagnostic sleep disruption?

Methods: Data was collected within the large-scale Biological Classification of Mental Disorders study at the Max Planck Institute of Psychiatry in unmedicated psychiatric outpatients with affective/anxiety symptomatology ($n = 36$) and healthy subjects ($n = 21$). Sleep measurement constituted of a 6-channel EEG headband (Dreem2) throughout 2–7 nights ($N = 57$, $M_{age} = 36$, 6, 17 females, 259 nights), combined with actigraphy, mini-electrocardiography and a sleep diary. Sleep stages were scored by the automatic algorithm provided by the producer. The algorithm based scoring was double checked by trained sleep experts according to the standardized criteria. Potential misidentification of stages was corrected manually. Arousals were scored according to standardized criteria.

Results: Principal component analysis (PCA) was run on 17 sleep variables calculated for each participant by taking the median value throughout their nights, resulting in 6 main components. Group comparisons were run for these components, yielding no significant difference for macro- and micro-structural variables between the control and patient groups. To capture the hypothesized relationship between subjective symptoms and trans diagnostic sleep parameters correlation coefficients were calculated between Beck's Depression Inventory scores and our sleep components yielding no significant correlation across groups. However, focusing on its insomnia item showed significant correlation with the component interpreted as sleep efficiency and also correlated negatively with the single variables wake after sleep onset and sleep efficiency ($p < 0.001$). Further correlational analysis includes heart rate, spectral and subjective questionnaire data.

Conclusions: In this preliminary analysis no significant difference was found between external psychiatric patients and healthy controls in regards of sleep macro- and micro-structure. However, there was significant correlation between subjective insomnia symptoms and objective macro-structural measures across groups indicating potential use of the headband EEG in screening for insomnia in the general population.

Disclosure: No

P508 | Poor sleep quality may contribute to dysfunctional illness perception and emotional distress in hospitalized patients: a national survey of the italian society of consultation-liaison psychiatry

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Objective: Distress associated with physical illness is a well-known risk factor for adverse illness course in general hospitals. Understanding the factors contributing to it should be a priority and among them dysfunctional illness perception may play a role. Dysfunctional illness perception is associated with high illness distress, somatic symptom severity and low quality of life in hospitalized patients and may negatively influence not only the adaptation to disease, but disease outcomes as well. Despite that good sleep quality might play a key role in the recovery from sickness and plays a critical role in maintaining proper emotional/cognitive processing hospitalized patients often experience fragmented and poor sleep quality. Despite that poor sleep quality may affect daytime emotional and cognitive processing, to date it remains unclear whether poor sleep quality may contribute to emotional and physical distress or to dysfunctional illness perception during hospitalization for medical/surgical problems. In this context we examined their associations in a population of patients hospitalized in medical and surgical wards of different hospitals. located throughout the Italian national territory.

Method: A consecutive series of409 individuals who were hospitalized in medical and surgical wards of different hospitals located throughout the Italian national territory and required an assessment for psychopathological conditions, were included in this cross sectional study. Sleep quality was assessed with Pittsburgh Sleep Quality Index (PSQI), Emotional and physical distress with the Edmonton Symptom Assessment System (ESAS) Illness Perception with the Brief Illness Perception Questionnaire (BIPQ). Differences between groups, correlations and mediations analyses were computed.

Results: Patients with poor sleep quality were more frequently females, with anxiety comorbidity and hold higher scores in ESAS and BIPQ. Poor sleep quality was related to dysfunctional illness

perception, and to both emotional and physical distress. In particular, by affecting cognitive components of illness perception, poor sleep quality may, directly and indirectly, predict high levels of distress during hospitalization.

Conclusions: Poor sleep quality may interest more than 70% of hospitalized patients and may favor dysfunctional illness perception and emotional/psysical distress.Assessing and treating sleep problems in hospitalized patients should be included in the routine of hospitalized patients.

Disclosure: No

P509 | Short- and long-term effects of group psychotherapy for patients with narcolepsy type 1

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Objectives/Introduction: Narcolepsy type 1 (NT1) is a severe chronic disorder of the sleep-wake system with excessive daytime sleepiness and cataplexy. It is often accompanied by psychiatric symptoms. Standard therapy focusses on pharmacotherapy while psychotherapeutic aspects as quality of life (QoL), emotion regulation and disease acceptance are neglected. The aim of this pilot study was to explore the efficiency of an additional method-integrating group-psychotherapy (cognitive-behavioural and body-oriented) on comorbid affective symptoms.

Methods: This prospective single-arm interdisciplinary study included 10 patients (6 women, 4 men) with NT1 (ICSD). Medication did not change during the study period (24 weeks). We collected psychometric data at T-1 (6 weeks waiting control phase), T0 (pre-intervention), T1 (post-intervention; 6 weeks after T0) and T2 follow-up (12 weeks after T1). Psychometric data included specific sleep-related symptoms (PSQI, FSS, ESS), affective symptoms (HADS), emotion regulation (FEEL-E), health-related QoL (SF-12), disease acceptance, processing and coping (FKV-LIS-SE), as well as data concerning severity and burden of specific narcoleptic symptoms.

Preliminary Results: We found trends towards improvement in mean scores of psychological QoL (T0 → T1), emotional and social burden of specific narcoleptic symptoms (T0 → T1) and affective distress and regulation (T0 → T1 → T2). However, results did not reach statistical significance.

1. Emotional and social burden of typical narcoleptic symptoms: cataplexies: **1.8** → **1.3**; hypnagogic hallucinations: **1.2** → **1**
2. Psychological subscale of QoL (SF-12): **60.4** → **64.8**
3. Depression and anxiety (HADS): anxiety: **7.7** → **6.3** → **7**; depression: **6.9** → **6.7** → **5.7**
4. Emotion regulation (FEEL-E): **20** → **18.6** → **17.3**

A subsample of 3 patients with clinically relevant anxiety or depressive symptoms showed even greater improvement in the aspects listed above. There were no relevant changes in PSQI, FSS, ESS and FKS-LIS-SE.

Discussion: The results indicate a reduction in the psychological burden of narcolepsy symptoms in the whole group, lacking statistical relevance according to a small sample size. Patients with clinically relevant anxiety or depressive symptoms benefited more strikingly from group therapy. We suggest to further explore cognitive behavioural therapy in a group setting as a complementary treatment strategy for narcolepsy, especially in a subgroup of NT1 patients with relevant comorbid affective symptoms and in order to prevent depression or anxiety disorders.

Disclosure: No

P510 | Emotional regulation activities moderates the risk of depression in people with sleep disturbance: evidence from a community health survey

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Background and objective: It is widely known that poor sleep quality is closely related to depression, but there are not many studies on what mediating factors are in between.

Methods: Based on national health survey data, the relationship between sleep quality and depressive symptoms was explored, and structural equations were drawn to determine whether emotional regulation activities between poor sleep quality and depression, such as regular breakfast, regular exercise, smoking and drinking contribute to poor sleep quality-induced depression.

Results: There was a significant correlation between poor sleep quality and depressive symptoms. Regular breakfast tended to mediate between poor sleep quality and depression the most, followed by smoking, drinking, and regular exercise.

Conclusion: Several emotional regulation activities including regular breakfast, can play a protective role in the process leading to depression from poor sleep quality. As a follow-up study, it would be of clinical importance and use to examine how clinically regular breakfast can prevent the process of going from poor sleep quality to depression.

Disclosure: No

P795 | Sleep macrostructure and microstructure in psychogenic non epileptic seizures: comparison between PNES and temporal lobe epilepsy

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Rationale: Sleep complaints are commonly reported in patients with PNES (Psychogenic Non-epileptic Seizure) but few studies have addressed this issue. In addition, the lack of clear markers makes PNES diagnosis still difficult and often late. We investigated the differences in sleep macrostructure and microstructure (cycling alternating pattern CAP, sleep spindles, slow-oscillations SO and coupling) between documented PNES patients and temporal lobe epilepsy (TLE) patients with hippocampal sclerosis, with the aim of finding a neurophysiological marker for the PNES diagnosis.

Method: 13 patients with PNES and 13 patients with TLE were recruited and underwent two 48-h ambulatory polysomnography (A-PSG) monitoring sessions. Scoring and analysis of sleep macrostructure and sleep microstructure (cyclic alternating pattern CAP, fast and slow spindles and sloSO were performed.

Results: No differences were found in sleep macrostructure between the two groups of patients. PNES patients presented a higher CAP rate in N1, a lower in N3, a longer mean CAP duration of phase *B* and a higher number of CAP cycles compared to the TLE group. PNES patients had higher amplitude of frontal slow spindles and central fast spindles. PNES had also higher density, amplitude and rate of slow oscillation (SO) but shorter mean duration of Slow Oscillation (SO) on frontal and central regions. Coupling between SO and spindle was higher in PNES patients compared to TLE group.

Conclusion: PNES seem to induce a less fragmented sleep as shown by microstructural analysis compared to TLE. This finding may be the expression of more resilient strategies of sleep in PNES than TLE.

Disclosure: No

P796 | Sleep regularity in healthy adolescents and its association with depressiveness and mental health

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Introduction: Existing research points out the importance of sleep for psychological health in adolescents. In addition to sleep duration and quality, regularity in the timing of sleep may also be an important indicator of sleep health. To address this aspect of sleep, the present study investigated daily variability of sleep in adolescents during school days, weekends, and holidays and its association with depressive symptomatology as well as general psychopathology.

Methods: The sample consisted of forty-six adolescents aged 10–14 years (mean 12.78 years, SD = 1.07; 23 females). The data presented here were collected as part of a longitudinal study designed to investigate genetic and environmental influences on sleep in adolescents. Using actigraphy, sleep was measured during a 6-month period and daily variability of sleep was quantified through the sleep regularity index (SRI). Depressive symptomatology (Center for Epidemiological Studies – Depression) and psychopathology (Strength and Difficulties Questionnaire) were assessed at the end of the 6-months of sleep measurement.

Results: Sleep was most regular during school days and least regular during free days. On school days, more regular sleep was associated with objective markers of better sleep, including longer sleep duration, earlier sleep times, shorter sleep onset latency and greater sleep efficiency. Moreover, SRI on school days was associated with depressive symptomatology, whereas SRI on weekends was correlated with psychopathology. Higher SRI values on holidays were associated with earlier sleep times and rise times. Social jet lag was not associated with any of the day-specific SRIs, yet it was highly correlated to the SRI over all days. Chronotype was not correlated to SRI, however, participants who endorsed more problematic sleep had lower sleep regularity on school days and holidays.

Conclusions: Healthy sleep behaviour is essential for adolescents' physical and mental health. In order to promote this, adolescents should not only be encouraged to get enough sleep but also to retain regular sleeping patterns, especially during school days. Depressive symptomatology was higher in adolescents that exhibited irregular sleep during the school week.

Disclosure: No

P797 | Nighttime sleep, chronotype and behavioral characteristics in chilean young adults

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Objective/Introduction: Seep disturbances and sleep timing have been related to behavioral problems. Our aim was to assess the relation of nighttime sleep and chronotype with behavioral characteristics in young adults.

Methods: Participants were part of a cohort follow-up study since infancy. Using actigraphy for a week, nighttime sleep-wake parameters were assessed for weekdays and weekends: sleep onset time, total sleep time (TST), wake after sleep onset, awakenings and wake-up time (WT). Participants were grouped according to percentile distribution of their nocturnal TST on weekdays: 23 in the short (<6.5 h), 45 in the average (6.5–8.3 h), and 23 in the long (>8.3 h) groups. Chronotype was estimated (mid-sleep time on weekdays corrected

for "oversleep" on weekends) and categorized in early and late chronotypes based on the median (5.5 h). Adult self-report scale comprised eight syndrome scales (anxious/depressed, withdrawn, somatic complaints, intrusive, thought and attention problems, aggressive and rule-breaking behaviors) and six other scales (depressive, anxiety, somatic, avoidant personality, antisocial personality problems, and attention deficit/hyperactivity [ADH: inattention and hyperactivity/impulsivity subscales]). We used T-scores norm-based on age and gender. General linear models were conducted and the interaction with sex was assessed.

Results: Ninety-one participants (47.2% female and 21.3 ± 0.3 y) were assessed. The long sleep group showed:

(a) higher scores in attention problems compared to short sleep group (59.0 vs 54.8, $p < 0.05$); and

(b) higher scores in avoidant personality relative to short (61.6 vs 55.0, $p < 0.01$) and average (61.6 vs 57.0, $p < 0.05$) sleep groups. The long sleep group also showed:

(a) later WT on weekdays relative to short (10.0 vs 8.6 h, $p < 0.01$) and average (10.0 vs 8.6 h, $p < 0.001$) sleep groups; and

(b) less awakenings on weekends compared to average sleep group (1.3 vs 2.5, $p < 0.05$). Further, females with late chronotype showed higher scores in rule-breaking behavior than females with early chronotype (60.0 vs 54.3, $p < 0.01$), and males with early (60.0 vs 55.8, $p < 0.05$) and late (60.0 vs 55.3, $p < 0.05$) chronotypes.

Conclusions: Participants of the long sleep group showed worst behavioral characteristics. Females with late chronotype were more disruptive compared to females with early chronotype and males with either early or late chronotypes.

Support: NIH HD33487 grant.

Disclosure: No

P798 | Diminished slow wave activity in un-medicated adolescents with major depressive disorder

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Introduction: In adolescents as well as adults with major depressive disorder (MDD), studies have found changes in slow wave activity (SWA). Due to samples with broad age ranges, different medication status' and variable severity of depression findings have been inconclusive. The aim of the present study was to examine sleep neurophysiology in an un-medicated sample of adolescents with and without major depressive disorder (MDD) using high-density sleep electroencephalogram (EEG).

Methods: Thirty-nine adolescents with and without depression between the age of 14 and 17 years (mean 15.15 years, SD = 1.1; 25 females; 18 with MDD) participated in the present study. Participants in the MDD group met criteria for moderately to severe depression based on a clinical interview. All participants followed a sleep schedule for three days prior to a night of high-density sleep EEG (59 EEG derivations) recording at participants homes. Slow wave activity (SWA) was calculated as power in the 0.6–4.6 Hz range. An ANOVA with factors age, sex and group was used to determine statistical differences in SWA between the groups.

Results: In our study, we found a significant diminution of SWA in adolescents suffering from depression as compared to those without depression. Thirty-three derivations distributed over widespread brain regions showed statistically significant reduction in SWA in the MDD group. Effect sizes were large, with eta-squared values for significant electrodes ranging between 0.11 and 0.28.

Conclusions: The reduction of SWA in adolescents with MDD as compared to controls was topographically more widespread and effect sized were larger compared to previous studies in adolescents. This might be explained by the recruitment of an un-medicated sample, the narrow age range and the moderate to severe depression, which may help reduce variability and furthermore, increases statistical power. Our results add to the existing literature showing a reduction of SWA in MDD and further our understanding of the role of sleep in adolescent depression.

Disclosure: No

P799 | Substance use and sleep problems in patients with psychotic disorders

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Introduction: Substance use and sleep problems are common in patients with psychotic disorders, but how the use of various substances and sleep problems are associated in these patients has not been studied. In this study, we aim to investigate associations between substance use and sleep problems in a large nationwide cohort of patients diagnosed with a psychotic disorder.

Methods: This study is part of the Finnish SUPER study, which in turn is part of the Stanley Global Neuropsychiatric Genomics Initiative. The participants ($N = 8616$) in this cross-sectional, multicentre study were recruited nationwide from primary and specialized health care. Psychosis diagnoses were ascertained from a national health care register, and patients diagnosed with schizophrenia, schizoaffective

disorder, bipolar disorder and psychotic depression were included in this study. Information on current use of alcohol (AUDIT-C) and cigarettes as well as lifetime illicit drug use, including cannabis, benzodiazepines, amphetamines and opioids, were collected using questionnaires. The sleep outcomes were short and long sleep duration, difficulties falling asleep, early morning awakenings, fatigue and poor sleep quality.

Results: Self-reported substance use was associated with higher prevalence of sleep problems. After adjustments with age, gender, diagnostic group and living status, hazardous alcohol use was associated with several sleep problems, including difficulties falling asleep and early morning awakenings. Current smoking and lifetime benzodiazepine misuse were also associated with sleep problems, including short sleep duration.

Conclusions: In our study, substance use was associated with sleep problems. This study highlights the importance of screening substance use when treating sleep problems in patients with psychotic disorders.

Disclosure: No

P800 | Sleep disorders are highly prevalent in dutch mental health patients, especially in those with posttraumatic stress disorder

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Objectives/Introduction: Sleep disorders are prevalent in persons with mental disorders and have adverse consequences on their mental health. Associations between sleep disorders and development, relapse and increased symptomatology of mental disorders have been observed. However, existing estimates of the prevalence of sleep disorders in mental disorders vary, and the prevalence of certain combinations of mental and sleep disorders remains relatively unexplored. The current study aimed to assess the point prevalences of the six major groups of sleep disorders in an overarching Dutch mental disorder population and within specific mental disorder groups using a sleep disorder screening instrument.

Methods: A total of 1634 persons with a mental disorder registered for treatment at GGZ Drenthe mental health institute filled out the Holland Sleep Disorder Questionnaire, which screens for sleep disorders defined in the International Classification for Sleep Disorders (ICSD). Information on demographics (age, sex) and mental disorder diagnoses were collected as well. Specifically, attention deficit disorders, autism spectrum disorders, anxiety disorders, bipolar disorders, depression, personality disorders, obsessive compulsive disorder, posttraumatic stress disorder, schizophrenia spectrum disorders, somatization disorder and substance use disorders were considered. Cross tables were used to assess the point-prevalences of the six ICSD sleep disorders in the overarching mental disorder sample and in the specific eleven groups of mental disorders mentioned above.

Results: Overall, 53.8% of all persons with a mental disorder scored also above cut-off for having a sleep disorder. Specifically, 27.2% scored on insomnia, 18.9% on restless legs syndrome, 14.8% on circadian rhythm sleep wake disorders, 13.5% on obstructive sleep apnea syndrome, 12.7% on parasomnia and, 10.0% on hypersomnolences. Analysis of prevalence of specific sleep disorders within the different mental disorder groups, revealed that all sleep disorders were most prevalent within persons with PTSD. Detailed description of the disorder specific prevalence will be presented at the meeting.

Conclusions: The prevalence of sleep disorders is increased in persons with mental disorders relative to the general population. This was especially apparent for PTSD.

Disclosure: No

P801 | Psychotic-like experiences in patients with sleep disorders

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Objectives: There are strong links between sleep and psychosis. Sleep disturbances are commonly observed in schizophrenia patients but studies investigating psychotic-like experiences in subjects with sleep disorders are rare.

Methods: We studied 24 subjects with insomnia disorder (41 ± 13 years), 47 participants with obstructive sleep apnea (47 ± 11 years) and 33 healthy controls (41 ± 13 years). Sleep in patients with sleep disorders was recorded and scored according to American Academy of Sleep Medicine (AASM) standard criteria. Psychotic-like experiences were measured by the Magical Ideation Scale (MIS) and by the Peters et al. Delusional Inventory (PDI).

Results: (1) Significant higher scores of magical ideations in patients with insomnia compared to healthy controls (mean and SD of MIS score: 9.0 ± 8.2 versus 4.7 ± 6.4).

(2) A tendency of a higher score of delusional beliefs in sleep apnea patients in comparison to controls (mean and SD of PDI total score: 19.5 ± 20.8 versus 11.2 ± 18.5; both times two-tailed *t*-test).

(3) Magical ideations in insomnia subjects were significantly negatively correlated with the number of sleep spindles ($r = -0.45$; partial correlation controlled for age).

Conclusions: As there are indications that diminutions of sleep spindles are a biomarker for dysfunctional thalmo-cortical circuits underlying the neuropathology of psychosis, we conclude that there might be a sub-group of insomnia patients with less sleep spindles which is more vulnerable for developing a psychotic disorder in the future.

Disclosure: No

P802 | Parent- and child-reported internalizing problems are associated with reduced sleep quality in early adolescence–preliminary results based on a trans diagnostic, dimensional approach to mental health

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Introduction: The three-factor model of psychopathology, consisting of the higher-order factors internalizing, externalizing, and thought disorders, is a dimensional and trans diagnostic approach that accounts for the remarkably high share of co-occurrence of certain psychiatric conditions in youth. In developmental samples, the three dimensions can be assessed using parent and child-report. Akin to the high comorbidity amongst psychiatric diagnoses, compromised sleep quality is ubiquitous across psychiatric disorders identified based on categorial classification systems. Since the role of sleep in dimensional and trans diagnostic conceptualizations remains understudied, the aim of this study was to investigate the relationships between this alternative model of mental health and sleep quality in adolescence using both parent and child reports.

Methods: We conducted a stepwise regression using the higher-order factors (internalizing problems, externalizing problems and other problems) of the child-behavior checklist (CBCL; a parent-report) and its parallel self-report version, the Youth Self Report (YSR; child-report) as well as lower-order syndrome scales as predictors of subjective sleep quality. Sleep quality was assessed using the Pittsburg Sleep Quality Index (PSQI). Thirty-three adolescents aged 11 to 12 years (mean = 11.73 (± 0.45); 15 girls) participated in the study.

Results: Results showed that internalizing problems ($\beta = 0.806$, $p < 0.001$) and externalizing problems ($\beta = -0.512$, $p = 0.026$) as measured by the CBCL, significantly predict sleep quality (PSQI). As indicated by results of stepwise regression including the YSR (child-report) syndrome scales as predictors, the scale withdrawn/depressed significantly predicted PSQI scores ($\beta = 0.43$, $p = 0.014$).

Conclusion: The finding that the internalizing dimension of the CBCL is associated with diminished sleep quality is consistent with previous findings indicating that sleep disturbance and internalizing problems are highly correlated. The association between the withdrawn/depressed symptoms of YSR (also belonging to the internalizing dimension), and sleep quality is in line with existing evidence showing that sleep problems are reported by the majority of depressed adolescents. The relationship between internalizing problems and sleep disturbances is found independently of the informant, further highlighting the salience of this relationship from both a categorial and a dimensional standpoint, when usually, cross-informant agreement in mental health is modest.

Disclosure: No

P900 | Prolonged sleep latency and reduced REM latency were associated with depression in a japanese working population

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Objectives/Introduction: Examining the relationship between sleep and depression may be important to understanding the etiology of affective disorders. Most studies that use electroencephalography (EEG) to objectively assess sleep have been conducted using polysomnography in the laboratory. Impaired sleep continuity including prolonged sleep latency and changes in rapid eye movement (REM) sleep were reported to be associated with depression in clinical settings.

Methods: We performed a cross-sectional epidemiological study in a Japanese working population to identify the EEG parameters associated with depressive symptoms based on the results of a questionnaire survey and home EEG measurements in a large population using 1-channel (1-Ch) EEG.

Results: 650 Japanese (41.2% male, 44.7 ± 11.5 years) underwent home EEG monitoring with a questionnaire including the Patient Health Questionnaire-9 (PHQ-9) to assess depression. Logistic regression analysis revealed that depression (PHQ-9≥10) was associated with sleep latency (OR: 1.00, 95%CI: 1.01–1.04) and REM latency (OR: 0.994, 95%CI: 0.988–1.00).

Conclusions: Our results suggested that depression was associated with prolonged sleep latency and reduced REM latency in a Japanese working population. 1-Ch EEG may be a useful tool to monitor sleep and screen depression in non-clinical settings.

Disclosure: Yes

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P902 | **The combined influence of anxiety and COVID-19 on sleep quality and insomnia severity**

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Introduction: Based on recent studies, we put forward a hypothesis about the synergistic effect of anxiety disorders and previous COVID-19 on the deterioration of the quality of sleep and the occurrence of insomnia. The objective was to investigate the impacts of anxiety disorders, COVID-19 in anamnesis, and its combined effect on sleep disturbances.
Methods: We conducted a retrospective clinical study, which included 60 males and females, who were divided into groups:
group 1 – patients who have anxiety disorders and became ill with COVID-19 during the last 6 months;
group 2 – patients with anxiety disorders and did not suffer from COVID-19 during the last 6 months;
group 3 – persons who were not ill with COVID-19 during the last 6 months and have not anxiety disorders.
We used the Beck anxiety inventory to assess the overall level of anxiety. For measurement of sleep quality, we used the Pittsburgh Sleep Quality Index. The Insomnia Severity Index was used to measure the degree of insomnia.
Results: It had been detected that patients from group 1 are more inclined to lower subjective quality of sleep, higher latency of sleep, and more severe daily dysfunction, while groups 2 and 3 had better habitual sleep efficiency and less frequency of sleeping medications usage. We found a statistically significant difference between groups in degrees of insomnia ($p = 0.003$). Our analysis shows a statistically significant impact on sleep quality and insomnia severity as anxiety disorders ($p < 0.001$ in both cases), as COVID-19 in medical history for the last 6 months ($p = 0.038$ and $p = 0.006$ respectively) with a significant relationship ($p = 0.019$ and $p = 0.046$ respectively). It notices a tendency to more severity of insomnia in patients with anxiety disorders and COVID-19.
Conclusions: Our research shows that anxiety disorders and COVID-19 in anamnesis of the last 6 months have links to poorer sleep quality and more severe insomnia. Their combined effect also significantly influences sleep quality and the degree of insomnia. These findings indicate a potential role of COVID-19 as an enhancer in relationships between anxiety and sleep disorders.
Disclosure: No

23: NORMAL PHYSIOLOGY OF SLEEP AND NORMAL VARIANTS

P198 | **The association between self-reported electronic device usage and objectively measured sleep in adults**

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Introduction: Use of light emitting electronic devices in bed before sleep has been associated with sleep disruption in children and adolescents. Both the wavelength and intensity of the emitted light, and cognitive and emotional engagement with the device, have been proposed as explanations for subsequent sleep disruption. Here, we examined the association between daily self-reported electronic devices usage and objective sleep parameters in an adult population of consumer sleep technology users.
Methods: Data from 231 users without sleep disorders (mean age: 48.8 ± 16.6 years, 51% female, ages 16–82) across 25,282 nights were included in the analysis. Sleep data was captured between March 3, 2020 and March 3, 2022, using the PSG-validated Sleep Score mobile application, which uses a non-contact, sonar-based method to objectively capture sleep-related metrics. Self-reported data were collected from a cross-sectional survey whereby users were asked, "In a typical week, how often do you use electronic devices in bed before going to sleep?" as per their experience after the COVID pandemic started. A mixed effect model was used for the analysis controlling for age, chronotype, weekend, and gender. Dependent variables included total sleep time (TST), sleep onset latency (SOL), sleep efficiency, WASO percent, bedtime, waking up time and time in bed (TIB).
Results: Higher electronic device usage was associated with a reduction in TST (min) ($\beta = -9.2$, 95%CI [−15.9, −2.5], $p = 0.007$), delayed bedtimes ($\beta = 0.17$, 95%CI [0.029, 0.324], $p = 0.019$), and a reduction in TIB (min) ($\beta = -8.8$, 95%CI [−14.75, −2.87], $p < 0.005$).There was no significant relationship between electronic device usage screen usage and SOL, sleep efficiency, percentage wake after sleep onset (WASO), and waking up time.
Conclusion: Self-reported use of electronic devices in bed before sleep was associated with shorter TIB, later bedtime, and shorter TST. Our results suggest that electronic device usage before bed reduces the sleep opportunity window and subsequently shortens the time in bed and total sleep time. Future research is warranted to determine whether consumer sleep technologies may allow users to uncover deleterious pre-sleep behaviours which may contribute to sleep-wake dysfunction through daily logging and personalized feedback.
Disclosure: Yes
Conflict of Interest statement: All authors are employees of Sleep Score Labs.

P199 | **Seasonality of human sleep - II: PSG-data in neuropsychiatric sleep patients**

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Introduction: Earth rotation causes precise 24-h changes in the environment. Evolutionary adaptations have created circadian systems that anticipate these changes with light and darkness being the strongest zeitgebers. Except close to the equator, the length of the light-dark signal varies over the year triggering seasonal phenomena such as breeding, migration and hibernation. In humans, photoperiod responsiveness is well conserved, but seems to be complex. Seasonal changes in physiology differ according to age, sex, light-source and many more variables including some 70 percent of the population not reporting any seasonal changes in behavior. We have recently replicated this complexity in healthy subjects and in the same population reported human seasonality to be influenced by changes in intraindividual melatonin secretion levels (Seasonality of Human Sleep – I: this meeting). The aim of this study was to investigate seasonality of human sleep architecture.

Methods: In our neuropsychiatric sleep-clinic three consecutive nights of polysomnography were performed in 292 patients in 2019. Diagnostic second nights were averaged per month and analysed over the course of one year. Patients were advised to sleep "as usual" including timing, alarm-clocks were not allowed. Exclusion criteria were: administration of psychotropic agents known to influence sleep ($n = 96$), REM-sleep latency <120 min ($n = 5$), technical failure ($n = 3$). Included were 188 patients: 46.6 ± 15.9 yrs (mean ± SD; range 17–81 yrs); 52% female. Sleep related diagnoses were: insomnia ($n = 108$), depression ($n = 59$), sleep-related breathing disorders ($n = 52$), RLS ($n = 20$), PLMD ($n = 36$), RBD ($n = 19$) and others ($n = 15$). For statistical analyses a linear-mixed-model was performed.

Results: Analyses showed significant differences in: 1. sleep-period-time with longer sleep during winter compared to summer (80 min; $p = 0.036$); 2. Higher amount of REM-sleep during winter compared to summer (30 min; $p = 0.008$); 3. shorter REM-sleep latency during winter compared to summer (22 min, $p = 0.012$) and 4. shorter NREM-3 in autumn (40 min; $p = 0.044$).

Conclusions: To the best of our knowledge data present first evidence of seasonal variation in human sleep architecture in a heterogenous group of patients with disturbed sleep. The mechanisms behind are still poorly understood. Nevertheless, these findings emphasize the extent to which humans are subject to seasonal changes even in an urban environment and may add to the ongoing discussion of daylight-saving-time.

Disclosure: No

P200 | The characteristics of sleep habits of slovenian university students during COVID-19 epidemic: preliminary results of a two-wave study

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Introduction: It is well known that university students are at high risk for developing sleep problems due to the unique challenges of early adulthood. The COVID-19 pandemic and accompanying infection control measures, including university closures and home schooling, imposed additional challenges to healthy sleep of university students around the world. The aim of our study was to evaluate the characteristics of Slovenian students' sleep habits during the first and second wave of the COVID-19 epidemic in Slovenia. We also aimed to investigate the possible role of sleep hygiene in predicting the sleep quality of students during the epidemic.

Methods: This prospective cross-sectional study was conducted during the first wave of the epidemic in Slovenia (spring 2020) and one year later, when the epidemic was declared for the second time (spring 2021). Slovenian university students responded to sleep-related, change-specific questions in an online survey.

Results: 541 participants (80% women) responded to the survey in the first wave and 719 (81% women) in the second wave. Our preliminary results show that most students slept within the recommended time frame of at least 7 h per night during both the first (73.2%) and second wave (63.8%), and most students reported sleeping more or the same amount of time during the epidemic compared to the pre-epidemic period. On the other hand, sleep quality worsened for a large proportion of participants during the first (37.2%) and second wave (41%), and many experienced less consistent sleep-wake cycles during both the first (48.6%) and second wave (52.1%) compared with the pre-epidemic period. Multiple regression analyses revealed that sleep hygiene predicted overall sleep quality during the epidemic in both waves, even after controlling for relevant variables that might affect sleep (demographic variables, presence or absence of physical illness or mental disorders, stress, anxiety, and depressive symptoms).

Conclusions: Our data confirm evidence of sleep changes previously observed in other studies during the pandemic and demonstrate the vulnerability of university students to decreased sleep quality and regularity during the COVID-19 epidemic. Our preliminary results also suggest the potential role of sleep hygiene in predicting sleep quality across the pandemic waves.

Disclosure: No

P517 | Effects of chronotype on sleep and dream in healthy adults

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Objectives: Dreaming may be affected by sleep behavior, but there are few researches investigating the effect of chronotype on dreaming.

Dreaming may reflect the brain mechanisms relating emotion and memory process during sleep. Given the clinical significance of chronotype, investigation of the chronotype on dreaming may have implication in the research field of cognition and psychology. In this study, we investigated the effect of chronotype on sleep parameters using polysomnography as well as self-reported questionnaire. We also investigated dream recall and nightmare distress for their relation to chronotype.

Methods: In this cross-sectional study, we retrospectively examined subjects who visited a sleep laboratory for evaluation of sleep disorder between 2016 and 2021. Subjects were eligible for the trial if they were more than 18 years old and evaluated with a standard polysomnography. Subjects who had major sleep disorders were excluded. Chronotype was assessed by a Korean version of the Morningness-eveningness questionnaire. To assess dreaming components in study population, a 9-item Dreaming Questionnaire consisting of nightmare distress and dream recall was used.

Results: In this study, we found that individuals with eveningness chronotype had higher nightmare distress (p = 0.039) and remembered dreams better ($p < 0.001$). People with morningness chronotype were older ($p < 0.001$) and more married (p = 0.002) than whom with other chronotypes. There was no difference according to the chronotype in subjective measurements of depression, anxiety and sleep quality, and PSG variables such as respiration and sleep architecture did the same. In multivariate linear regression analysis, the higher OSA severity, the lower nightmare distress($b = -0.209$; $p = 0.029$) and dream recalls ($b = -0.189$; $p = 0.044$), and depression was positively correlated with nightmare distress ($b = 0.450$; $p = 0.002$). In this study, the chronotype had an effect on dreaming, but its effects to sleep quality or mood were not significant.

Conclusion: The findings indicate the contribution of eveningness chronotype to nightmare distress and dream recall. Investigating the feature of chronotype and dreaming may have implication in the research field of cognition of psychology. Some spotlight for these research fields is needed.

Disclosure: No

P518 | Alcohol and caffeine are associated with poor sleep: a big data analysis of self-reported consumption and objectively measured sleep

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Introduction: The direct effects of caffeine and alcohol consumption on subsequent sleep have largely been confined to in-lab protocols with cross-sectional measurements and relatively small samples, thus limiting the ecological validity and generalisability of findings. This present analysis leveraged longitudinal and naturalistic data from active consumer sleep technology users to examine whether daily self-reported alcohol and caffeine consumption were associated with objectively measured sleep.

Methods: Data from 26,248 users (mean age: 38.6 ± 15.4, 51.0% female) across 316,556 nights were captured using the non-contact, sonar-based, PSG-validate Sleep Score Mobile Application over the course of a year. Alcoholic beverage and caffeine beverage consumption were gathered using daily self-reports within the app. Total Sleep Time (TST), Sleep Efficiency, Wake After Sleep Onset (WASO) and Sleep Onset Latency (SOL) were examined. Mixed-effects modelling was used for analysis, controlling for age, gender, and day of the week. Users reporting a diagnosed sleep disorder were excluded from the analysis.

Results: Consumption of alcohol or caffeine at least once a week was reported by 41.6% and 70.1% of respondents respectively. Increased alcohol consumption had an associated decrease in Sleep Onset Latency (SOL) ($b = -0.67$,95% CI=[-0.72 -0.63], $p < 0.001$), TST ($b = -1.72$,95% CI=[−1.9 −1.54], $p < 0.001$), sleep efficiency ($b = -0.08$, 95% CI=[−0.1 −0.06], $p < 0.001$) and increase in WASO percentage ($b = 0.2$,95% CI=[0.17 0.22], $p < 0.001$). Increased caffeine consumption had an associated increase in SOL ($b = 0.16$, 95% CI=[0.09–0.22], $p < 0.0001$) as well as a decrease in TST ($b = -2.59$,95% CI=[−2.84−2.34], $p < 0.001$) and sleep efficiency ($b = -0.05$,95% CI=[−0.08 −0.02], $p < 0.01$). There was no significant association between caffeine consumption and WASO percentage.

Conclusion: Alcohol and caffeine consumption are associated with shorter sleep durations and impaired sleep efficiency, suggesting an overall reduction in sleep quality. Our findings suggest that a reduction in alcohol and caffeine consumption by the general public may have a positive impact on sleep health and on subsequent general health.

Disclosure: Yes

Conflict of Interest statement: All authors are employees of Sleep Score Labs

P519 | Assessing the impact of race and income on changes in self-reported sleep quality during the COVID-19 pandemic

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Objectives/introduction: Early evidence suggests that the COVID-19 pandemic has differentially impacted sleep-wake functioning. While burgeoning research has demonstrated the unequal distribution of sleep deficiencies across social and economic groups in general, few studies have examined the association between socioeconomic

factors and changes in self-reported sleep quality from before to during the COVID-19 pandemic.

Methods: A cross-sectional survey of users from the Sleep Score database (n = 2,154; mean age = 46.8 +− 16.1 years; 56% female; 28% minority race/ethnicity) was conducted in January 2022. Proportional odds (ordinal) logistic regression was employed to test the significance of race/ethnicity and annual household income for the likelihood of changes to pre-pandemic self-reported measures of sleep quality, wake after sleep onset (WASO), and sleep onset latency (SOL). All regression models controlled for age, gender, and parenthood (college-age or younger child living at home).

Results: Compared to high-income ($150,000+ USD) participants, low-income ($0-$25,000 USD) participants were 2.7 times (95%CI 1.91–3.89, $p < 0.001$) more likely to report reduced overall sleep quality, 2.3 times (95%CI 1.55-3.33, $p < 0.001$) more likely to report increased WASO, and 2.2 times (95%CI 1.52–3.20, $p < 0.001$) more likely to report increased SOL during the pandemic. Participants with income levels of $25,000-$34,999 USD and $75,000-$99,999 USD were also 1.9 (95%CI 1.27–2.87, $p = 0.002$) and 1.6 (95%CI 1.14–2.15, $p = 0.006$) times more likely than high-income participants to report decreased overall sleep quality. In terms of race/ethnicity, Hispanic/Latino participants were 1.7 times (95%CI 1.16–2.61, $p = 0.007$) more likely than White participants to report increased SOL. No significant changes in self-reported overall sleep quality, WASO, or SOL were observed for other racial/ethnic groups.

Conclusions: Significant changes in self-reported sleep quality during the COVID-19 pandemic were seen across social and economic groups. These results suggest that the COVID-19 pandemic may exacerbate pre-pandemic sleep inequalities among individuals with low household incomes. Analyses also indicated a differential impact of the COVID-19 pandemic on self-reported SOL among Hispanic/Latino individuals, though no significant changes to self-reported measures of sleep quality were observed for other racial/ethnic groups.

Disclosure: Yes

Conflict of Interest statement: All authors are employees of Sleep Score Labs.

P803 | Seasonality of human sleep - I: influence of individual melatonin levels in healthy subjects

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Introduction: The pineal hormone melatonin is the natural transducer of the environmental light-dark-signal to the body. Although the responsiveness to photoperiod is well conserved in humans, only some 25 percent of the human population experiences seasonal changes in behavior. As a consequence, humans seem to have adapted - at least partly - to the seasonal changes in day length. The aim of the study was to demonstrate that the individual melatonin deficit marker DOC (degree of pineal calcification) is related to variation of seasonal phenomena in humans.

Methods: Out of 3011 patients in which cranial computer tomography (cCT) was performed for diagnostic reasons, finally 97 consecutive "healthy" subjects (43 female, 54 male; age 18–68 yrs., mean ± SD: 35.0 ± 13.1) were included. Exclusion criteria were e.g.: pathological finding in cCT, acute/chronic illness including alcohol/drug abuse, shift-work, medication known to influence melatonin excretion. Degree of pineal calcification DOC was semi-quantitatively determined using the previously validated method. The seasonal pattern assessment questionnaire (SPAQ) was performed in a telephone interview.

Results: Twenty-six subjects fulfilled criteria for seasonal affective disorder (SAD) or subsyndromal (S)-SAD. Seasonality was more pronounced in women as compared to men (SPAQ seasonality score 7.8 ± 4.0 vs. 4.9 ± 4.5; $p = 0.001$) and negatively and significantly associated with age ($r = -0.178$; $p = 0.04$). Subjective sleep length significantly varied between seasons (one way repeated measures ANOVA: $F = 45.75$; $p < 0.0001$) with sleep during winter being 53 min (±70 min) longer than during summer. Controlling for age total seasonality score was negatively and significantly associated with DOC ($r_{94} = -0.214$; $p = 0.036$).

Conclusions: Data confirm earlier studies with respect to distribution of seasonality with sex and age. The survival of seasonality in sleep length of people living in an urban environment underlines functionality of the circadian timing system in modern societies. Moreover, data confirm for the first time, that diminished experience of seasonality in behavior is associated with a reduced individual capacity to produce melatonin.

Disclosure: No

P804 | Real-world evidence for the impact of scent on sleep in healthy individuals using biometric and self-report measures

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Objectives/Introduction: Reports on the benefits of scent for sleep are often based on anecdotal evidence and thus lack scientific rigor. The current sleep study evaluated the impact of IFF proprietary scent compositions relative to an unscented control in healthy individuals using both *at-home* biometric and self-reported measures.

Methods: 51 and 52 healthy adults participated in *Study 1 (Scent A)* and *Study 2 (Scent B)*, respectively. The two scent compositions were designed by IFF specifically for sleep application using both published research and proprietary knowledge. Each study lasted 3 weeks, during which participants tracked their sleep in-context (at home), using

the Sleep Score Labs Max device (Sleep Score Labs, Carlsbad, CA, USA), and completed a daily questionnaire administered in the morning and evening. The first week was used to familiarize participants with the measurement protocol without using any product. During the next two weeks, the participants were required to apply either a scented (active), or an unscented pillow mist (control) on their pillowcase at bedtime for one week each following a standardized protocol. The order of presentation was counterbalanced across participants. Multilevel regression was used for statistical analysis.

Results: *Scent A* was shown to improve sleep by reducing wake after sleep onset (WASO) (−19%, $p < 0.05$), sleep onset (-19%, $p < 0.01$), increasing Deep Sleep stage duration (+6%, $p < 0.05$) & percent Deep Sleep (+1.5%). Consequently, there was an improvement in overall sleep quality as reflected by an increase in Sleep Efficiency (+1.8%, $p < 0.01$), Sleep Maintenance (+1.1%, $p < 0.05$) as well as overall *Sleep Score*(+3%, $p < 0.05$) and *Body Score* (+2%, $p < 0.05$). For Scent A, improvement in self-reported sleep quality did not reach statistical significance. *Scent* B showed a significant reduction in biometrically measured sleep onset (−15%, $p < 0.05$), and a significant improvement in self-reported Sleep Quality, and feeling refreshed and well-rested in the morning.

Conclusions: This study provides strong scientific evidence that scent solutions composed for sleep can improve a range of objective and subjective sleep measurements in individuals with light to moderate sleep complaints. Further studies are needed to elucidate the drivers of the impact of scent on sleep in terms of odor character, chemical structure, physicochemical properties, etc.

Disclosure: Yes

Conflict of Interest statement: All authors are employees of IFF or Sleep Score Labs. This research conducted by IFF in collaboration with Sleep Score Labs and was funded by IFF.

P805 | The relation between sleep quality and work-related factors among employees of the General Secretariat of the Council of the European Union during the COVID-19 epidemic

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Introduction: The COVID-19 epidemic and its measures, such as working from home, have had a significant impact on various aspects of people's lives and have contributed to the challenges of healthy and quality sleep. The aim of our study was to examine the characteristics of sleep of employees of the General Secretariat of the Council of the European Union (GSC). Specifically, we wanted to assess how sleep quality correlates with various work and mental health parameters, and whether Zoom fatigue was an important predictor of employee sleep quality during the COVID-19 epidemic.

Methods: This prospective cross-sectional study was conducted during the first half of summer 2021 when most employees were still working from home or in a hybrid work model. We invited employees of different directorates of the GSC to complete an online survey, with which we wanted to obtain some work-related information and to assess overall sleep quality (The Pittsburgh Sleep Quality Index, PSQI), anxiety symptoms (The General Anxiety Disorder-7, GAD-7), and level of fatigue due to use of web-based tools - Zoom fatigue (The Zoom Exhaustion & Fatigue Scale, ZEF).

Results: The online survey was completed by 201 participants (62 % female). The results show that almost half (46.8 %) slept less than the recommended minimum of 7 h per night and more than half (58.7 %) reported poor sleep quality. The statistical analyzes performed (correlation, regression analysis, and mediation) showed that sleep quality was significantly correlated with anxiety symptoms, Zoom fatigue, and mental connection with work after official working hours. Results also highlighted the importance of Zoom fatigue as a significant predictor of sleep quality, with anxiety as a mediator of the relationship between Zoom fatigue and sleep quality.

Conclusion: Our results support previous findings that healthy sleep might be difficult to achieve during the COVID-19 epidemic. In our view, these preliminary results highlight the potential role of Zoom fatigue in predicting sleep quality during the COVID-19 epidemic. These findings could serve as a basis for further research on sleep, and work-related factors, particularly the hazards of long-term use of electronic devices for telework during the epidemic.

Disclosure: No

24: PAEDIATRICS

P202 | Habitual sleep and intraindividual variability of gifted children: an actigraphy study

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Objectives/introduction: Giftedness is a multidimensional condition. It is increasingly put forward that gifted children (GC) could be a population at high risk for sleep problems. The current study investigated GC and typically-developing children (TDC) for their habitual sleep, night-to-night sleep variability, and parental reports of child sleep.

Methods: The sample consisted of 62 GC (31 girls; mean age = 9.63 ± 1.71 years) and 62 TDC (31 girls; mean age = 9.68 ± 1.68 years). Giftedness was identified using Renzulli's three-factor definition of giftedness. Sleep duration, quality and night-to-night variability were assessed using actigraphy. Parents were asked to complete the short-form version of the Children's Sleep Habits Questionnaire to report on their child's sleep. Groups were compared with independent sample *t*-tests and chi-square analyses.

Results: GC displayed lower sleep efficiency, more wake time after sleep onset, and more night-to-night sleep variability than TDC. GC were

found to experience less social jetlag compared to TDC and they also showed more clinically significant sleep problems as reported by parents.

Conclusions: Sleep maintenance and stability are challenged in GC. While there is growing evidence that greater sleep variability is associated with poorer physical and emotional health, studies have yet to examine these associations in GC specifically to get a better understanding of giftedness. Overall, there is a need for research focused on both predictors and consequences of sleep patterns and sleep variability in GC.

Disclosure: No

P203 | Prevalence of sleep training among parents of infants in South Korea

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Introduction: Sleep training methods, defined here as standard extinction, graduated extinction, and camping-out, are effective in consolidating and improving infant sleep. While sleep training is prevalent and widely used in Western countries, very little is known about Asian countries where co-sleeping remains the norm in parenting. The current study aims to examine parental recognition of sleep training methods and explore barriers in implementing sleep training among parents in South Korea.

Methods: An online survey was conducted in 171 parents who had children aged 6 to 18 months in South Korea. Participants mainly consisted of mothers (62%), and average age was 35.30 years old (SD = 4.78). Children were 57.3% boys, and average age was 12.91 (SD = 3.79) months. Participants completed Brief Infant Sleep Questionnaire-Revised (BISQ-R). Participants also responded to questions about experience implementing three evidence-based training methods (standard extinction, graduated extinction, and camping-out) and other non-evidence-based sleep training methods.

Results: Frequency analyses results indicated that 65% (n = 112) of the sample knew about evidence-based sleep training (standard extinction 41.5%, graduated extinction 45.6%, camping-out 21.6%). Only 8.8%, 13.5%, 9.9% reported implementing standard extinction, gradual extinction, camping-out, respectively. Difficulties in implementing sleep training were explored among participants who reported knowledge of any of the evidence-based sleep training methods (n = 112). Among the participants who reported knowing about evidence-based sleep training, 24.1% (n = 27) reported low parental crying tolerance ("I have difficulty coping with the baby crying because it is too stressful") and 19.6% (n = 22) reported worrying about noise ("If the child cries at night, it will bother the neighbour") as main barriers in implementing sleep training. These imply that parental interpretation or worries about baby's crying could be a barrier in implementing sleep training in parents in South Korea.

Conclusions: The current study found that despite knowledge of evidence-based sleep training methods, there was a very low prevalence of implementing sleep training in parents. In addition, parent's low tolerance for crying and worries about noise was one of the main barriers in implementing sleep training. Addressing these barriers will be important in overcoming cross-cultural nuances of evidence-based sleep training in South Korea.

Disclosure: No

P204 | Mother's perceptions of infant sleep difficulty – internal representations vs. objective measures

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Managing infants' sleep in the first year of life is often a challenge for parents, and is closely linked to other parenting practices, parental satisfaction and mood. When examining infant's sleep, studies frequently use parental reporting tools and few rely on objective tools. Such parental reports are considered a reliable reflection of the infant's sleep, albeit biased by the infant's tendency or lack thereof to signal the parent when she's awake. However, maternal reports of infant sleep problems often co-occur with depression symptoms, sleep difficulty, and bonding problems. To better understanding the relationship between maternal subjective experience of her infant's sleep, her mood and the infants objectively measured sleep the following predictions were tested: [1] maternal diary reports will correlate with actigraphy; [2] maternal cognitions and perceptions regarding infant sleep difficulty will be associated with mothers' characteristics more than with infants' sleep.

Twenty-two mother-infant dyads (mothers' ages M = 30.7 ± 3.3; infants' ages M = 5.6 ± 1.3) participated in the present study. Mothers completed questionnaires regarding their mood (Edenborough Postnatal Depression Scale, EPDS), sleep (Pittsburgh Sleep Quality Index, PSQI), bonding (Postpartum Bonding Questionnaire, PBQ), infant sleep quality (ISQ), and their cognitions regarding the infant's sleep (Parental Cognitions about Infant's Sleep Questionnaire, PCISQ). In addition, the infants wore actigraphs for five consecutive nights, and mothers completed daily sleep diaries of their infant's sleep.

Using Pearson correlations and Bland-Altman plots we showed that mothers' reports of quantitative sleep measures, such as total sleep time and awakening during the night, were correlated. There was a negative bias for nighttime awakenings, wherein mothers underestimated the duration of wake during the night. This underestimation was greater for older infants. On the other hand, subjective assessment of infants sleep problems (ISQ) was predicted by mothers' cognitions and beliefs regarding sleep, which in turn was predicted by mothers' depression symptom.

In conclusion, while mothers had accurate perceptions of quantitative aspects of their infant's sleep, their experience of sleep difficulty was

associated with their expectations regarding infant sleep, which were associated with their mood.

Disclosure: No

P205 | Neurocognitive evaluation of children with down syndrome and obstructive sleep apnea syndrome

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Early diagnosis of obstructive sleep apnea syndrome (OSAS) in children with Down syndrome (DS) is important to prevent its complications, as its treatment has been shown to improve behavioral and cognitive functions. The main objective of our study was to assess the cognitive function of children with DS with and without OSAS. The second objective was to determine the impact of the therapeutic intervention on the cognitive function of children with OSAS.

Children with DS underwent polysomnography for OSAS diagnosis and a cognitive evaluation.

41 children with DS, among which 24 (59%) boys, aged between 3.4 and 17.3 years, were included. Their median AHI was 2.6 (0–31)/h of sleep, 30 (73%) were diagnosed as OSAS (15 (37%) mild OSAS, 15 (38%) moderate/severe OSAS, and 11 (27%) non-OSAS). Some scores of the Raven's colored progressive matrices were negatively correlated with the respiratory arousal index, AHI tended to be positively correlated with Reiss behavioral problems. 24 (59%) patients received a treatment. Among the 16 (39%) patients for whom a follow-up visit was performed, some displayed improvement in their neuropsychological scores after treatment, especially those with moderate/severe OSAS.

Children with DS have low intellectual abilities and are at risk of developing OSAS due to their morphological characteristics, which may lead to further neurocognitive impairment if not treated.

Disclosure: No

P207 | Multidisciplinary intervention/Therapy on a pediatric sleep disorder – when sleep is more than sleep…

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Objectives/Introduction: Pediatric Sleep can be challenging due to the presence of multi-system symptomatology, namely at the behavioural, cognitive and physical level. Need experts capable of recognizing symptoms associated with poor sleep and available for a multidisciplinary intervention, including Psychology, Nutrition, Family Support, Oral Myofunctional Therapy and Orthodontics.

Methods: The authors present the clinical case, with a 5-year follow-up, of a 12-year-old boy with alopecia areata unresponsive to treatment, severe anxiety and perfectionism, low self-esteem, suspected of leaky gut and with no evident complaints of poor sleep. The cephalometric evaluation patient shown, protrusive skeletal prefile, Skeletal class II growth, lower hyoid bone, upper airway space and lower airway space stablished, tongue position above the occlusal plan. At the intra-oral observation, presents a scissors bite at the right side and apical constriction at the upper left side, anterior mild crowding. Considering the clinical evaluation, a blood sample and a type II PSG was performed, which revealed multiple vitamins and mineral deficiencies, and a moderate OSA, severe index of PLMs and bruxism.

Results: After two years of excellent adhering of a combined therapy, this boy improved growth, achieved emotional stability and the control PSG revealed total OSA correction. The orthodontic treatment allowed us to achieve a balance occlusal intermaxillary relationship, with class I canine and molar, a good overbite and overjet. Patient keeps supplementation in progress and personalized nutrition. Surprisingly, with the control of the great pillars of health - food, exercise, sleep and mind, there was a total regression of alopecia areata, without specific treatment for it.

Conclusions: The authors stress the importance of a sleep evaluation in chronic diseases and an early combined intervention with positive implications in quality of life, school performance at the cognitive, behavioural level and eventually relapse of other conditions.

Disclosure: No

P241 | Does the brain sleep differently depending on intellectual abilities?

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Objectives/introduction: While the involvement of sleep in effective cognitive functioning is well established, only a few studies have examined sleep in children with high cognitive abilities. The main objective of this study was to compare sleep EEG spectral power in children with an intellectual quotient (IQ) in high (HIQ: verbal, perceptual reasoning index or IQ > or = 130) vs normal (NIQ) intellectual abilities area.

Methods: Children underwent one-night polysomnography and EEG power spectral analysis was computed afterwards. Children were separated into two groups according to IQ assessment with the WISC-IV: 17 with NIQ (71% of boys, $M = 10.1$ years) and 24 with HIQ (67% of boys, $M = 10.8$ years). Comparisons were conducted on mean relative spectral power in C3, using Wilcoxon or t-test according to Shapiro-Wilk results. Spearman correlations were computed between WISC-IV indices and EEG frequency bands.

Results: Compared to NIQ, children with HIQ had more beta power (15.5–22.5 Hz, total: $p = 0.05$), sigma power (12.5-15.5 Hz, REM: $p = 0.07$), theta power (4.5–8.5 Hz) (total: $p = 0.01$, REM: $p = 0.02$) and fast delta power (2.5–4.5 Hz) (total: $p = 0.03$, REM: $p = 0.07$). There was no difference in NREM sleep between groups. The total IQ was correlated with theta (total: 0.34, REM: 0.32) frequency. The verbal comprehension index was correlated with beta and theta frequencies (total: 0.33 and 0.34, respectively). The perceptual reasoning index was correlated with theta (total: 0.43, REM: 0.31) and delta (total: −0.35, NREM: −0.31) frequencies. The processing speed index was correlated with gamma (22.5–45 Hz) and delta frequencies (REM: 0.32 and −0.32, respectively).

Conclusions: In a previous study conducted on sleep macrostructure, we found that children with HIQ had more REM sleep than those with NIQ and suggested that REM sleep might play a role in their intellectual functioning. Here, studying sleep microstructure, we reinforce the hypothesis of an alternative functioning in children with HIQ, particularly during REM sleep. This may be related to a form of hyperarousal during sleep, which may explain both their intellectual abilities and their predisposition to sleep disorders.

Support: This work was supported by a French Grant from the SFRMS to Marine Thieux and by a China Grant China Scholarship Concil to Min Zhang.

Disclosure: No

P520 | Subjective and objective measures of sleep patterns and sleepiness as predictors of depressiveness in adolescents on rotating school schedules

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Introduction: Our previous survey and diary studies have shown that the adolescents attending school on rotating morning and afternoon school schedules obtain recommended amount of sleep and schedule their sleep at preferred time in 9 out of 14 days of such schedule. In this study, we wanted to compare several objective and subjective indices of sleep and sleepiness over two consecutive weeks with different school start times (SST). We also wanted to examine the relative contribution of different sleep and sleepiness measures in predicting depressiveness on weekends following each school schedule.

Methods: A total of 21 secondary school students (11 females, 16 y) participated in the study. They were keeping sleep-wake diaries, wearing wrist actigraphs, and giving sleepiness ratings at predesignated times with actigraph-score option for two consecutive weeks with alternating morning and afternoon SST, and the respective weekends. On Fridays of each school week they came to laboratory where MSLT measurements were conducted four times at two-h intervals.

Results: During both school weeks students went to bed at similar times, reported similar sleep quality and had similar sleep efficiency. However, on week with afternoon SST they slept on average 81 min longer ($p < 0.001$) due to significantly later wake-up times. On week with morning SST, social jetlag was on average 2.03 h in contrast to 1.23 h on week with afternoon SST ($p < 0.01$). Differences in self-reported sleepiness during school weeks and in physiological sleepiness at the end of school weeks with different SST were not found. Regression model for morning schedule explained 53.2% of variance of depressive symptoms ($p < 0.05$), with average sleep duration and subjective daytime sleepiness being significant individual predictors. Physiological sleepiness at the end of school week did not predict depressiveness on the respective weekend. The regression model for afternoon school schedule was overall not significant.

Conclusion: In adolescents on weekly rotating school schedules, morning SST results both in shorter sleep duration and greater sleep irregularity between school days and weekends than the afternoon SST. Our results indicate that sleep loss on school days and subjectively reported sleepiness have a significant impact on depressive symptoms reported on weekend following morning SST.

Disclosure: No

P521 | Circadian sleep pattern in pediatric acute onset neuropsychiatric syndrome

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Objectives/Introduction: Sleep disorders and disordered sleep represent one of the most frequent manifestations of PANS (Pediatric Acute Onset Neuropsychiatric Syndrome), involving around 80% of patients.

PANS is thought to be due to several mechanisms and multiple etiologies, ranging from endocrine/metabolic causes to post-infectious autoimmune and neuro inflammatory disorders.

The aim of our study was to assess circadian rhythm of melatonin and cortisol in a cohort of children affected by PANS and in sex and age-

matched control subjects, and to correlate these results to polysomnographic features of patients.

Methods: Patients and control subjects underwent melatonin and cortisol dosage through salivary sampling at 7:30 p.m., 8:30 p.m., 9:30 p.m., 10:30 p.m., and 7:30 a.m. Association between PANS and cortisol and melatonin rhythm was made through logistic regression analysis. Moreover, a subgroup of patients underwent a full-night polysomnography (PSG) according to AASM standard, and PSG parameters were compared between patients with normal and abnormal rhythm of melatonin and of cortisol.

Results: 24 PANS patients (9 females; mean age 9,5 years, range 4–17), and 19 sex and age-matched control subjects were enrolled. Among the patients 22 completed cortisol dosage, and 18 completed melatonin dosage. 21 patients underwent full-night PSG.

Although statistical power is not sufficient due to low sample size, data trends might us to hypothesize that cortisol rhythm abnormalities seem to involve both males and females, whereas melatonin rhythm alterations seem to involve especially males. Moreover, children aged 10 or older show more frequently alterations of cortisol rhythm; conversely, alterations in melatonin rhythm are observed more in children of 9 years or less. Furthermore, alteration of both cortisol and melatonin rhythms seems to be characteristic of PANS males aged 10 or more.

Despite what expected, subjects with alterations in cortisol/melatonin did not show any correlations with PSG features.

Conclusions: Children affected by PANS, especially males aged 10 years or more, seem to have alteration in cortisol and melatonin rhythm.

Further studies with larger sample size are needed in order to better characterize cortisol and melatonin rhythm in these patients.

Disclosure: No

P522 | Leveraging convenient wearable technology to assess adolescent sleep: Physical and psychiatric health correlates of single-channel sleep EEG in a community sample of youth

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Objectives/Introduction: Sleep vitally supports physical and psychiatric health during adolescence, yet sleep is rarely adequately evaluated in pediatric health care settings due to the cost and inconvenience associated with gold-standard evaluations (i.e., polysomnography). Wearable sleep-EEG devices may represent accessible tools for identifying sleep patterns associated with adverse health outcomes in youth, and our prior work has shown high feasibility and acceptability of these devices for use with adolescents. This study is among the first to examine associations between sleep and physical and psychiatric health indicators using self-administered, at-home sleep-EEG in adolescents.

Methods: Ninety-eight adolescents (mean age = 14.38, 50% female) completed 7 nights of single-channel sleep-EEG (Zmachine Insight+), a brief physical exam, and a self-report of psychiatric health. Sleep-EEG was self-administered by adolescents each evening before bed and removed upon waking. Logistic regressions controlling for age and sex assessed the contributions of sleep-EEG indices (averaged total sleep time (TST); efficiency (SE); wake after sleep onset (WASO); sleep-onset latency (SOL); light, deep, rapid eye movement (REM) percentages) to overweight/obese and hypertensive status, and partial correlations examined associations between sleep-EEG and psychiatric (internalizing, externalizing) symptoms.

Results: Reduced TST (Wald $\chi^2 = 12.1$, $p = 0.001$), SE (Wald $\chi^2 = 4.2$, $p = 0.04$), and REM percentage (Wald $\chi^2 = 6.4$, $p = 0.01$) were associated with overweight/obese status in adolescents, and reduced REM percentage remained a significant predictor after accounting for shortened TST. Sleep-EEG indices were not associated with hypertensive status. Shorter TST ($r = -0.34$), reduced SE ($r = -0.21$), and longer SOL ($r = 0.21$) were associated with greater externalizing psychiatric symptoms, and decreased TST ($r = -0.30$) was related to greater internalizing psychiatric symptoms (all p's < 0.05).

Conclusions: Findings suggest associations between specific sleep-EEG indices and physical and psychiatric health among adolescents using self-administered, at-home sleep-EEG, suggesting convenient sleep-EEG wearable technology may be a useful tool for assessing health-related sleep difficulties in routine health care settings. Further, the relationship between reduced REM and overweight/obese status replicates prior polysomnographic studies, suggesting that wearable sleep-EEG may capture important information about adolescent sleep architecture conferring risk for health outcomes not obtainable from routine sources (e.g., self-report). Future studies may investigate methods for incorporating data from wearable EEG devices into emerging digital interventions and applications.

Disclosure: No

P523 | Effects of treatment of sleep disordered breathing on sleep macro- and micro-architecture in children with down syndrome

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Background: Children with Down syndrome (DS) are at increased risk of obstructive sleep disordered breathing (SDB), which is associated with intermittent hypoxia and sleep disruption affecting daytime

functioning. We aimed to examine the effects of treatment of SDB on sleep quality and daytime functioning in children with DS.

Methods: Children with DS and SDB ($n = 24$) completed a baseline and follow-up overnight polysomnographic (PSG) study 22 ± 7 months (mean ± SD) later. Sleep macro-architecture was assessed using standard clinical measures and sleep micro-architecture was assessed using EEG spectral analysis. Parents completed a number of questionnaires assessing sleep, behaviour, daytime functioning and quality of life (QOL).

Results: 9 children (38%) had been treated. At baseline the treated group had more severe SDB compared to the untreated group. The obstructive apnoea hypopnoea index significantly improved from 40.3 ± 46.9 events/h to 17.9 ± 26.9 events/h ($p < 0.01$) at follow up in children who were treated. There were no significant differences in sleep macro-architecture parameters from baseline to follow up in either the treated or untreated group. Sleep micro-architecture was not different between studies in the treated group, however this tended to improve in the untreated group, particularly in REM sleep. Daytime functioning and behaviour were not different between the studies in either group, however QOL improved after treatment.

Conclusions: Our study identified that treatment of SDB improves severity of the disease as defined by PSG and this was associated with parental reports of improved QOL, despite treatment having no demonstrable impacts on sleep quality, behaviour or daytime functioning.

Disclosure: No

P524 | Apnea of prematurity: polysomnographic studies of their evolution with maturation

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Introduction: Apnea of prematurity are well known in neonatal units. They can be responsible for incidents such as bradycardia and deep desaturations in oxygen, but with maturation these are often better tolerated. However, in some cases these apnea are still too numerous or still responsible for unwanted incidents at term equivalent age, requiring ventilatory support at discharge from the neonatal unit.

Methods: A cohort of 12 extreme preterm infants (average gestational age of 27 weeks) were followed by the HUDERF sleep unit as they received a cardio-respiratory monitor for home use during sleep at discharge. All 12 infants had a polysomnography performed at term equivalent age (TEA), and 10 of these infants had another polysomnography 11 weeks later.

Result: All infants presented with apnea of prematurity at TEA, which significantly decreased 11 weeks later. One infant was discharged with a CPAP.

Another infant received a NIV after re-admission one week after discharge from the neonatal unit for oxygen dependency on a suspected viral infection. Both the CPAP and the NIV were used at home during sleep for about one month, then stopped.

10 of the 12 infants had a sleep study with polysomnography on average 11 weeks after discharge.

Discussion: Apnea of prematurity are the result of the complex interactions between immature lungs, a pliable thorax, and an immature central respiratory control. Ventilatory support reduces these events as it allows for overall better oxygenation, with positive effect on central control.

Conclusion: Apnea of prematurity are indices of general immaturity, which decrease to disappear as the child grows and mature. The use of ventilatory support may optimize oxygenation with a favorable effect on maturation.

Disclosure: No

P806 | Barriers of behavioral sleep training among parents of infants in South Korea

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Objection/Introduction: Sleep training for infants, especially based on evidence-based behavioral methods (e.g. standard extinction; graduated extinction; camping out) is effective in consolidating and improving infant sleep. Although previous studies have shown that cultural differences can interfere with implementing sleep training, barriers to evidence-based sleep training have not been closely studied in Asian cultures where co-sleeping is considered the norm. This study aimed to explore barriers to evidence-based sleep training.

Methods: Participants were South Korean parents of infants ages 6–36 months ($N = 507$). All participants completed demographic information, Brief Infant Sleep Questionnaire (BISQ), Parent's Understanding and Misperception about BAby's sleep Questionnaire (PUMBA-Q), Patient-Reported Outcomes Measurement Information System-depression (PROMIS-depression), PROMIS-anxiety, parent-reported total sleep time (TST) of infant, Parental Cry Tolerance checklist, attempted sleep training method, and co-sleeping status (bed sharing, room sharing, sleeping alone).

Results: The average age of parents was 35.94 (SD = 4.61) and 62.7% ($n = 318$) were females/mothers. The average age of infants was 22.73 months (SD = 8.49), and 52.9% ($n = 268$) were boys. Among the sample, 21.9% ($n = 111$) of parents reported having used at least one behavioral method for sleep training, and 78.1% ($n = 396$) reported never having tried sleep training. A preliminary

analysis indicated Parental misconceptions of baby's sleep (PUMBA-Q scores), having a monthly income above $3300, sharing nightly infant duties between parents, and co-sleeping status were significant at the $p < 0.1$ level, and these variables were entered into the final logistic regression model. Logistic regression analysis results indicated PUMBA-Q scores (OR = 0.971, 95% CI 0.954–0.988, $p = 0.001$), having a monthly income above $3300 (OR = 0.578, 95% CI 0.364–0.920, $p = 0.021$), sleeping alone (OR = 6.597, 95% CI 2.911–14.949, $p < 0.001$) and bed sharing (OR = 0.528, 95% CI 0.320–0.870, $p = 0.012$) were found to predict sleep training implementation.

Conclusion: Higher parental misconceptions about infant sleep and co-sleeping status may be important intervention targets for educating parents about sleep training in South Korea.

Disclosure: No

P807 | Feasability of undertaking at-home PSG and actigraphy upon children who have SYNGAP1-related Intellectual Disability

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Introduction: For people with Intellectual Disability (ID) and Autism Spectrum Disorder (ASD), new experiences and unfamiliar environments can cause significant distress even without undergoing evaluation in a sleep laboratory. Stress can reduce seizure threshold, leading potentially to significant challenges in obtaining representative sleep data in participants with SYNGAP1-related ID, a genetic condition associated with ID, ASD, epilepsy and sleep problems. We aim to analyse sleep patterns and circadian rhythm in a less distressing manner by minimising the equipment involved and recording in participants' homes. We anticipate this will reduce any risk to participants' mental state (especially anxiety) and physical health (e.g., seizures). Although sleep problems are prevalent in people with SYNGAP1-related ID, their nature has not yet been delineated. To our knowledge this is the first systematic use of actigraphy and polysomnography (PSG) in this population.

Objectives:

1. Can PSG feasibly be performed at home, in a population known to have difficulties with sensory tactile processing and anxiety?
2. Can actigraphy be tolerated and provide data of sufficient quality for circadian rhythm analysis in this population?

Methods: Inclusion criteria: UK residents with a confirmed SYNGAP1 gene-variant, who are 15 years old or younger, as well as controls, all of whom are either able to consent or have a parent consent on their behalf. Participants undertake one week of actigraphy, and 2 nights of overnight PSG in their own homes. The sample size was 15 children with SYNGAP1-related ID and 15 controls (mainly siblings).

Results: Reliable actigraphy data was obtained from the majority of participants, and at least 4 h of PSG data obtained from most participants. However, unobserved at-home PSG resulted in higher data loss as compared to typical in-lab PSG, with frequent loss of EEG signal due to participants self-removing electrodes, or electrodes becoming detached whilst the participant was restless during the night.

Conclusions: Actigraphy is a measure that can be successfully undertaken in this population of children despite their tactile sensory sensitivity and anxiety. PSG required 2 nights of recording to obtain sufficient data for analysis in majority of participants. Alternate EEG derivations may improve data collection reliability.

Disclosure: No

P808 | Pediatric obstructive sleep apnea: a potential opportunity for a novel oral appliance therapy

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Introduction: Obstructive Sleep Apnea (OSA) is common in children with a prevalence of 1%–3%. OSA has been linked to cardiovascular, metabolic, neurocognitive and psychological, and behavioural consequences. Adenotonsillectomy, although considered first line, does not cure all children with OSA. Additional traditional limited therapies for OSA have issues in the pediatric population in the form of compliance, immature bony structures, and a growing body. Complete Airway Repositioning and Expansion (CARE) systems are an oral appliance therapy used by dentists to promote healthy jaw development and tooth alignment in children. CARE has been associated with significant improvements in adult OSA. In this retrospective database review we queried for sleep health benefits in children suffering from OSA who were also using CARE.

Methods: After IRB exemption by the Program for Protection of Human Subject at the Icahn School of Medicine at Mount Sinai (STUDY-21-01561) we conducted a retrospective review of the Vivos Airway Intelligence Service database, a prospectively collected, real-world database of patients who underwent CARE treatment. Patients with OSA under 18 years old who utilized CARE for at least 6 months and had both pre-treatment and an interval or post treatment AHI at least 6 months apart were reviewed. Demographics, treatment information, sleep respiratory parameters, and Pediatric Sleep Questionnaire (PSQ) scores were reviewed. Descriptive statistics were calculated. Reported ambulatory sleep study parameters were without the appliance in the mouth.

Results: Overall, 20 charts from 4 dental practices across the United States and Canada were found to meet criteria. Average age at treatment initiation was 10 (5–16) years old, with genders balanced. Mean BMIs were stable over therapy. All patients improved. The mean AHI improvement was 8 (1.3–21) events.

Mean percent decrease in AHI was 72.2 (29.4–100)%. PSQ scores decreased by a mean of 0.17 (.041–0.388), or 62.2 (19.5–89.7)%.

Conclusions: This limited retrospective database review suggests CARE may be an efficacious treatment option in pediatric OSA in appropriately selected children. Larger pediatric cohorts and clinical trials are warranted to determine the role CARE systems might play. Enhanced medical-dental collaboration is required to optimize care for OSA.

Disclosure: Yes

Conflict of Interest statement: The authors are all compensated advisory board members of Vivos Therapeutics

P809 | Reliability of the paediatric sleep questionnaire in children with mild to moderate sleep related breathing disorder

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Objectives: Sleep questionnaires are widely used in both clinical practice and research, with a large number being developed and published over the last 20 years. The Paediatric Sleep Questionnaire (PSQ) has been adopted into paediatric sleep medicine for children with suspected sleep related breathing disorders (SRBD) with reportedly high sensitivity and specificity. This project aimed to assess the value of the PSQ in children who had been diagnosed with mild to moderate SRDB using cardiorespiratory polygraphy.

Methods: This was a retrospective review of electronic medical notes and cardiorespiratory polygraphy results. 495 paediatric patients aged 2–16 had undergone sleep studies at Addenbrookes Hospital between 2020 and 2022. We randomly selected 46 patients who were referred to our centre with suspected SRDB and had either a normal sleep study or mildly to moderately raised Apnoea Hypopnoea Index (AHI). Children with major co-morbidities were excluded. PSQs were completed by parents prior to the commencement of the sleep study on the same day, and AHI was scored by a paediatric sleep physiologist according to the American Academy of Sleep medicine scoring manual.

Results: Mean age 8.01 years (range 2.42–15.9 years), 17/46 children were female. Mean Body Mass Index (BMI) was 22.5 kg/m^2 (95%CI 20–25 kg/m^2). 25/46 children had an AHI ≤1, mean AHI was 0.4 (95%CI 0.256–0.544) and 21/46 had an AHI >1 with mean AHI 4.99 (95%CI 3.17–6.8). Groups were matched for age and sex. BMI was higher in the group with AHI >1 (19.6 Vs 25.6 kg/m2, $p = 0.0372$). In children with AHI>1 we found no significant correlation between PSQ score and AHI ($R = -0.04251$, $p = 0.8548$). Mean PSQ score for the AHI ≤1 group was 13.2 (95%CI 11.8–14.7) Vs mean PSQ score for the AHI > 1 group of 13.0 (95%CI 11.2 –14.7), $p = 0.6559$.

Conclusion: PSQ scores were similar in children with normal cardiorespiratory polygraphy and those with mild to moderate SRDB. Further tools are required to reliably identify children at risk of SRDB.

Disclosure: No

P810 | Children's sleep disordered breathing and its clinical and polysomnography features

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Introduction: It is estimated that 3% to 15% of all children snore frequently and the prevalence of paediatric obstructive sleep apnoea is suggested to be 1% to 5%. The pathophysiology of paediatric sleep disordered breathing is not fully understood, although tonsil hypertrophy is considered to be the primary pathophysiological factor. Furthermore, the symptoms and clinical features change along with growth.

Material and methods: The present studies concentrate on sleep disordered breathing in children and were executed as part of the ChildSleep project, which is a longitudinal birth cohort study that involves 1673 children born between April 2011 and February 2013 at Tampere University Hospital, Finland. In total, 52 children from the cohort were recruited to the clinical studies at the age of two years.

Results: In the present studies, dentofacial morphology changes were already found in two to three years old children suffering from sleep disordered breathing. Furthermore, it was observed that total snoring time in polysomnography was significantly longer in children with obstructive sleep apnea than in children with primary snoring. Additionally, children with obstructive sleep apnea were more likely to breathe through their mouth and have a larger tonsil size in contrast with children with primary snoring.

Conclusions: The findings of the studies add to the body of knowledge on paediatric sleep disordered breathing and its clinical and polysomnography features. The evident strength of the studies is the young participants.

Disclosure: No

P905 | Nap cessation age does not predict social-emotional functioning in early childhood: Findings from the e4kids study

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Objectives/Introduction: Early childhood sleep is characterized by the gradual transition from habitually napping in the first years of life to nap cessation around preschool years. Research to date has focused on the effects of the presence or absence of a nap in children. However, the implications and meaning of the age at which habitual napping ceases have not been investigated thus far. This study set out to investigate: (1) trends in age of nap cessation, (2) correlates of age of

nap cessation, and (3) the association between age of nap cessation and internalizing/externalizing behaviors, temperament, and social skills in a sample of Australian 3–5-year-old children.

Methods: Data derived from the Effective Early Educational Experiences (E4Kids) study ($N = 1121$). A histogram displayed trends in nap cessation and correlational analyses determined the correlates of age of nap cessation. Linear and multinominal regressions were used to evaluate whether parent-reported age of nap cessation was associated with parent-reported behavior, temperament, and social skills which were measured using the strengths and difficulties questionnaire (SDQ), Short Temperament Scale for Children (STSC), and Social Skills Inventory Scale (SSIS), respectively.

Results: The study sample was 1121 children. Results revealed: (1) large variability in the age of nap cessation across children, ranging from as young as 6 months to 6 years old. (2) Significant correlations between age of nap cessation and child gender, mother's age at childbirth, parental income, and child ECEC attendance. And, (3) Few statistically reliable (e.g., $p < 0.05$) associations between age of nap cessation and SDQ, STSC, and SSIS.

Conclusion: In conclusion, age of nap cessation varies dramatically across children. This finding may provide comfort for parents and clinicians as large variations in the age of nap cessation between children appear to be normal. Further, the results of this study suggest the age at which children were reported to cease habitual naps had limited association with measures of child behavior, temperament, and social skills. Again, this, suggests children's social-emotional functioning may not strongly depend on the age of nap cessation. Overall, these novel findings provide much-needed insight for general understanding and clinical practice.

Disclosure: No

25: SLEEP AND AGING

P218 | Thermoregulation, sleep efficiency and napping in the aged

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Introduction: Aging goes along with sleep and rest-activity cycle fragmentation and an increasing incidence of daytime napping, putatively underlined by circadian rhythm alterations. Here, we assessed circadian modulation of sleep efficiency and temperature in healthy older nappers and no-nappers.

Methods: Fifty-three healthy participants (69 ± 5.4 years) were prospectively recruited with regards to their napping habits (no-nap, $n = 28$; nap, $n = 25$). Participants took further part in a 40-h multiple-nap constant routine protocol, encompassing 10 consecutive sleep-wake cycles comprising 160 min of wakefulness followed by 80 min of nap sleep opportunity. The mean distal-proximal skin temperature gradient (DPG) was measured for each of the 10 scheduled wake sessions using iButtons. Sleepiness was assessed by the Karolinska Sleepiness Scale (KSS), and sleep efficiency was derived from polysomnographic recordings during scheduled naps. Repeated measures ANOVAs explored whether napping habits affect DPG, sleepiness and sleep efficiency across sessions. Harmonic regressions extracted amplitude and phase from DPG profiles. The first 4 short cycles were discarded from the analysis due to potential residual effects of night-time sleep differences between participants and habituation to the protocol.

Results: A main session effect ($F(5,304) = 24.158$, $p < 0.001$) highlighted modulation in sleep efficiency over the protocol. Circadian modulation differed between groups: usual nappers displayed lower sleep efficiency over night-time naps and higher sleep efficiency over daytime naps, compared to no-nappers (group: $F(1,304) = 4.759$, $p < 0.05$; group × session interaction: $F(5,304) = 2.608$, $p < 0.05$). Session significantly modulated DPG ($F(5,306) = 5.497$, $p < 0.001$) and KSS ($F(5,619) = 8.74$, $p < 0.001$), but group (ps > 0.2) and group × session interactions (ps > 0.7) were non-significant. However, DPG amplitude and phase differed between usual nappers and no-nappers (ps < 0.001), with amplitude being higher in usual nappers than in no-nappers.

Conclusion: Our results suggest that napping habits in the elderly are associated with an altered 24-h distribution of sleep efficiency, and a concomitant change in phase and amplitude of DPG modulation. These observations may reflect a bidirectional relationship between thermoregulation and sleep initiation or maintenance; that is modulated by daytime napping. Future analysis will focus on DPG modulation during nap opportunities to assess sleep-dependent thermoregulatory changes according to the nap habits phenotype.

Disclosure: No

P219 | Cognitive impairment and obstructive sleep apnea syndrome (OSAS) In adults and the elderly: a retrospective observational study

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Background: Untreated moderate and severe OSAS predisposes to deficits in attention, memory, executive functions and leads to the onset of depression. Continuous Positive Airway Pressure Therapy significantly improves these cognitive deficits.

Objectives: The aim of the study is to verify the relationship between OSAS, depression and cognitive impairment. In addition, the study aims to evaluate the possible correlation of cognitive impairment and anatomical brain damage, observed with Structural Magnetic Resonance Imaging.

Materials and methods: 404 patients with mild, moderate or severe OSAS. All of them underwent medical history, recording of anthropometric parameters, MMSE, GDS and polygraphy. For the purpose of the study, patients were divided into two groups stratified by age, respectively older and younger than 65 years. A subgroup of 71 patients underwent morphological brain-neck MRI for clinical investigation.

Results: There is a direct, statistically significant relationship ($p < 0.001$)between AHI and GDS score, and between mean nocturnal SpO2 and MMSE score. An inverse correlation ($p < 0.001$) exists between AHI and MMSE score. These correlations are confirmed in the geriatric patient, but not in the adult patient. Of all the patients that underwent MRI, 2 (2,8%) had hippocampal damage, 11 patients (15%) had thalamus and/or basal ganglia damage, 2 patients (2.8%) had cerebellum damage. In 13 patients(18.3%)there was damage in the frontotemporal cortex, in 3 patients(4.2%)there was damage in the parieto-occipital lobe.

There was no significant relationship between AHI and brain damage on MRI. The correlation between mean nocturnal SpO2 values and the presence of focal brain damage was not significant, but a multivariate analysis including age, gender, BMI, and hypertension and diabetes mellitus as covariates, showed that mean nocturnal SpO2 values correlated independently with the presence of fronto-temporal damage. The same multivariate analysis using AHI as an independent variable showed no significant correlations. However, a bias due to the small number of patients cannot be excluded.

Conclusions: Our study confirms the relationship between OSAS and cognitive decline, as well as between OSAS and depression. The correlations are significant for the elderly patient but not for the adult patient. In agreement with a part of the literature, in our patients cognitive functional impairment correlates with typical anatomical brain damage.

Disclosure: No

P220 | Associations between gut microbiota composition, sleep quality and cognitive performance in older adults with insomnia

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Objectives: Late-life insomnia is a common chronic health condition in older adults, affecting around 50% of the adult population over 65 years old. Likewise, aging has been associated with cognitive changes. However, the underlying mechanisms that may explain the reduction in sleep quality and the impairments in cognitive performance accompanying the aging process are unclear. Such an understanding may pave the way to novel interventions. A growing literature suggests the importance of gut microbiota to brain function. We tested associations between sleep quality and cognitive performance with gut microbiota composition among older adults with insomnia.

Methods: Seventy-two older adults with insomnia (mean age 73.2 ± 5.73 years, 56 females) provided a stool sample for gut microbial sequencing. Microbiota profile was determined using the Dada2 bioinformatics pipeline. Participants performed a battery of cognitive tests on the Cambridge Neuropsychological Test Automated Battery (CANTAB) system. Sleep was monitored over two weeks by wrist-worn actigraphy. Likewise, participants completed the Insomnia Severity Index (ISI). Partial canonical correspondence analysis (pCCA) was used to examine the relative contribution of insomnia state represented by ISI and actigraphy-based sleep efficiency (SE), along with cognitive status, based on the Spatial Working Memory and Multitasking Test, to variance in microbiota composition. Spearman correlations were used to correlate sleep quality and cognitive performance with microbiota composition.

Results: Partial canonical correspondence analysis (pCCA) revealed that sleep quality and cognitive performance explained between 7.5% and 7.9% of the variation in gut microbiome composition in older adults with insomnia. Correlation analysis between ASV (Amplicon Sequence Variants), genus, and family levels with sleep quality and cognitive performance measurements revealed that Lachnoclostridium correlates positively with sleep quality and cognitive performance, while Blautia correlates positively with cognitive performance.

Conclusions: Findings demonstrate the contributions of sleep quality and cognitive performance parameters to the variance in gut microbiota composition, and associations between sleep quality and cognitive performance measures and specific genus abundance. Further studies are needed to validate findings and determine whether improving microbiome composition via dietary intervention may improve sleep quality and cognitive performance among older adults with insomnia.

Disclosure: No

P221 | Benzodiazepine receptor agonist prescription in a population of hospitalised patients in four psychogeriatric wards in Switzerland

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Introduction: Benzodiazepine receptor agonists (BZRA) are widely prescribed among the elderly, especially among hospitalised patients. Nevertheless, rates of BZRA prescription among elder patients in

psychiatric wards are unknown. Our study aimed to investigate BZRA prescription rates and distribution among a population of hospitalised patients in four psychogeriatric wards in Switzerland.

Methods: The medical records of all elder patients (65 years old or more) that had been hospitalised in one of the four psychogeriatric wards of our University Hospital in Switzerland during 2019 were analysed. Sociodemographic data (age, sex), clinical data (main diagnosis and diagnosis of mild cognitive impairment or dementia) as well as the presence or absence of BZRA prescription at admission and at discharge was researched. We then calculated the rates and distribution of BZRA prescription.

Results: 396 patients were retained for our study, 56% of which were women. The age range was 65 to 96 years old, with a mean age of 78.1. At admission, 29.3% had a benzodiazepine prescription, and 9% had a z-drug prescription, which was reduced to 16.7% and 8.8% respectively at discharge. Women received benzodiazepines more often than men (32.7% versus 24.8%), but men received z-drugs more often than women (10.4% versus 8%). Benzodiazepine prescription was highest among the youngest age group (31.4% among 65–69 year-old group) and decreased progressively with age (30.5% among 70–79, 29.2% among 80–89, 20.5% among 90-96). Z-drug prescription peaked among the 70–89 age group (10.8% in both 70–79 and 80–89), was lower with the youngest group (5.7% among 65–69) and was lowest with the oldest age group (2.6% among 90–96). Benzodiazepine prescription was reduced at discharge for both men and women, across all age groups. On the other hand, z-drug prescription was almost the same at discharge, with a slight increase in women and a slight decrease in men.

Conclusions: BZRA prescription among the patients hospitalised in the four psychogeriatric wards of our University Hospital during 2019 was very high, although this population is at very high risk of complications related to the use of BZRA. The reduction of BZRA at discharge was higher for benzodiazepines than for z-drugs.

Disclosure: No

P222 | Sleep quality in residents of nursing homes before and during the COVID-19 pandemic

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Objective: The results of our pre-COVID studies on sleep quality (SQ) in older adults showed that SQ was impaired in 71% of residents of nursing homes (NH) and in 50% of community dwelling older adults of comparable age. During the COVID-19 pandemic older adults, and especially NH residents, have been at higher risk of SARS-CoV-2 infection, impairments in SQ and impairments in mental health due to physical distancing restrictions. The aim of the present study was to examine SQ in NH residents during the COVID-19 pandemic and to compare it with the results of NH residents collected five years earlier.

Method: The results of 202 residents of several NH in Zagreb (79% females, 69-97) collected in 2021 were analysed and compared to results of other 161 participants (80% females, 63-100 years) collected in 2016. Participants were ambulatory, without diagnosis of dementia, and the data was collected in NHs as part of larger studies. Participants answered the questionnaires with either a trained interviewer assistance (in 2016) or themselves with researchers' control and assistance (in 2021). SQ was assessed by Pittsburgh Sleep Quality Index (PSQI). In both studies participants self-rated their subjective health in comparison to their peers, and answered different loneliness scales with two comparable items.

Results: Total PSQI score was greater than 5 in 48% of NH residents in 2021, which was lower percentage than in 2016. Multivariate ANOVAs showed that participants in 2021 rated their health significantly poorer in comparison to their peers than participants in 2016 ($p < 0.001$), and they reported more impairments in daytime functioning ($p < 0.05$). However, their SQ was generally less impaired ($M_{PSQI2021} = 6.77$ vs. $M_{PSQI2016} = 8.26$, $p < 0.001$), their sleep duration longer ($p < 0.001$) and sleep efficiency better than in participants in 2016 ($p < 0.001$).

Conclusion: The accelerated turnover due to COVID-19 pandemic may have changed the characteristics of residents of long-term care setting who may perceive themselves as having poorer health but reporting generally better SQ. In analysing SQ in NH residents during the COVID-19 pandemic it is especially important to consider wider socio-cultural context.

Disclosure: No

P223 | Understanding the nature and impact of sleep disturbances and cognitive fluctuations in dementia with lewy bodies: apilot qualitative study

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Objectives/introduction: Dementia with Lewy bodies (DLB) is the second most common form of dementia. Sleep disturbances, including poor sleep quality and excessive daytime sleepiness, are highly prevalent in DLB. Cognitive fluctuations, which refer to rapid changes in attention and awareness, are a core clinical symptom of DLB. Given the bi-directional relationship between sleep and cognition, it is very likely that sleep disturbances can negatively impact, or worsen, cognitive fluctuations. However, the specific impact of

sleep disturbances upon cognitive fluctuations is currently poorly-understood. The aim of this qualitative study was to specifically understand the nature and impact of sleep disturbances upon cognitive fluctuations, and the effect upon patients and caregivers, in DLB.

Methods: Five caregivers and family members of patients with DLB completed semi-structured telephone interviews, which asked specific questions regarding the nature and impact of sleep disturbances and cognitive fluctuations, upon both the patient and caregiver. Data were analysed using a qualitative descriptive approach in order to identify, define and organise themes.

Results: Sleep disturbances, excessive daytime sleepiness and cognitive fluctuations were experienced by all DLB patients. Three main themes were identified. Firstly, when patients experienced worse sleep disturbances during the night, this led to more pronounced and severe cognitive fluctuations in the subsequent day. Secondly, the sleep quality of caregivers is often disturbed, even during a "typical" night, as they reported having a heightened awareness of patients during the night even if they slept in a separate bedroom. Thirdly, days featuring more severe cognitive fluctuations can have a negative impact upon patient daytime fatigue, which can in itself be distressing.

Conclusions: These results suggest that sleep disturbances can potentially exacerbate the core DLB symptom of cognitive fluctuations in the subsequent day, with a negative impact upon patients and caregivers. This will inform future quantitative work clarifying if sleep has a causative role in the severity of cognitive fluctuations, and this will also inform the design of better DLB measurement tools which account for patient sleep quality. This study also demonstrates that improving the sleep of DLB caregivers should also be considered a priority.

Disclosure: Yes

Conflict of Interest statement: There are no potential conflicts of interest to declare; this study was funded by Alzheimer's Research UK, British Psychological Society, and the NIHR Newcastle Biomedical Research Centre.

P526 | EEG detected slow wave coincidence in NREM sleep declines with age and is associated with mild cognitive impairment

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Introduction: There exists a bidirectional relationship between sleep disruption and neuropathology in Alzheimer's disease (AD). Electroencephalogram (EEG) during polysomnography (PSG) provides an opportunity to examine stereotyped, coordinated brain activity. Slow wave activity (SWA), a defining feature of non-rapid eye movement (NREM) sleep, is aberrant in AD, and disruption of SWA in healthy adults is related to increased amyloid-beta levels. Coincidence, a measure of cross-hemispherical agreement in slow wave detection across different cortical regions may serve as a metric of brain network coordination -- sensitive to earliest AD pathology. We explored slow wave coincidence during sleep in relation to age, sleep macrostructure and cognitive performance in the Biomarkers of Alzheimer's Disease in Sleep and EEG (BASE) cohort.

Methods: EEG was collected during an attended overnight PSG from the BASE cohort ($n = 79$, average age = 70.8 ± 4.4 years), approximately 20% of whom had Clinical Dementia Rating (CDR) of 0.5, representing mild cognitive impairment. A custom slow wave peak detector was implemented in MATLAB to analyze slow wave coincidence across 6 EEG leads (Frontal: F3, F4; Central: C3, C4; Occipital: O1, and O2) for every 100ms of data, and slow wave coincidence was calculated as the product of two cross-hemispherical (ex. F3-F4, C3-C4, O1-O2) lead detections divided by the product of the sum of detections in each lead in a 30s epoch. Mean regional coincidence was computed from all 30s bins of any given sleep stage.

Results: Frontal slow wave coincidence in N2 sleep was negatively correlated with sleep fragmentation (number of awakenings $r = -0.35$, p 0.002), and age ($r = -0.28$, p 0.01). Among individuals with CDR = 0.5 ($n = 16$), frontal N3 slow wave coincidence was decreased compared to controls ($n = 62$, $p = 0.04$).

Conclusions: Frontal slow wave coincidence (a measure of connectivity across hemispheres) is strongly correlated with sleep fragmentation, age, and mild cognitive impairment. Slow wave coincidence may be a promising biomarker to examine brain connectivity during sleep which is vulnerable to age and early AD.

Disclosure: No

P527 | Validation of blood-based transcriptomic circadian phenotyping in older adults

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Introduction: The circadian clock plays a critical role in human physiology and in neurological diseases. Circadian function can be cumbersome to measure, limiting research and clinical application. Blood-based transcriptomic circadian biomarkers have emerged but have not been validated against standard methods and in relevant populations. We tested Time Signature, a transcriptomic algorithm to predict circadian phase, in an older population, and compared results with established measures of circadian phase.

Methods: Whole blood was obtained from 40 healthy older adults (mean age 71.2 ± 4.2 years)twice over 24 h, and RNA sequencing performed. Participants completed the Horne-Ostberg Morningness-Eveningness Questionnaire (MEQ) questionnaires, wore an actigraph

during their usual activities for 5–14 days, and provided hly saliva samples in the evening which were assayed for melatonin levels to derive dim light melatonin onset (DLMO). Time Signature was applied to RNA-Seq data to derive Transcriptomic Time for each blood sample. To assess the accuracy of Time Signature, the normalized area under the curve (nAUC) of the receiver-operator characteristic curve (ROC) was computed. We developed a measure called the Transcriptomic Angle, which is the difference between the Transcriptomic Time and the True Time a sample was drawn. The Transcriptomic Angle was compared to established methods for estimating circadian phase via Pearson correlations, including DLMO, MEQ score, and time of most active 10 h by actigraphy.

Results: Time Signature performed accurately in this cohort, with the nAUC of the ROC comparing the Transcriptomic Time and the True Time reaching 0.81, which is comparable to previous work that reported nAUCs 0.83-086. Transcriptomic Angle correlated strongly and significantly with measures of circadian phase, including actigraphically-assessed most active 10 h ($r = -0.431$, $p = 0.008$), DLMO ($r = -0.597$, $p = 0.003$), and MEQ score ($r = -0.442$, $p = 0.005$).

Conclusions: Time Signature accurately predicts the time of sampling based on the whole blood transcriptome in older adults. Furthermore, the Transcriptomic Angle, or the difference between Transcriptomic and True time, provides meaningful information about circadian phenotype, and offers a convenient molecular complement or alternative to more cumbersome traditional measures of circadian phase. Transcriptomic tools like Time Signature will help support precision medicine for circadian rhythm disorders and neurological research.

Disclosure: No

P528 | The association of self-reported usual and previous night's sleep duration with cognitive performance among older adults: pooled analysis of three finnish cohorts

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Objectives/Introduction: Previous studies have examined the association between usual sleep duration and cognitive performance, but little is known about whether sleep duration immediately prior to cognitive testing has an influence on the results. The aim of this study was to examine the role of the previous night's sleep duration on cognitive performance in older adults, while taking into account the usual sleep duration.

Methods: The study population consisted of 3,147 older adults aged 59 to 93 years (mean age 72.7, standard deviation 5.7) from three Finnish cohorts: the Finnish Retirement and Aging Study ($n = 283$), the Cardiovascular Risk in Young Finns Study ($n = 2{,}100$), and the Turku Senior Health Clinic Study ($n = 764$). Participants reported their usual sleep duration and sleep duration on the night preceding the cognitive measurements and were categorized into three groups respectively: short (<7 h), mid-range (7 h – 8.99 h), and long (≥9 h) sleep duration. A computerized test battery, Cambridge Neuropsychological Test Automated Battery (CANTAB®), was used to assess:

(1) learning and memory,
(2) working memory,
(3) information processing, and
(4) reaction time.

Linear regression analyses were used to compare cognitive performance in different sleep duration groups while adjusting for age, gender, socioeconomic status, and study cohort.

Results: Both usual and previous night's long sleep duration were associated with poorer reaction time when compared to those with mid-range sleep duration. Usual long sleep duration was also associated with poorer learning and memory and information processing. No marked differences in cognitive performance were observed between those who had slept less, more, or the same amount as usual on the night preceding the cognitive testing.

Conclusions: This study suggests that usual long sleep duration is associated with worse performance in several cognitive domains, while previous night's long sleep duration is associated only with poorer reaction time. Thus, cognitive testing can be considered reliable regardless of the participant's sleep duration on the previous night.

Disclosure: No

P529 | Association between age and sleep quality: findings from a community health survey

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Objective: This study aimed to investigate the changes in sleep quality with increasing age and the effect of age on the components of the Pittsburgh Sleep Quality Index (PSQI).

Methods: We used data from the Community Health Survey conducted by the Korea Center for Disease Control and Prevention in 2018. A total of 228,340 participants in this nationwide survey. Sleep quality was assessed using the PSQI. Adults aged ≥19 years were divided into six age groups and one-way analysis of variance (one-way ANOVA) was used to compare the mean values of PSQI of each

group. By comparing the scores for each PSQI component in those aged ≥65 years and <65 years, we aimed to reveal the differences in special components according to age group.

Results: In total, 223,334 respondents were included in the study. Based on a one-way analysis of variance, the PSQI score generally increased with age. Although the average PSQI score of patients in their 40 s was lower than that of patients in their 30 s, there was no significant difference between the two groups (p = 0.11). When the PSQI component was compared between the population aged over and under 65 years, the population aged ≥65 years scored higher in most components. In contrast, daytime dysfunction scored higher in the population aged <65 years.

Conclusion: Sleep quality tends to decrease with increasing age. Several factors, including physiological changes, underlying physical conditions, and psychosocial factors, may contribute to a decrease in sleep quality with age.

Disclosure: No

P530 | Clinical characteristics and PAP adherence among elderly european sleep apnoea patients from the esada cohort

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Background and Objective: The prevalence of obstructive sleep apnoea (OSA) is growing, and the population is ageing. However, data on the clinical characteristics of elderly OSA patients and their adherence to positive airway pressure (PAP) treatment are scarce.

Methods: Data of 23,418 30–79-year-old OSA patients prospectively collected into the ESADA database during the period of 2007 to 2019 were analysed. Information on PAP use (h/day) in association with a first follow-up visit was available for 6547 patients. The data was analysed according to ten-year age-groups.

Results: The oldest age group was less obese, less sleepy, and had lower AHI compared to middle-aged patients. The insomnia-phenotype of OSA was more prevalent in the oldest age group than in the middle-aged group (36%, 95% CI 34-38 vs. 26%, 95% CI 24–27, $p < 0.001$). The 70–79-year-old adhered to PAP therapy as well as the younger ones with a mean PAP use of 5.59 h/day (95% CI 5.44–5.75). PAP adherence did not differ between clinical phenotypes based on subjective daytime sleepiness and sleep complaints suggestive of insomnia in the oldest age-group. A higher score on the clinical global impression severity (CGI-S) scale predicted poorer PAP adherence.

Conclusion: The elderly patients were less obese, less sleepy, had more insomnia symptoms and less severe OSA, but judged to be more ill compared to middle-aged OSA patients. Elderly OSA patients adhered to PAP therapy as well as the middle aged. Low global functioning (measured by CGI-S) of the elderly patient predicted poor PAP therapy adherence.

Disclosure: No

P531 | Chronic insomnia in older adults produced by the COVID-19 pandemic

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Introduction: The COVID-19 pandemic has rocked our society to its core. Insomnia is the most common sleep disorder in later life and impacts approximately 20%–50% of older adults >65 years, therefore, especially vulnerable to mental health problems, including fear, anxiety and depression.

Objectives: to analyse the changes in older patients with chronic insomnia produced by the covid-19 pandemic.

Methods: consecutives individuals aged ≥65 years of the sleep unit were included, 50 patients before a COVID-19 pandemic (BeCOVID) and 50 patients posterior a COVID-19 pandemic (POSTCOVID). Clinical history specific for sleep disorders; scores on sleep-questionnaires: Epworth Sleepiness Scale (ESS) ≥8 sleepiness mild, moderate or severe; Insomnia Severity Index (ISI)≥15 clinical insomnia moderate or severe; psychological tests Beck depression inventory (BDI-II), no-mild ≤19, moderate-severe (20–63); the state-trait anxiety inventory (STAI) considered positive above 50th percentile.

Results: A total of 8 patients BeCOVID and 25 POSTCOVID with chronic insomnia, the most prevalent sleep disorders in older adults produced by COVID-19 ($p = < 0{,}001$), age (72.5 ± 0.8 and 71 ± 0.9) years old. Intake of benzodiazepine hypnotic drugs in (63/40%), non-benzodiazepine hypnotic drugs (13/12%) and antidepressants (25/32%) of the patients. Chronic diseases (hypertension 75/76%;

mellitus diabetes 38/18%, dyslipidaemia 56/25%; glaucoma 38/8%), psychiatric disease previous 0/8%. Other sleep disorders, obstructive sleep apnoea 63/72%, rest leg syndrome 32/25%, periodic leg movement (PLM) disorders 63/16%, REM sleep behaviours disorders 0/4% and circadian rhythms disorders 2/2%. When comparing polysomnography no significant difference were observed in sleep architecture parameters such as sleep latency, REM sleep latency, efficiency, total sleep time, proportion of sleep stages (N1, N2, N3 y REM), wake after sleep onset, arousals index, PLM index or apnoea-hypopnea index (AHI) or changes of phases number were observed. Sleeps questionnaires show moderate or severe clinical insomnia in 50/76%, depression mild 20/32%, moderate 20/16% severe 0/8%, anxiety state 60/40% and trait 60/64%.

Conclusion: Immediate interventions are essential in order to enhance psychological resilience.COVID-19 pandemic was associated an increase of chronic insomnia and generalized anxiety disorder in older patients.

Disclosure: No

P812 | Age-related changes in objectively measured sleep-wake are not associated with diurnal preference: a big data analysis of 18,100 users

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Objectives/Introduction: The circadian system and sleep homeostasis are altered in aging populations. The endogenous circadian pacemaker influences sleep timing and architecture, however, whether the observed changes in sleep-wake functioning across the lifespan are associated with diurnal preference (morningness-eveningness) remains unclear.

Methods: Data from 18,100 users (mean age: 51.4 $\pm$ 16.6, 58% female) across 741,738 nights were included in the analysis from the PSG-validated Sleep Score Mobile Application, which uses a non-contact, sonar-based method to objectively measure sleep-wake metrics. Diurnal preference was subjectively assessed with a 5-item questionnaire ranging from *definitely morning-type* to *definitely evening-type*. Linear mixed effect models were employed to test whether, across age, morningness-eveningness was associated with total sleep time, wake after sleep onset, sleep onset latency, and sleep efficiency, controlling for gender and self-reported diagnosed sleep disorders.

Results: Total sleep time declined linearly with age across all diurnal preferences ($\beta = -1.03$, SE = 0.062, $p < 0.0001$), however, the slope of this decline was not significantly different between strong-morning versus strong-evening types ($\beta = -0.078$, SE = 0.079, $p = 0.32$). Similar null findings between strong-morning versus strong-evening types were observed for other sleep-wake variables. Wake after sleep onset increased with age across all diurnal preferences (β = 0.40, SE = 0.012, $p = < 0.0001$), with no significantly different slopes observed across age between strong-morning versus strong-evening types ($\beta = -0.005$, SE = 0.015, $p = 0.74$). Likewise, sleep onset latency increased with age across all diurnal preferences ($\beta = 0.026$, SE = 0.011, $p = 0.013$), but no significant differences in the slopes over age between strong-morning versus strong-evening types ($\beta = -0.014$, SE = 0.014, $p = 0.28$) could be observed. Finally, sleep efficiency declined linearly with age across all diurnal preferences ($\beta = -0.27$, SE = 0.008, $p = < 0.0001$), and the slopes of this increase with age were not significantly different between strong-morning versus strong-evening types (β = -0.001, SE = 0.010, $p = 0.91$).

Conclusions: The present findings suggest that age-related sleep impairments are unlikely to be driven by inter-individual differences in morningness-eveningness (diurnal preference), despite previous work indicating that diurnal preference reflects dimensions related to circadian periods, sleep homeostasis, and ontogeny. Instead, age-related changes to difficulty maintaining and initiating sleep likely result from age-related changes to the endogenous circadian and homeostatic sleep-wake systems.

Disclosure: Yes

Conflict of Interest statement: All authors are employees of Sleep Score Labs.

P813 | The effectiveness of exercise interventions targeting sleep in older adults: a systematic review and meta-analysis

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Nearly half of persons over the age of 65 experience difficulty initiating or maintaining sleep. Sleep loss in older adults is associated with multiple morbidities, reduced quality of life and increased mortality. Exercise is a promising, accessible intervention for sleep but the optimal mode, dose, and moderators of its effectiveness in older adults remain unclear.

Methods: A systematic review and meta-analysis of controlled studies of structured physical activity or exercise (any mode, frequency, duration), compared to non-exercise or wait-list controls, and polysomnography(PSG), actigraphy, or self-reported sleep quantity, quality, or architecture in adults aged 55-85, with and without disrupted sleep (PSQI > 5). Systematic searches were conducted without date or language limits in PubMed, Embase, Cochrane Library, and ClinicalTrials.gov. Risk of bias was appraised with Cochrane's Risk of Bias Tools.

Random-effects meta-analysis, subgroup-analyses and meta-regression by age, gender, exercise characteristics, and subjective vs objective sleep measures were performed.

Results: 4244 papers were screened, 86 eligible were systematically reviewed, and 63 meta-analysed. Exercise was associated with increased subjective sleep quality and greater reductions in PSQI

scores than non-exercise interventions(PSQI −2.61, 95%CI-3.08,−2.15). The largest effect on self-reported sleep quality was seen in studies of moderate-intensity-(50%–70% max heart rate (mHR)) exercise (−2.70, 95%CI −3.15,−2.26), followed by low-intensity, <50%mHR (−2.90,95%CI-3.28,−0.91), then high-intensity, >70% mHR(−1.82,95%CI−3.03,−0.61).

Exercise was associated with greater improvements in PSG and actigraphy measured total sleep time(14.47 min) sleep efficiency(4.18%), sleep onset latency(−2.71 min), wake after sleep onset(−17.34 min), and number of awakenings(−2.5) than non-exercise controls. Only 5 studies assessed sleep cycles (PSG), with no statistically significant differences found between exercise and controls in pooled data.

Conclusion: Aging, increasingly sedentary populations heighten the need for effective and accessible interventions for poor sleep. This meta-analysis suggests exercise can be an effective intervention for sleep difficulties in older adults. Key questions about exercise intensity, dose, and moderators remain however, and few studies investigated sex differences in sleep or the effects of time of day of exercise interventions on sleep. Our results and recommendations for future research support the development and dissemination of effective exercise interventions for sleep that may also aid secondary prevention of sleep-related health problems in older persons.

Disclosure: No

P814 | Non-parametric actigraphy-derived measures differ in dementia with lewy bodies compared to alzheimer's dementia: afeasibility study

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Objectives/introduction: Dementia with Lewy bodies (DLB) is the second most common form of dementia. Sleep disturbances are highly prevalent in DLB and are more severe relative to other neurodegenerative dementias including Alzheimer's dementia (AD). Whilst actigraphy is a feasible method of assessing objective sleep in dementia populations, To date, no studies have examined non-parametric methods of actigraphy analysis in DLB. These are more sensitive to change than standard actigraphy measures of sleep continuity, and may be a useful diagnostic tool or outcome measure.

The aim of this study was to: (1) assess the feasibility of deriving non-parametric measures from DLB actigraphy data, and (2) compare these to AD. It was hypothesised that non-parametric measures would differ between DLB and AD groups.

Methods: One week of actigraphy data was collected from mild-to-moderate DLB ($n = 8$) and AD participants ($n = 6$). Non-parametric measures were derived using the nparACT package (Blume et al., 2016). Interdaily stability (IS), intradaily variability (IV), relative amplitude of activity (RA), 5 h with the lowest actigraphy amplitude (L5) and 10 h with the highest average amplitude (M10) values were calculated. These were compared between DLB and AD groups using non-parametric Mann-Whitney *U*-tests.

Results: It was feasible to obtain non-parametric rest-activity values from all participants. Relative to AD, RA values were lower (DLB: $M = 0.34$, SD $= 0.25$; AD: $M = 0.69$, SD $= 0.14$; $p = 0.01$) and M10 values were lower in DLB (DLB: $M = 32.72$, SD $= 24.40$, AD: $M = 89.29$, SD $= 22.31$; $p < 0.01$). There were no group differences in IS, IV or L5 values.

Conclusions: It is feasible to derive non-parametric rest-activity measures from actigraphy data collected from individuals with DLB. The relative amplitude of activity, and 10 h with the highest average amplitude were significantly lower in DLB compared to AD. These results indicate that specific actigraphy-derived circadian markers, may be differentially affected in DLB. Future work should examine if these measures are a suitable DLB prognostic or diagnostic target, or if they are suitable outcome measures in clinical trials.

Disclosure: Yes

Conflict of Interest statement: There are no potential conflicts of interest to declare; this study was funded by Alzheimer's Research UK, Alzheimer's Research UK North Network Centre, British Sleep Society, Northumbria University Graduate Futures, and the NIHR Newcastle Biomedical Research Centre.

P815 | The effectiveness of the behavioural components of cognitive behavioural therapy for insomnia in older adults: a systematic review

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Introduction & Objectives: The prevalence of insomnia in older adults is greater than in the general population, carrying with it risks of poor psychological, cognitive, and physical outcomes. Cognitive Behavioural Therapy for Insomnia (CBTI) is recommended as the first line of treatment, but may prove too cognitively taxing for some, such as those with cognitive impairment, warranting investigation of more accessible methods. This systematic review aimed to explore the effectiveness of explicitly behavioural interventions (Sleep Restriction and Stimulus Control) at treating insomnia in older adults, with a secondary aim of exploring their effect on measures of mood and daytime functioning.

Methods: Four electronic databases (MEDLINE – Ovid, Embase – Ovid, CINAHL, and PsycINFO) were searched from inception to June 23, 2021. All experimental, quasi-experimental, and pre-experimental studies were included provided they: (a) were published in English; (b) treated insomnia in older adults; (c) used sleep restriction and/or stimulus control; (d) reported outcomes pre-and-post intervention. Hedge's g standardised mean difference effect sizes were determined.

Results: Fifteen studies, summarising the results of 498 older adults, were included. Three focused on stimulus control, four on sleep restriction, and eight adopted multicomponent treatments comprised of both interventions. No adverse outcomes related to treatment were reported in any study. All interventions brought about significant improvements in one or more subjectively measured facets of sleep, although overall, multicomponent therapies demonstrated larger effects (median Hedge's g = 0.55). Actigraphic or polysomnographic outcomes demonstrated smaller, or no effects. Improvements in measures of depression were seen in multicomponent interventions, but no intervention demonstrated any statistically significant improvement in measures of anxiety.

Conclusions: These findings corroborate the existing consensus that multicomponent approaches confer the most benefit for participants and add to the existing literature by demonstrating that this is also true in brief, explicitly behavioural interventions. However, the low volume of studies highlights the need for more high-quality studies in this area. This review helps to inform future research exploring interventions for insomnia in populations for whom CBTI is not appropriate.

Disclosure: No

P816 | Sleep state of elderly population in Korea: nationwide cross-sectional population-based study

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Objectives: As people tend to live longer, sleep disorders of elderly are becoming a major social issue. South Korea has one of the most highly increasing elderly populations in the world. This sociologic phenomenon strengthens the importance on geriatric specified medical approach and this includes management of poor sleep quality.

Methods: Cross-sectional surveys were collected including total 311 patients of age from 65-86 years old. Multistage clustered random sampling method was conducted proportional to the population and socioeconomic distribution for all Korean territories. Study population of having poor sleep quality was defined based on Pittsburgh Sleep Quality Index (PSQI) score above 9 and other sleep related questionnaires were acquired through survey (Insomnia Severity Index; ISI, Epworth Sleepiness Scale; ESS, Berlin Questionnaire; BQ, Cambridge-Hopkins diagnostic questionnaire; CH-RLSq, Patient Health Questionnaire-9; PHQ-9, Goldberg Anxiety Scale; GAS). Student's *t* test, ANOVA, and chi-square test was performed for univariate analysis. Then, multivariate logistic regression analysis was done to seek for risk factors of poor sleep of elderly. All analysis set the significance level at $p < 0.05$.

Results: Total 271 participants with mean age 69.9 ± 4.4 years were included in this study. 51.3% of participants were female. Based on PSQI, 34 participants (12.5%) had poor sleep quality. These participants had older age (71.4 ± 3.9 vs 69.7 ± 4.4), shorter sleep duration during week days (h; 5.4 ± 1.6 vs 7.4 ± 1.2), and weekends (h; 5.7 ± 1.7 vs 7.5 ± 1.2). According to survey data, 19.0%, 14.3%, and 24.5% of participants with excessive daytime sleepiness, restless leg syndrome, and obstructive sleep apnea, retrospectively, had poor quality of sleep. Furthermore, 17.7% of total participants had insomnia estimated based on ISI. Among participants with insomnia, 56.3% had poor sleep quality. Multivariate logistic regression analysis adjusted on age and gender showed insomnia as a risk factor of poor sleep quality on elderly with statistical significance. Sociodemographic factors such as education level, anxiety, and depression did not increase the risk of having poor quality of sleep.

Conclusions: Sleep quality of elderly Korean population was not affected by education level, anxiety, and depression, but was related to insomnia after adjusting for age and gender.

Disclosure: No

26: SLEEP AND GENDER

P224 | The role of victimisation, sexual minority and poor sleep quality in adolescents' non-suicidal self-injury behaviours: a longitudinal investigation

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Objectives/Introduction: Non-suicidal self-injury (NSSI) behaviours are noted among adolescence but the risk and protective factors are not well-studied. With increasing studies showing poor sleep quality as an early predictor of poor mental wellbeing, we aim to investigate if poor sleep quality could prospectively predict later development of NSSI.

Methods: We conducted a secondary data analysis using the Millennium Cohort Study, a prospective birth Cohort in the United Kingdom. The final sample included 5819 adolescents (mean age: 13.8, 45.9% female), who completed the following required measures: Sexual minority was measured by self-reported sexual attraction to same-sex and/or opposite sex at both age 14 and age 17 (sexual minority: 9.6%). Participants were asked about victimisation experience, e.g. physical and sexual assault, and they were to report the usual time taken to initiate sleep, and their frequency of nocturnal awakening after sleep onset at age 14. At age 17, they reported whether they had performed self-injury behaviours and whether the intention is to end their life or not, with 16.6% indicated NSSI in the past 12 months.

Results: A hierarchical logistic regression model was used to address the research aim, with age-17 NSSI as dependent variable, and age-14 demographic factors and negative mood symptoms (odd ratio, $OR = 1.05$, $p < 0.001$) entered at step 1, age-14 self-injury behaviours at step 2, ($OR = 2.23$, $p < 0.001$), sexual minority status ($OR = 3.07$, $p < 0.001$) at step 3, victimisation($OR = 1.51$, $p<.001$) at step 4, and sleep onset latency ($OR = 1.10$, $p = 0.003$) and frequent nocturnal awakening ($OR = 1.08$, $p = 0.010$) at step 5. Results showed that the additional inclusion of variables in steps 2-5 all significantly increased the variance explained by the regression models, $ps < 0.001$.

Conclusion: After adjusting for baseline self-injury behaviours and other well-established correlates of NSSI, comparing to non-sexual minority, sexual minority adolescents had increased risk in developing NSSI. Also, sleep onset latency and nocturnal awakening frequency both related to increased risk in developing NSSI. The relationship between poor sleep quality with other predictors of NSSI (e.g., depressive symptoms, victimisation) should be further assessed for better conceptualisation of NSSI.

Disclosure: No

27: INSTRUMENTATION AND METHODOLOGY (CLINICAL SLEEP SCIENCE)

P226 | Automatic sleep scoring: The relationship between age and sleep

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Objectives/Introduction: It is well known that sleep and age are closely related. However, this factor is usually underestimated in the development of automatic sleep scoring algorithms.

In this preliminary work we explored how sleep characteristics change with age and how much this can affect the performance of a sleep scoring algorithm.

Methods: The dataset used contains 8950 whole night polysomnographies from 7985 subjects (0–91 y), collected by the Inselspital (Bern University Hospital).

Games-Howell test was performed to evaluate how much sleep characteristics are different between age-related groups. Then, our sleep scoring algorithm, previously pretrained on a collection of 13 datasets, was fine-tuned both on the whole Inselspital dataset and on different age-related subsets and the performances were compared.

Results: The statistical analysis showed that the difference is large (Cohen's $d > 0.8$) between babies and children, adolescents and young adults, medium ($d > 0.5$) between children and adolescents, young and middle-aged adults and small ($d > 0.2$) between middle-aged adults, elderly and old-elderly.

The analysis of the performance of the sleep scoring algorithm confirmed a significant difference between children and adults. Furthermore, the adolescents turned out to clearly belong to the adults' group instead of to the children's group.

Conclusion: Sleep characteristics change with ageing and these differences affect the performance of the automatic sleep scoring. Further experiments should be conducted to explore how to improve the performance of an automatic sleep scoring algorithm considering the age of the subjects.

Disclosure: Yes

Conflict of Interest statement::

We have no conflicts of interest to declare.

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P227 | Multi-scored sleep databases: How to exploit the multiple-labels in automated sleep staging

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Objectives/Introduction: Inter-scorer variability in scoring polysomnograms is a well-known problem, which is reflected also in the automated scoring algorithm development and performance evaluation. Most of the existing sleep scoring models are trained using labels annotated by a single-scorer. The subjectivity of evaluation is then transferred to the model. When annotations from two or more scorers are available, the existing scoring models are trained on the scorer consensus (i.e., weighted majority vote) [1, 2]. By training models on the scorer consensus, the network architectures are still trained on a single one-hot encoded label. Indirectly, the averaged scorer's subjectivity is transferred into the model, losing information about the internal variability among different scorers. In this study we aim to insert the multiple-knowledge of the different physicians into the training procedure. Our ultimate goal is to adapt the model to the consensus of a group of scorers.

Methods: We trained our DeepSleepNet-Lite model [3] on the IS-RC database [4]. The dataset contains 70 recordings from patients with sleep-disordered breathing. Each recording is scored by six clinicians from five different sleep centers. We exploit the label smoothing technique together with a soft-consensus distribution (LSSC) to insert the multiple-knowledge in the training procedure of the model. We use

the averaged cosine similarity (ACS) score to quantify the similarity between the hypnodensity-graph generated by the model (with- and without- LSSC) and the hypnodensity-graph generated by the scorer consensus. The ACS values range between 0 and 1, that is, lowest and highest similarity between the graphs.

Results: The performance of our model improves when we train the architecture with labels smoothed with the soft-consensus distribution, from 71.6% (without-LSSC) to 78.5% (with-LSSC) in overall accuracy. Besides, we found an increase in similarity between the hypnodensity-graph generated by the model and the hypnodensity-graph generated by the consensus, from 0.79 (without-LSSC) to 0.85 (with-LSSC) in ACS.

Conclusions: The results suggest that our approach enables the model to better adapt to the consensus of the group of scorers. The robustness of our learning approach needs to be further investigated on more scoring architectures and different databases.

Disclosure: No

P228 | Persistent treatment-emergent central sleep apnea (TECSA) following hypoglossal nerve stimulation

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Objectives/introduction: Hypoglossal nerve stimulators (HNS) have been shown to successfully treat patients with obstructive sleep apnea (OSA). Surgery to implant this device is considered if a patient fails to adhere to long-term continuous positive airway pressure treatment. However, several studies have reported that treatment-emergent central sleep apnea (TECSA) can develop and persist after implanting an HNS device. Therefore, this study investigated the possible predictive factors and underlying mechanisms of persistent TECSA in patients with an implanted HNS device.

Methods: Twenty-seven patients with moderate-severe OSA and <25% central events who already received HNS surgery were included in this retrospective study. Data such as demographics, baseline recordings, post-implantation sleep study characteristics, and device usage were collected. These variables were used to measure the effectiveness of HNS in preventing OSA and central sleep apnea (CSA) during follow-up, as well as to help identify which factors might lead to TECSA.

Results: After activation of HNS, the mean baseline apnea-hypopnea index decreased from 34.50 ± 12.04 to 23.48 ± 16.43, $p < 0.05$. The mean oxygen desaturation index reduced from 31.30 ± 14.75/h to 22.15 ± 12.18/h, $p < 0.05$, and the success rate to treat OSA and CSA was 52% and 66.7%, respectively. Three patients displayed elevated postoperative CSA (central apnea index ≥5), which was associated with an increased baseline Epworth sleepiness score (ESS) and mixed sleep apnea index (MAI). Two of these patients were diagnosed with TECSA due to a significant negative correlation between obstructive apnea index and central and mixed sleep apnea index ($R = -0.745$, $p = 0.021$) during stimulation from the device.

Conclusion: Overall, HNS seems to be an effective alternative treatment for OSA patients. However, it might not be suitable for all patients, as this study has shown that patients with increased ESS and baseline MAI may be susceptible to elevated postoperative CSA after HNS implantation. Furthermore, the development of TECSA may be from different stimulation intensity of the HNS device. These findings provide an initial insight into the possible development of TECSA after HNS.

Disclosure: No

P229 | Development of a pre-treatment questionnaire for obstructive sleep apnoea patients predicting use of early continuous positive airway pressure therapy and risk of long-term non-adherence

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Objectives: The global prevalence of obstructive sleep apnoea (OSA) is estimated at 1 billion, and severe OSA leads to a two-fold increased risk of cardiac events and stroke. Although continuous positive airway pressure (CPAP) is a highly efficacious therapy for OSA, high CPAP non-adherence rates are a major obstacle to its effectiveness. We have shown that in 2020, only 42% of patients in the UK were adherent to CPAP just three months after starting treatment. Patients also had six different early behavioural patterns of CPAP use, which also predicted their likelihood of treatment non-adherence long-term. Health and illness beliefs, in addition to elements of behaviour change models, have been better predictors of CPAP adherence than physiological factors. Our aim was to develop a pre-treatment questionnaire to predict early patient behaviour to offer appropriate personalised support to reduce CPAP non-adherence.

Methods: A scoping review across MEDLINE, EMBASE, PsychInfo and Web Of Science databases identified articles including beliefs and behavioural constructs predicting CPAP adherence one month or more after treatment initiation. Subscales and individual questions were reviewed by two experienced behaviour change psychologists and two senior sleep physicians. Questions were selected based on strength of association, behavioural theory, and modified only if essential for readability or clarity. Three additional questions were devised to improve the questionnaire's discriminatory power. Patient volunteers using CPAP reviewed the questionnaire content with respect to clarity, conciseness, accessibility and inclusivity to all patient groups, suitability of rating scales, and format. The

questionnaire underwent two refinements, the first with feedback from three focus groups, including 16 patients, and the second with two groups, including 10 patients.

Results: The search identified 1317 articles, of which 23 were eligible. Questions on patients' illness perceptions, self-efficacy and outcome expectations of using CPAP, and personality traits, were included to produce a 32-question form. By the final focus group, all participants found the questionnaire acceptable.

Discussion: We have co-developed a pre-treatment clinic tool with OSA patients to predict early CPAP use to guide clinics in planning personalised support. The next step is to investigate the efficacy of this questionnaire in a prospective study.

Disclosure: No

P230 | Coverage of international classification of functioning, disability and health components in sleep questionnaires: an analysis of content

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Objectives/Introduction: A multifactorial evaluation of sleep disorders is crucial to understand the impact of sleep disorders on functioning, considering sleep can be influenced by biological, psychological, social and environmental factors. With the development of the International Classification of Functioning, Disability and Health (ICF), a universal and standardized language to describe health and health states based on a bio-psycho-social perspective became available. The ICF model describes a person's functioning as an interaction between a person's health condition(s) and

(1) functioning and disability, comprising the components body functions, body structures and activities and participation and

(2) contextual factors, encompassing the components environmental factors and personal factors.

The objective of this content analysis study is twofold:

(1) to evaluate if ICF components are adequately covered in the content of existing sleep questionnaires and

(2) to critically reflect on the use of the ICF.

Methods: Based upon a previous review a selected set of generic and disease-specific sleep questionnaires were used for content analysis. Every ICF component consists of categories up to the 4th level as the most specific classification. Each meaningful concept of every item was linked to the most precise ICF category according to standardized linking rules.

Results: A total of 58 sleep questionnaires contained 1123 items, that went through a process of concept extraction and coding to ICF categories. Preliminary results indicated that the concepts were mainly linked to categories of the component body functions, followed by activities and participation, and only a small number of concepts could be linked to environmental factors.

Conclusions: Using the ICF as a framework can be useful to compare the content of sleep questionnaires, however one must take into account some limitations regarding the strict use of the model. First, personal factors are not classified yet, nevertheless these factors are shown to have an impact on sleep disorders. Second, an incongruence between ICF concepts and concepts covered in questionnaires could either mean that these concepts are being collected unnecessarily by the questionnaires, or that these concepts are necessary within the assessment of sleep disorders but are not covered by the ICF model.

Disclosure: No

P231 | Daytime complaints associated with sleepiness and fatigue among patients suffering from obstructive sleep apnea and narcolepsy: a qualitative study

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Objectives/Introduction: Like other sleep disorders, obstructive sleep apnea and narcolepsy have been linked with various prevalent daytime complaints, such as excessive daytime sleepiness (EDS). However, in clinical practice, EDS can be experienced and expressed in a variety of ways, with common overlap with other states (fatigue, drowsiness, tiredness) and ties to other cognitive or behavioral symptoms. Patients' experiences are often difficult to define and to target given the interchangeable nature of the symptoms and their descriptive terms. In order to achieve more accurate diagnosis, to improve evaluating or monitoring tools, and to investigate possible therapeutical interventions, the present study aims to explore the general daytimes experiences and descriptors from a patient perspective.

Methods: Twenty semi-directed interviews were conducted among Dutch patients (20–74 years old, 12 females, 8 males). Patients had either received a prior diagnosis of narcolepsy ($n = 5$) or of sleep apnea ($n = 15$). The interviews focused on the patients' description of their daytime complaints in their own words, temporal variations in the experienced complaints, and patients' solutions and strategies to face them. The data resulting from the transcriptions were analyzed using an eclectic coding method before the thematic analysis.

Results: Preliminary results highlight frequent and persistent daytime complaints pertaining to sleepiness, fatigue and tiredness, without clear distinctions between the descriptors of these states. In fact, the patients' actual descriptions of their symptoms varied quite a lot. Patients' experiences were often divided between physical concerns and "mental" ones, with a common cause associated with the lack of "energy". The temporal pattern of complaints throughout the day showed substantial inter-patient variability, with some patients referring to linear trends while others describe more fluctuating or unpredictable tendencies.

Conclusion: The initial findings highlight the interchangeable nature of the daytime complaints, with commonalities but also deviations in the experiences and descriptions across patients, and suggest a misalignment between the scales often used to diagnose and monitor daytime complaints – particularly those pertaining to daytime sleepiness – and patients' experiences. The insights can be used to improve the detection of these multifaceted complaints, and to develop person-tailored and just-in-time therapeutical interventions.

Disclosure: No

P232 | Paradoxical effect of alcohol on peripheral arterial tomography (PAT) Data in obstructive sleep apnea: a controlled case report

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Objectives/Introduction: Home sleep apnea tests utilize peripheral arterial tone (PAT HSAT) to measure changes in arterial volume to help detect sleep disordered breathing. Validation studies comparing PAT HSATs to polysomnogram have demonstrated a high correlation but the influence of alcohol consumption has not been addressed. The possibility that alcohol could confound the results of PAT HSATs is of great clinical importance because alcohol is widely used and not always disclosed by patients.

Methods: We describe a case of a middle-aged man with a pattern of nightly modest alcohol use close to bedtime who underwent two PAT HSATs followed by two polysomnograms (one night with and one without alcohol).

Results: We found moderate obstructive sleep apnea (OSA) on both polysomnograms but only on the PAT HSAT without alcohol, with an unexpected false negative result on the night he consumed alcohol. The overall pAHI on the PAT HSAT with alcohol was 2 while without alcohol was 14. The AHI on a polysomnogram with the same amount of alcohol was 14 versus 25 without. A table will report the remainder of the study data.

Conclusions: This report describes a false negative report of OSA on a PAT HSAT conducted in the context of modest alcohol use. Alcohol is known to alter autonomic function and smooth muscle function that in turn could affect PAT. Unresolved questions include what pattern of alcohol consumption could be problematic for the results of a PAT HSAT.Is the risk of alcohol obscuring the results applicable to all patients? Variables include the timing of consumption relative to bedtime, the quantity consumed, and whether a patient has consistent daily intake or binge-usage. The severity of sleep apnea, the patient's age or coexisting medical conditions might also be factors that determine the impact alcohol has on PAT HSATs. Alcohol use could confound results when a PAT HSAT is used to assess longitudinal management of OSA. In view of this report and the widespread adoption of PAT HSATs and frequency of alcohol consumption argues for further investigation into the effects that alcohol may have on the validity of this type of HSAT.

Disclosure: No

P233 | Feasibility and diagnostic yield of polysomnography in adults with intellectual disability

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Objectives/introduction: Sleep disorders, such as obstructive sleep apnea (OSA), have a higher prevalence in people with intellectual disabilities (ID). Sleep disorders can have serious consequences for daily functioning and quality of life. Timely diagnosis is important, so that appropriate treatment can be initiated. Polysomnography (PSG) is the gold standard to diagnose sleep disorders. In people with ID PSG registration can be an obtrusive and challenging endeavor, due to communicative impairment, high levels of anxiety, challenging behavior and sensory hypersensitivity. Therefore, it might be considered as too burdensome, resulting in caregivers refraining from referral for sleep investigation, leading to underdiagnosis and under treatment of sleep disorders. The aim of the study was to determine feasibility and assess diagnostic yield of PSG in adults with ID.

Methods: The PSG-recordings of adult patients with ID, who were referred to the sleep disorders clinic of Kempenhaeghe (Heeze, the Netherlands) between January 2017 and December 2020, and who underwent a video-PSG (at the inpatient clinic) as a part of the diagnostic process, were retrospectively screened for feasibility and diagnostic yield. Feasibility was established by sufficient total sleep time (TST) (TST > 4 h) and a sufficient recording (≥1 EEG channel with a continual signal to differentiate the sleep stages and wake in more than 66% of TST, ≥1 respiratory channel in more than 66% of TST, and oximetry measurement for at least 66% of TST). The diagnostic yield was established by the possibility to answer the diagnostic question.

Results: 89 patients with ID underwent a PSG. TST was >4 h in 80 (89.9%) patients. PSG recordings were considered sufficient in 70 (78.7%) patients. In 88 (98.8%) PSG recordings, the diagnostic question could be answered.

Conclusion: This study has shown that video-PSG at the inpatient clinic is feasible in patients with ID. It has a high diagnostic yield, meaning that in most patients the diagnostic question could be answered.

Disclosure: No

P234 | Comparison of the paroxetine's effect on the sleep parameters measurements extracted by polysomnography vs somno-art in depressed patients

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Introduction: Sleep dysfunction, manifesting as too much or too little sleep, can be an indicator of depression. In addition, sleep dysfunction can be a side effect of antidepressant medications. It has been clearly shown that depression is associated with abnormal sleep architecture and the treatment by antidepressants such as selective serotonin reuptake inhibitors (SSRIs) are associated with sleep parameters modulations. The Somno-Art solution, a new sleep scoring approach, has been validated in various studies including healthy subjects and pathological patients. This novel technology can be a valid alternative to the cumbersome PSG recordings for the sleep parameters measurement.

Objectives: The aim of the current analysis was to show that the sleep stage scoring extracted by the Somno-Art solution compares favorably to PSG and can be used in pharmaceutical trials to estimate paroxetine's effect in depressed patients.

Methods: One baseline night followed by a second night after a dose of paroxetine were recorded from 11 depressed patients. Sleep staging was obtained from PSG and from Somno-Art analysis on synchronized electrocardiogram and actimetry signals. For each sleep parameter investigated, Wilcoxon signed-rank test between baseline night and night under paroxetine was performed. Statistical significance was set at $p < 0.05$.

Results: Both PSG and Somno-Art analyses show a significant increase on NREM sleep and significant decrease on REM sleep. No other sleep parameters show significant variation, but we can see that the trends shown on the PSG are similar on the Somno-Art analyses.

Conclusions: Similar to PSG, Somno-Art shows comparable differences on the sleep parameters, and allows for the same conclusions to be drawn regarding the potential drug effect. Somno-Art offers a reliable solution for sleep parameters evaluations.

Disclosure: No

P235 | Do primary health care patients with insomnia interpret and respond to the consensus sleep diary as intended? A cognitive interview study

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Objectives/Introduction: The Consensus Sleep Diary (CSD) was developed to facilitate the comparison of sleep variables across research studies. Psychometric evaluations and focus-group studies support its validity and clinical usefulness, but further research into its content validity is needed. Cognitive interviewing is an accepted method of exploring content validity, as it can be used to investigate the response process to show whether respondents interpret and respond to items as intended. This study used cognitive interviewing to explore the content validity of the Swedish version of the CSD in primary health care patients with insomnia.

Methods: The CSD was translated into Swedish in accordance with international guidelines. During this process, content validity was pretested in 15 healthy adults from the community, which led to small changes in wording. The revised version was then tested in 13 adult primary health care patients with insomnia disorder in an iterative process of developing and testing to improve content validity. Participants were interviewed after using the CSD for two consecutive weeks. A questionnaire based on the Question Appraisal System was used. Interviews were transcribed, and a deductive, top-down approach was used to code the results in relation to the cognitive model themes *comprehension*, *retrieval*, *decision process* and *response process*.

Results: The CSD was easy to use if participants read and followed the instructions carefully. However, if they were exhausted and stressed, it was difficult to fully understand the wording of items and instructions (*comprehension*). Because participants wanted to complete the diary, they tended to guess when uncertain instead of skipping items (*retrieval*). Participants had to make an effort to understand sleep-related terms (e.g., awake, napping, sleep quality) (*decision process*) and used their own interpretations when responding to items (*response process*).

Conclusions: Overall, the findings support the content validity of the Swedish version of the CSD when used by primary health care patients with insomnia. However, it is important to find ways to help patients understand and remember the instructions, as this is difficult when experiencing stress and exhaustion, common symptoms of insomnia disorder.

All authors declare that they have no conflicts of interest.

Disclosure: No

P236 | Sleep symptom network analysis: an fruitful approach in sleep medicine

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An important issue of sleep medicine is to better understand the relationship between symptoms: (i) found in conventional diagnostic manuals to compare classifications, (ii) presented by the patient to better understand the clinical manifestation of a sleep disorder. In this presentation we will present: (i) two specific exhaustive works on the general structure of the networks of symptoms of sleep disorders as described in the International Classification of Sleep Disorders (ICSD-3) and in the Diagnostic and Statistical Manual of Mental Disorders (DSM-5); (ii) a work based on the general structure of the networks of sleep symptoms extracted from an online questionnaire accessible via the "Réseau Morphée" collected in a large French population of subjects concerned by their sleep ($n = 35{,}808$). We will compare the theoretical sleep symptom networks (ICSD-3/DSM-5) with the empirical sleep symptom network ("Réseau Morphée"). We will show that daytime sleepiness and insomnia are two central sleep symptoms. We will discuss these results in regard to:

(i) an historical approach of sleep medicine (e.g., the Diagnostic Classification of Sleep and Arousal Disorders (DCSAD) that proposed in 1979 the terms: DIMS for "Disorders of initiating and maintaining wakefulness" and DOES for "disorders of excessive somnolence"),

(ii) an epistemological approach of sleep disorder definition (e.g., the place of sleep disturbances and sleep complaints in the way to delineate the normal and the pathological in sleep medicine),

(iii) an public health approach concerning health models and organization of sleep health prevention.

Disclosure: No

P534 | Inter-scorer reliability between Somno-Art Software and 5 sleep centers

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Introduction: A number of studies have evaluated epoch-by-epoch agreement between 2 technologists in scoring individual sleep stage. Scoring for the specific sleep stages average agreement ranged from 20% to 90% in different studies.

Objectives: The goal of this study is to evaluate the validity of the Somno-Art analyses against a pool of scorers including validated automated system for scoring polysomnograms.

Methods: Sixty polysomnography recording nights, representative of clinical practice (participants who are healthy or suffering from obstructive sleep apnea [OSA], or insomnia or major depressive disorder [MDD]), were scored by 5 different sleep scoring centers and by the Somno-Art Software (total of 6 scorers). Intra-class correlation coefficient (ICC) and Wilcoxon Signed-Rank Test were calculated between each scorer and the average value of the 6 scorers. In addition, epoch-by-epoch agreements between scorers were analyzed.

Results: Somno-Art Software estimation of sleep efficiency, wake, N1+N2, N3 and REM sleep belonged to the interscorer range for the full dataset and the participant groups, except N3 sleep in OSA patients. Somno-Art Software tended to overestimate sleep latency with a significant difference to the average scoring for insomniacs (4.7 ± 1.6 min). On the full dataset, Somno-Art Software had good or excellent ICC scores for all sleep parameters except N3 sleep (moderate score). 4-stages epoch-by-epoch agreement ranged between 78.5-88.7% for the visual scorers and 69.9%–71.2% for Somno-Art Software. For the healthy participants, visual scorers agreed between 68.9 and 86.9%, while Somno-Art Software overlapped this range with an interscorer agreement between 62.0% and 71.4%.

Conclusions: Somno-Art solution provides results that are comparable to manual and automatic scoring for commonly used metrics in sleep medicine. It shows a robust interscorer reliability in the range of the 5 polysomnography scorers

Disclosure: No

P535 | Comparison of polysomnography and actigraphy in sleep assessment in adults

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Polysomnography (PSG) and actigraphy are widely used methods for sleep assessment. Despite its limitations, PSG remains the gold standard for monitoring sleep. Herein, we aimed to determine if there is agreement between PSG- and actigraphy-based sleep measures and compare sleep patterns at home to that obtained in a sleep laboratory.

Participants wore actigraphy devices for 7 or 14 days and, additionally, underwent in-laboratory PSG on the last night of the actigraphy assessment. Data from patients who underwent multiple sleep latency test at a single institution from January 2016 to February 2020 were analyzed. Sleep parameters obtained from PSG, namely total time in bed (TIB), total sleep time (TST), sleep efficiency (SE), sleep latency (SL) and wakefulness after sleep onset (WASO) were compared to data of the actigraphy and to the data obtained from the in-lab actigraphy of each patient. We used descriptive analysis and paired samples t-test (Confidence Interval >95%) to report the findings. Statistical analyses were performed using IBM SPSS software.

Data from 130 patients (aged 18–73 years; 53, 1% women) were obtained. TIB, TST and SE were statistically different when compared

the PSG-assessed to actigraphy (p < 0,001) and to in-lab actigraphy (p < 0,001) and also when standard actigraphy was compared to in-lab actigraphy (p < 0,001). Mean SL was similar when obtained by PSG and in-lab actigraphy (p = 0,354). Mean WASO was similar when PSG was compared to standard actigraphy (p = 0,218). Except for SE (p = 0,062), all sleep measures were statistically different when actigraphy was compared to in-lab actigraphy (p < 0,001).

Overall, the findings suggest that the actigraphy is a reliable tool to measure WASO. Differences in the actigraphy measures in laboratory and at home may be explained by the requirements imposed by PSG protocol, namely the need to stay in bed during the exam and the absence of external stimuli.

Disclosure: No

P536 | Effects of continuous positive airway pressure on sleep state misperception in patients with obstructive sleep apnea

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Introduction: Little is known regarding sleep state misperception and its improvement during continuous positive airway pressure (CPAP) therapy in patients with obstructive sleep apnea (OSA). This study aimed to examine the effects of CPAP on sleep state misperception in patients with moderate to severe OSA who underwent CPAP titration studies.

Methods: Sleep state perception was measured by subtracting the objective total sleep time from the subjective sleep duration to obtain the absolute difference. Sleep underestimation and overestimation were defined as ± 60 min sleep perception. Insomnia symptoms were assessed using a questionnaire. The Epworth Sleepiness Scale and Beck Depression Inventory were also applied. Finally, nonparametric statistical analyses were performed.

Results: Of the 339 patients with OSA included in the study, 90 (26.5%) and 45 (13.3%) showed sleep underestimation and overestimation, respectively. Overall, a significant underestimation of sleep was noted during CPAP titration compared to a diagnostic PSG (p < 0.001). The degree of misperception during CPAP titration was negatively correlated with N1 sleep ($r = -0.146$, $p = 0.007$), total sleep time (TST) and apnea-hypopnea index ($r = -0.110$, $p = 0.042$). OSA patients with insomnia or depressive symptoms did not show any changes in sleep perception between diagnostic and CPAP titration studies, whereas those without insomnia or depressed mood showed significantly underestimated sleep duration during CPAP titration. Patients with OSA and either underestimated or overestimated misperception showed a decrease in an absolute difference between subjective and objective TST during CPAP titration, leading to perceptual improvements in sleep perception regardless of the presence of insomnia or depressive symptoms. However, of 204 patients with normal sleep perception, 138 (67.6%) and 10 (4.9%) had underestimation and overestimation of sleep during CPAP titration, respectively.

Conclusions: CPAP titration may improve sleep perception in patients with moderate to severe OSA who have sleep state misperception, regardless of the types of underestimation or overestimation and the presence of insomnia or depressive symptoms. However, CPAP titration may result in sleep misperception especially underestimation of sleep in those who have normal sleep perception.

Disclosure: No

P537 | A systematic review of sleep-wake disorder diagnostic criteria reliability based on clinical interviews

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Background: To provide a systematic review of the reliability studies of the Sleep-Wake disorder diagnostic criteria of the principal international classifications used in Sleep Medicine.

Methods: Electronic databases (PubMed (1946–2021) and Web Of Science (— 2021)) were searched up to December 2021 for studies computing the Cohen's kappa coefficient of diagnostic criteria for the main Sleep-Wake Disorders categories described in the International Classification of Sleep Disorders (ICSD), Diagnostic and Statistical Manual of Mental Disorders (DSM) and International Classification of Diseases (ICD) subtypes. Cohen's kappa coefficients were extracted for each main Sleep-Wake Disorders categories, for each classification subtypes and for the different types of methods used to test the degree of agreement about a diagnosis.

Results: The database search identified 383 studies. Fifteen studies were analyzed in this systematic review. The reliability of all main Sleep-Wake disorders presents a Cohen's kappa with a substantial agreement (Mean Cohen's kappa = 0.66). No difference was found between main Sleep-Wake disorders, between classification subtypes or between different type of methods. Insomnia disorder (10/15) and Parasomnia disorders (7/15) diagnostic criteria are the most studied. The two main methods identified are "test-retest reliability" (11/15), principally used for ICSDs and "joint interrater reliability" (4/15) principally used for DSMs subtypes diagnostic criteria.

Discussion: The implications in term of design of methods used to test the degree of agreement about a diagnosis in Sleep Medicine are discussed. The role of the American Academy of Sleep Medicine that commissioned the project to develop standard definition for currently recognized Sleep-Wake disorders should lead to common reliability research project in order to evaluate diagnostic criteria of multiple

Sleep-Wake disorders, in representative sample, in multiple sleep centers. The source of the diagnosis of unreliability in the sleep clinical community should be better studied, in order to know how to modify the diagnostic criteria, in particular in regard to clinical significance criterion and in regard to objective diagnostic criteria obtained by polysomnography scoring.

Conclusion: These results should encourage the development of reliability studies for the further iterations of diagnostic criteria of Sleep-Wake Disorders.

Disclosure: No

P538 | Drug induced sleep endoscopy for the management of obstructive sleep apnea

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Introduction: Drug induced sleep endoscopy (DISE) or somnoscopy provides dynamic information about airway obstruction. This technique can be considered essential in the future for the therapeutic management of certain patients with obstructive sleep apnea (OSA). The aim of this study was to describe the main indications for DISE and the therapeutic approach carried out.

Material and methods: A prospective observational study was conducted analyzing the characteristics of patients undergoing DISE as well as post-procedure management. Quantitative variables are described as mean ± standard deviation and categorical variables as absolute and relative frequencies.

Results: Between June 2018 and January 2021, DISE was performed on 36 patients in our center who were included in the study. The mean age was 49 years (SD 12.7). 22.2% (8) were women and 77.8% (28) men. Body mass index was 27.8 kg/m^2 (SD 4.2). The mean Epworth was 9.5 (SD 6.2). The Apnea Hypopnea Index (AHI) was 37.6/h (SD 22.3), with 52.8% (19) of the studied patients presenting severity. Intolerance to CPAP was the most frequent indication (Figure 1), and the otorhinolaryngology surgery and the indication for the use of the Mandibular Advancement Device (MAD) were the attitudes most commonly adopted (Figure 2).

Conclusions: In certain patients with OSA with a poor response to treatment or possible surgical indication, DISE is positioned as a useful procedure, facilitating a multilevel and multidisciplinary approach.

Disclosure: No

P539 | Extraction of cardiac-related signal from suprasternal pressure sensor in polysomnography

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The accurate detection of respiratory effort during Polysomnography (PSG) is critical in the diagnosis of sleep disordered breathing conditions such as sleep apnea. Unfortunately, the sensors used in the clinical routine are invasive or do not capture upper airway dynamics. One promising alternative is the Suprasternal Notch Pressure Sensor (SSP): a small sensor placed on the skin that detects pressure swings in the thoracic cavity. Besides respiratory activity, the SSP may also pick up small pressure oscillations caused by the pumping heart. Although these are commonly removed as unwanted artifacts, they have potentially informative content regarding cardiac activity. In this study we propose a method to extract cardiac information from the SSP signal.

First, the raw signal is filtered to attenuate respiratory frequencies. Then we get robust-to-noise estimates of the heart rate (HR) as local maxima in the signal's autocorrelation. The frequency search range is determined through a-priori knowledge of HR dynamics and by tracking the temporal evolution of HR estimates. Finally, we tune time-variant filters on the HR to separate respiratory and cardiac signals.

The performance in HR estimation is compared with a ground truth extracted from synchronized ECG recordings on a sample of 100 participants undergoing a full single-night PSG, including the SSP sensor, for various suspected sleep disorders.

Since the transition to sleep apnea events may hinder our method, we also measured the loss of performance compared to normal breathing. The respiratory signal filtered using our method or a fixed frequency notch filter at 1.6 Hz (currently employed) are compared qualitatively.

Pooling all the estimates, the Bland-Altman agreement analysis resulted in a linear bias of 0.08bpm with 95% level-of-agreement of 5.06 bpm. The coverage of SSP noise-free estimates compared to the ECG was 94.4 ± 2.3%.

Paired Wilcoxon Rank-Sum test determined that the error caused by respiratory events is significant across the experimental population, with an average increase of 0.38 bpm (interquartile range 1.44 bpm).

We shown that besides thoracic pressure swings, the SSP sensor contains reliable cardiac information. Our method achieved good results in estimating the HR without additional sensors and unlocked new research activities regarding the extracted cardiac signal.

Disclosure: Yes

Conflict of Interest statement: At the time of writing, PF and GPwere employed and/or affiliated with Royal Philips, a commercial company and manufacturer of consumer and medical electronic devices, commercializing products in the area of sleep diagnostics and sleep therapy. Philips had no role in the study design, decision to publish or preparation of the manuscript.

PF and GP report personal fees from Philips Research during the conduct of the study, outside the submitted work.

SO received an unrestricted research grant from UCB Pharma and participated in advisory boards for UCB Pharma, Jazz Pharmaceuticals and Bioprojet, all paid to institution and all unrelated to the present work.

RV is co-founder and shareholder of Nemo Healthcare BV, unrelated to the present work.
LC has no conflicts of interest.
This work was performed within the IMPULS framework of the Eindhoven MedTech Innovation Center (e/MTIC, incorporating Eindhoven University of Technology, Philips Research, and Sleep Medicine Center Kempenhaeghe), including a PPS-supplement from Dutch Ministry of Economic Affairs and Climate Policy. Additional support by STW/IWT in the context of the OSA+ project (No. 14619).

P540 | Towards a smart sleep room: accuracy of physiological sleep data measured by unobtrusive sensors

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Introduction: The gold standard for diagnosing sleep disorders is based on polysomnography (PSG). It is composed of various body-attached wire-connected sensors to record physiological signals, requiring labour-intensive patient hook-up, limited ability to record for more than 24 h, and uncomfortable or unnatural sleep environment for some patients. Unobtrusive wearable and nearable devices have been developed with advances in wireless technologies, showing a high correlation with the PSG. This study aims to determine how those technologies may be combined into a sensor network with the goal of a future phase involving long-term home monitoring with equivalence of PSG monitoring.
Methods: All participants went through the clinical routine with PSG during the night and daytime measurements. Additionally, their physiological data were recorded using a pressure sensing mattress and two piezoelectric sensing devices placed under the mattress. A radar device is placed next to the bed; participants are asked to wear a wristband and a headband. These devices record body movements, heart rate, electrodermal activity, temperature, and brain activity. Bland-Altman plots, correlations, and agreements are computed to evaluate the performances of the sensor network.
Results: In this ongoing study, 76 participants were recruited from August 2021 to March 2022. 56% were female, and the average age was 49 years (range 18–85). 69% of the participants were diagnosed with sleep-related breathing disorders, and the remaining 31% with hypersomnolence, insomnia, and parasomnias. Analysis of body activity calculated from the radar, wrist band, and piezoelectric sensing devices showed high agreement with the EMG channels from the PSG.
Conclusion: The preliminary results of this study show the feasibility of accurately monitoring sleep with non-intrusive devices that do not alternate the patient's sleep. Moreover, the sensor network proves to be applicable to a real clinical setting involving patients with sleep disorders.
Disclosure: No

P541 | Actigraphy in studies on insomnia: worth the effort?

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Objectives: In the past decades, actigraphy emerged as a promising, cost-effective and easy-to-use tool for ambulatory sleep recording. Polysomnography (PSG) validation studies showed that actigraphic sleep estimates fare relatively well in healthy sleepers. Additionally, round-the-clock actigraphy recording has been used to study circadian rhythms in various populations. To this date, however, there is little evidence that the diagnosis, monitoring severity or treatment of insomnia can significantly benefit from actigraphy recordings. We therefore critically examine whether mean or within-subject variability of actigraphy sleep estimates or circadian patterns add to the understanding of sleep complaints in insomnia.
Methods: We acquired actigraphy recordings and sleep diaries of 37 controls and 168 patients with varying degree of insomnia severity for up to 9 consecutive days in their home environment. Additionally, participants spent one night in the laboratory, where actigraphy was recorded alongside PSG to check whether sleep is in principle well-estimated.
Results: Despite moderate to strong agreement between actigraphy and PSG sleep scoring in the lab, actigraphic estimates of average sleep and circadian rhythm variables failed to successfully differentiate patients with insomnia from controls in the home environment. Merely total sleep time differed between groups. Additionally, within-subject variability of sleep efficiency and wake after sleep onset was higher in patients.
Conclusions: Our results suggest that the limited reporting of actigraphy in insomnia may be related to null results. Insomnia research may benefit from shifting attention from average sleep variables to day-to-day variability or from the development of non-motor home-assessed indicators of sleep quality.
Disclosure: No

P542 | Headband EEG in a mixed psychiatric sample: quality, feasibility and time/night effects

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Introduction: Sleep markers have the potential to help stratify psychiatric patients with stress-related mental disorders and the increased commercial availability of wearable sleep devices allows to consecutively measure sleep in outpatients in their home setting. But how well are these wearables accepted, what is the overall recording quality and which sleep biomarkers can be reliably extracted?

Methods: In the large-scale Biological Classification of Mental Disorders study at the Max Planck Institute of Psychiatry, headband EEGs were tested in unmedicated psychiatric outpatients with affective/anxiety symptomatology ($n = 41$) and healthy subjects ($n = 24$). Sleep was recorded using a 6-channel headband EEG (Dreem 2, www.dreem.com) for 2–7 nights (360 nights in total) and complemented by actigraphy, mini-electrocardiography and a sleep diary. The quality of recordings was obtained by a general quality score and a headband-off-head indicator provided by the producer, and the number of epochs considered as "unscorable" by trained raters.

Results: According to a combination of these quality assignments, 72% of the night recordings were usable for the extraction of macro-structural elements and microstructural characteristics such as arousal events. There were neither quality differences between patients and healthy controls nor across nights. None of the sleep variables exhibited time effects. Interestingly, 9 out of 64 subjects (3 female, median age 24) had frequent SWS-to-wake transitions (≥6 per night) and total sleep stage transitions (≥81 per night). Another 6 subjects (1 female, median age 24) had frequent REM-to-wake transitions (≥16) and total sleep stage transitions (≥81), which could be indicative of disruptive sleep events.

Discussion: Our initial feasibility analyses indicate that headband EEG for a few consecutive days appears well accepted and provides sufficient quality for the majority of the recordings. Importantly, at home recordings did not show the expected "first-night-effect", suggesting that recordings can be analyzed from the first night on. Moreover, hypnogram-derived sleep fragmentation markers are potentially suited to unveil previously undiagnosed sleep abnormalities. Considering the high prevalence of sleep disorders among psychiatric patients, these results are strongly supportive of the use of headband EEG as a meaningful clinical and screening measurement.

Disclosure: No

P544 | Contactless radar based vital signs parameter estimation for sleep monitoring

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Polysomnography (PSG) is widely used in clinical practice as the gold standard in monitoring sleep, but the large amount of wired sensors may influence actual sleep quality and a less representative assessment of sleep as a result. We aim to develop a radar-based method for the unobtrusive assessment of vital signs parameters that are part of the current PSG setup.

A 60 GHz Frequency-Modulated Continuous Wave radar system (VTT, Finland) was installed above the head side of a bed in the clinical sleep laboratory of Sleep Medicine Center Kempenhaeghe (Heeze, Netherlands). This radar operates with multiple transmit and receiving antennas to construct a two-dimensional image. The measured signals show micro vibrations at the skin surface with 110 Hz sampling rate. Combined with advanced data processing techniques it allows the detection of heart beats and respiratory movements. Simultaneously recording PSG and radar data allows the validation of vital signs parameters estimated by radar against their gold-standard counterparts. Recruited patients had a variety of (suspected) sleep disorders and were scheduled for a video-polysomnography as part of their diagnostic trajectory.

Between September 2021 and February 2022, 43 participants were included in the study. Using the radar-based setup it was possible to detect heart rate with a mean average error of 2.4 beats per minute compared to ECG. The respiration rate shows a mean average error of 0.58 breaths per minute compared to the RIP belts signal. On average the coverage was 98.5% of the nocturnal recording. After reviewing the data, general causes for error were cardiac arrhythmias and motion artefacts.

The radar-based setup allows the measurement of heart rate and respiration rate in an accurate and completely unobtrusive manner. In future, surrogate measures for sleep architecture will be obtained, as well as pathological events, such as sleep related breathing and movement events. In contrast with other radar based vital signs monitoring approaches, our setup allows the detection of movements in a two-dimensional plane, and therefore has the potential of detecting larger body movements, such as limb movements and sleeping posture, as well as the ability to separately monitor vital signs of bed partners.

Disclosure: No

P822 | AI powered arousal scoring for polysomnography and self-applied-somnography sleep studies

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Introduction: Arousal scoring is a challenge for artificial intelligence (AI) models. This is partly due to the low interscorer-agreement between humans, which makes it more difficult for AI models to learn. We present an end-to-end deep learning approach to robustly score arousals from PSG and Self-Applied-Somnography (SAS) sleep studies which use a reduced frontal EEG montage.

Methods: The model makes predictions based on raw EEG, EOG and EMG signals, in an end-to-end fashion, thereby avoiding manual feature extraction. This allows shorter prediction times and the model can learn more complex relations as the size of its training data increases. The model's output is a sequence of arousal probabilities which are used to generate discrete arousal events in a post-processing step. The model was developed on over 1800 and 900 manually scored PSG and SAS studies, respectively.

Results: The model was validated on two previously unseen datasets. A set of PSG studies ($N = 151$, epochs = 119,774) and SAS sleep studies ($N = 88$, epochs = 70,349). Using PSG data the model is evaluated using epoch level agreement and achieved a positive percentage agreement (PPA [95%CI]) 67% (66%–70%), a negative percentage agreement (NPA [95%CI]) 91% [90%–92%], and an overall percentage agreement (OPA [95%CI]) 86% (85%–86%). The agreement (PPA, NPA, OPA) of the association of the arousals to respiratory events was (65%, 97%, 94%), to PLMS events (65%, 100%, 99%), and unassociated arousals (63%, 94%, 90%). Given a correctly scored arousal event, the association to the nearby respiratory, PLMS, or no-association was over 89%. The model had similar results when validated on data from SAS sleep studies, with a PPA of 68% (95%CI 66%–71%), and an NPA of 95% (95%CI 93%–95%), and OPA 91% (95%CI 89%–92%).

Conclusions: The AI model performs well for PSG and SAS sleep studies, with high epoch level agreement for arousal scoring. Furthermore, the model accurately places the arousal events with respect to the preceding respiratory or PLMS events. This suggests that the model output can be used to improve for hypopnea scoring.

Disclosure: Yes

Conflict of Interest statement: The authors are all employees of Nox Medical ehf.

P823 | Validity of actigraphy compared to polysomnography in adults with insomnia

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Objectives: Wrist-based motion sensors are widely utilised in the clinical and experimental sleep medicine field. These devices offer advantages over conventional in-laboratory polysomnography (PSG) at a fraction of the cost. While systematic reviews have compared actimetry against the gold-standard sleep measure, PSG, there is typically limited evidence at the device/algorithm level, especially in insomnia. This retrospective study sought to evaluate the agreement between sleep continuity outcomes from actigraphy and concurrent PSG in insomnia.

Methods: Thirty-two participants (female = 17; mean age = 54.1 ± 8.1 years) meeting diagnostic criteria for insomnia were recruited to a trial evaluating digital cognitive behavioural therapy (Sleepio, Big Health). Concurrent PSG (SomnoHD, Somnomedics) and actigraphy (MW8 watch, CamNtech Ltd) were obtained on the baseline, in-laboratory night. PSG was recorded to AASM standards and blind scored by a qualified Somnologist with 10% of records undergoing inter-rater concordance (85%). Actigraphy was recorded at 60-second epochs (medium sensitivity) and blind analysed within Motion Ware software v1.3.17(CamNtech Ltd). Sleep windows were determined by participant biomarkers (five eye blinks at sleep initiation) for PSG, and device markers and sleep diaries for actigraphy. Sleep continuity outcomes were extracted. Intra-class correlations (absolute agreement) were computed between the paired variables. Bland-Altman plots were used to visually evaluate data spread.

Results: Intra-class correlations (ICC) ranged from poor (sleep onset latency (SOL): mean difference = 4.02, ICC = 0.23, CI[-0.49,0.61]) to good (total sleep time (TST): mean difference = −15.98, ICC = 0.75, CI[0.49,0.88]/wake-time after sleep onset (WASO): mean difference = 16.26, ICC = 0.61, CI[0.22,0.81] / sleep efficiency (SE): mean difference = -3.28, ICC = 0.57, CI[0.15,0.79]). Actigraphy tended to show, on average, better sleep than recorded via PSG with a longer TST, shorter WASO and SOL, and a higher SE. against polysomnography on TST, WASO, and SE.

Conclusions: Data indicate variability in the agreement of sleep measures between one night of actigraphy and PSG. Despite good ICC scores, the 95% confidence intervals are wide. Inspection of Bland-Altman plots indicated the presence of proportional bias in all measures and better agreement when sleep is longer with fewer awakenings. Further analyses will assess epoch-by-epoch agreement to determine wake/sleep sensitivity and specificity.

Disclosure: Yes

Conflict of Interest statement: Colin Espie is co-founder and Clinical & Scientific Director of the CBT for insomnia programme (Big Health (Sleepio®) Ltd). No other investigators have conflicts of interest.

P824 | A novel deep learning AI method for estimating wake, NREM, and REM sleep states: using breathing and activity

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Introduction: There are known physiological changes in breathing between the sleep states: wake, NREM, and REM. We present an AI model that estimates these states from respiratory-inductance-plethysmography (RIP) and activity signals. The model uses a deep-learning-architecture, incorporating data from different sensors and learning important signal characteristics while preserving temporal information, which improves the predictions. A breathing-based model may be less influenced by arrhythmias and heart medications

than models using peripheral arterial tonometry (PAT) or pulse plethysmography (PPG).

Methods: The model was trained using manually scored polysomnography (PSG) recordings from clinics in 5 countries. The data was split into training, validation, and test datasets. The final validation was done on a fourth, previously unseen, dataset from a separate sleep clinic to evaluate how it performs in the "real-world". The positive percentage agreement (PPA), negative percentage agreement (NPA), and overall percentage agreement (OPA) between manual scoring of sleep and the AI model were calculated using 159 PSGs. The performance of the model on home sleep apnea test (HSAT) was investigated by Bland-Altman (BA) analysis, Mean bias and limits-of-agreement (LOA), on the estimated sleep time (est. ST) and the apnea-hypopnea-index (AHI) when using the PSGs sleep scoring, and the model sleep scoring or no sleep scoring as in a HSAT.

Results: The sleep state the results were (PPA, NPA, OPA): Wake (75%, 96%, 91%), NREM (93%, 75%, 87%), and REM (73%, 98%, 95%). BA mean bias (LOA): model Est.ST 11.0 min (−56.5, 78.5) min, compared to HSAT est. ST 90.5 min (−16.5, 197.6) min; model AHI −0.3 events/h (−4.1, 3.3) events/h, compared HSAT AHI 0.0 events/h (−10.1, 10.1) events/h.

Conclusion: The model can enhance the value of HSAT studies by providing sleep states without requiring EEGs, and it uses signals routinely collected as part of a HSAT. Agreement on all sleep states in a cohort representative of the patient population visiting a sleep clinic was high. The improved est.ST and AHI compared to a HSAT demonstrate how the model can enhance the value of HSAT studies.

Disclosure: Yes

Conflict of Interest statement: The authors are all employees of Nox Medical ehf.

P825 | Convolutional neural network approaches for sleep position classification using a compact sensorized mattress

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Introduction: Robust position classification during sleep is essential for closed-loop robotic interventions of position-dependent sleep disorders. Moreover, time spent in a supine position is a prodromal marker for neurological disorders, highlighting the importance of reliable position monitoring. Conventional methods to classify sleep positions rely on obtrusive body-worn accelerometers that could affect the user's sleep. Unobtrusive sensorized-mats with an integrated pressure sensor array covering the entire bed area have been successfully used with a four-class classification accuracy of 98% to detect supine, lateral-left, lateral-right, and prone positions. However, full-size sensor mats are expensive and time-consuming to install due to their size, indicating the need for smaller sensor mats.

Methods: This work shows that reliable classification of sleeping positions is also possible using a space-limited (40×80 cm^2) and low-resolution (14×28) sensorized-textile placed under the shoulder area. Recordings from 21 healthy participants were used to train multiclass (supine, lateral-left, lateral-right, and prone) and two-class (supine vs. non-supine) classifiers using convolutional neural networks. Participants were asked to alternate between the four positions for eight min while remaining in every position for 15 s. Head and shoulder positions could be chosen freely by the participants to increase the variability in the dataset. The performances of the classifiers were reported for the generalized and personalized models after cross-validation. Transferability to a real-life application was evaluated in an overnight test.

Results: The sensor-mat did not negatively influence the lying comfort in any of the 21 participants. Classification accuracy of 83% was achieved for the generalized multiclass model. For the personalized models, accuracy increased to more than 90%. Outstanding scores were also achieved for the two-class model, where the personalized classifier reached an accuracy exceeding 95%, outperforming the generalized binary model (94% accuracy). For the test night, 90% and 97% accuracy could be achieved for the four-class and the two-class classification models, respectively.

Conclusion: This work demonstrates the possibility of classifying users' sleeping positions using a compact sensor-mat placed underneath the shoulder area while obtaining performance scores comparable to sensor-mats covering the entire mattress (95% vs. 98%).

Disclosure: No

P827 | Towards personalized burnout prevention system: a probabilistic approach for analysis of data from wearable devices with subjective feedback. A preliminary study

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Objectives/Introduction: This study explores the relation between data collected with a smartwatch (Garmin VenuSQ) and subjective data: daily questionnaires and Shirom-Melamed Burnout Measures (SMBM). The analysis quantifies sleep factors indicating risk of burnout as a reduced coping and regenerative capability.

Methods: Bayesian mixed effect regression with random intercept was used to model the effects of measured factors on three defined outcomes:
(i) difference of average stress during day and night,
(ii) proportion of sleep stages,
(iii) proportion of stress levels during night. Compositional outcomes in (ii),
(iii) are modeled explicitly using additive log-ratio (ALR) transformation and the resulting effects should be interpreted as for log-odds.
Results: Longitudinal data from 16 participants collected during one week are summarized on individual and (awake-sleep) cycle level. For each outcome, the intercept captures the baseline of a non-smoker female having non-senior occupation on a non-working day. Small
(i) suggests reduced coping capability. In
(ii), the proportions of deep and REM sleep are responsible for physical and cognitive regeneration, whereas high proportion of awake indicates reduced sleep efficiency. In
(iii), proportion of low (0–25), medium (25–50) and high (51–100) stress indicate individuals' quality of sleep. For each outcome, we list intercept (I) and posterior means of effects with 90% credibility-interval different from 0.
For (i): I(11), working day (−7.3), crowded workplace (7.1), (cognitive, emotional, physical)-SMBM (16.54, −8.95, −9.82), subjective evening energy (−4.24).
In (ii), the proportion of light sleep was used as ALR baseline. For deep sleep: I(−4.44), daily stress (−0.05), (small, moderate, heavy)-alcohol consumption (1.37, 1.54, −7.2). For REM: I(1.545), male (1.67), age (−0.19), seniority occupation (2.72), moderate alcohol (−1.42). For awake: I(−25.79), sleep hours (2.26), moderate alcohol (−3.94).
For (iii), the proportion of low stress was used as ALR baseline. For high stress: intercept (−5.08), daily stress (0.04), (moderate, heavy) alcohol (1.42, 5.54). For medium stress: intercept (−5.97), daily stress (0.1), crowded workplace (−1.98), (cognitive, physical, emotional)-SMBM (−2.5, 2.19, 1.25), subjective evening energy (1.25).
Conclusion: Smartwatches are a promising tool in monitoring individual sleep recovery capabilities. The acquired knowledge will be used in follow-up research to develop a personalized system for burnout prevention.
Disclosure: Yes
Conflict of Interest statement: Yuriy Ilchenko and Max Grossenbacher belong to Resilient AG, that plan to create a system to exploit the results, but they were not involved in the data analysis. The remaining authors have no conflicts of interest to declare. The project has been funded by Swiss Secretariat for Education, Research and Innovation (SERI), INNO-55968.1 Cantonal Ethical Clarification of Responsibility (ID REQ-2021-00451).

P829 | AI-based automatic classification for sleep disorders based on single-lead electrocardiogram

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Objectives: Healthy sleep is an essential and important physiological process for every individual to live a healthy life. Many sleep disorders are both destroying the quality and decreasing the duration of sleep. Thus, a convenient and accurate detection or classification method is important for screening and identifying sleep disorders. In this study, we proposed an AI-based automatic classification for the automatic screening of sleep disorders based on a single-lead electrocardiogram (ECG).
Methods: AI-based automatic classification model—named a sleep-disorder network (SDN) was designed for automatic screening of four major sleep disorders namely insomnia (INS), periodic leg movement (PLM), REM sleep Behavior Disorder (RBD), and nocturnal frontal-lobe epilepsy (NFE). The SDN was constructed using deep convolutional neural networks that can extract and analyze the complex and cyclic rhythm of sleep disorders that affect ECG patterns. The SDN consists of a 5-layers1-D convolutional layer and is optimized via dropout and batch normalization. The single-lead ECG signal was extracted from the 35 subjects with the control (CNT) and the four sleep-disorder groups (7 subjects of each group) in the CAP Sleep Database. The ECG signal was pre-processed, segmented at 30-s intervals, and divided into the training, validation, and test sets consisting of 74,135, 18,534, and 23,168 segments, respectively. The constructed SDN was trained and evaluated using the CAP Sleep Database, which contains not only data on sleep disorders, but also data from the control group.
Results: The proposed SDN algorithm for the automatic classification of sleep disorders based on a single-lead ECG showed very high performance. We achieved F1-scores of 99.0%, 97.0%, 97.0%, 95.0%, and 98.0% for the CNT, INS, PLM, RBD, and NFE groups, respectively.
Conclusions: We proposed an AI-based method for the automatic screening of sleep disorders based on a single-lead ECG signal. In addition, it represents the possibility of the sleep disorder classification using ECG only. The SDN can be a useful tool or an alternative screening method based on single-lead ECGs for sleep monitoring and screening.
Disclosure: No

P830 | Sleep and COVID-19. A case report of a mild COVID-19 patient monitored by consumer-targeted sleep wearables

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Since its first description in Wuhan, China, the novel Coronavirus (SARS-CoV-2) has spread rapidly around the world. The management of this major pandemic requires a close coordination between clinicians, scientists and public health services in order to detect an treat promptly patients needing intensive care. The development of consumer wearable monitoring devices offers to physicians new opportunities for the continuous monitoring of patients in ecological situations, at home. This clinical case presents an original description of 55 days of SARS-CoV-2-induced physiological changes in a patient who routinely uses sleep monitoring devices. We observed that sleep is specifically affected during COVID-19 (Total Sleep time, TST, and Wake after sleep onset, WASO), with in a seemingly bidirectional manner. Sleep status prior to infection (e.g., chronic sleep deprivation or sleep disorders) may affect disease progression, and sleep could be considered as a biomarker of interest for monitoring COVID-19 progression. The use of habitual data represents an opportunity to evaluate pathologic states and improve clinical care.

Disclosure: Yes

Conflict of Interest statement: Maxime ELBAZ is an advisor of iSleeping by iSommeil.

28: HEALTHCARE SERVICES, RESEARCH AND EDUCATION

P237 | Changes in the work schedule of nurses during the COVID-19 pandemic and its relationship with sleep and turnover intention

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Background: This study aimed to investigate whether changes in nurses work schedule during the covid-19 pandemic are associated with sleep duration, sleep quality, and turnover intention.

Methods: Cross-sectional questionnaire data were collected between the first and the second wave of the covid-19 pandemic in Norway from 694 nurses participating in the SUrvey of Shift work, Sleep and Health (SUSSH). A total of 89.9% were female, and mean age was 44.6 years (SD = 8.6 years). Changes in the shift work schedule included reports of more long workdays (>8 h), less days off between work periods, more night shifts, more quick returns (i.e., 11 h or less between two consecutive shifts), more day shifts, more evening shifts, as compared to no change in the respective shift characteristics. Change in sleep duration, sleep quality, and turnover intention, as well as demographics were also assessed. Logistic regression analyses were performed to investigate whether changes in different work schedules were associated with sleep duration, sleep quality, and turnover intention, controlling for sex, age, cohabitation, children living in household, percentage of full time equivalent (FTE) and other changes in the work schedule.

Results: A total of 17% reported experiencing one or more changes in their work schedule during to the pandemic. Experiencing any change in the work schedule predicted worse sleep quality (OR = 2.68, $p < 0.001$), reduced sleep duration (OR = 4.56, $p < 0.001$) and higher turnover intention (OR = 1.96, $p = 0.006$) compared to experiencing no change in work schedule. Experiencing an increase in quick returns had the most severe consequences for sleep quality (OR = 10.34, $p = 0.007$) and turnover intention (OR = 8.49, $p = 0.014$) compared to those who reported no change in quick returns. Nurses experiencing an increase in long workdays were more likely to report higher turnover intention (OR = 4.37, $p = 0.003$), compared to those experiencing no change in long workdays.

Conclusions: Changes in work schedules during the pandemic were associated with worse sleep quality, reduced sleep duration and higher turnover intention. Increase in quick returns emerged as especially problematic in terms of sleep quality and turnover intention, along with long workdays demonstrating adverse association with higher turnover intention.

Disclosure: No

P238 | Healthcare professionals' sleep and mental stress during the two first consecutive waves of COVID-19 in northern greece

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Objectives/Introduction: In December 2019, a novel corona virus was identified (COVID-19). Healthcare Professionals (HCPs) experience high levels of stress and irregular work schedule, with frequent work shifts leading to increased sleep disturbances especially during the pandemic. This study aimed to assess the impact of COVID-19 on the healthcare workers' sleep and mental stress during two consecutive epidemic waves in northern Greece.

Methods: An online cross-sectional, anonymized, self-reported questionnaire survey was conducted in May 2020 (first epidemic wave) and then was repeated in December 2020 (second epidemic wave), including basic information (age, gender, marriage, education level, etc.), contact with COVID-19 patients, quarantine status, current physical condition, Sleep Condition Indicator (SCI), DAR-5 (anger), PHQ-4(depression and anxiety), Heaviness of Smoking Index (HSI) and Loneliness scale (LS). Statistical analysis was performed using the SPSS (version-20 IBM, NY, USA). Continuous variables were presented as mean±SD and categorical variables as number (%). $p < 0.05$ was accepted as statistically significant. To separate parametric from non-parametric variables normality tests using the Kolmogorov-

Smirnov test were performed. For the detection of statistically significant differences when comparing the results of a continuous variable between the two waves, the independent-samples-*T*-test and the Mann-Whitney-U-test were used for parametric and non-parametric variables respectively.

Results: 1044 HCPs answered (males/females 47%/53%) 79% doctors with mean age 45.2 ± 11.1 years. During the second wave HCPs presented worse sleep quality (SCI 23.7 ± 6.7 vs.26.4 ± 5.7, $p < 0.001$), worse PHQ-4 (4.4 ± 2.9 vs. 2.8 ± 2.3, $p < 0.001$), increased anger (DAR-5 9.2 ± 3.8 vs.7.7 ± 2.6, $p < 0.001$) and loneliness (LS 5.8 ± 1.9 vs. 5 ± 1.6, $p < 0.001$). The smoking status and HIS did not change during the two waves. A negative correlation was found between SCI – PHQ-4, SCI-DAR-5 and SCI- LS, especially during the second wave.

Conclusion: Changes in sleep quality were observed in health professionals, especially during the second wave. Sleep quality, anger, depression, anxiety and loneliness were negatively affected during the progression of the pandemic.

Disclosure: No

P239 | Impact of electronic gadget usage, sleep quality and day-time sleepiness on academic performance in university students

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Aim: The aim of the present study was to correlate the average daily screen time usage, day-time sleepiness and sleep quality with academic performance in university students.

Methodology: A cross-sectional study of 114 University students (aged 18–30 years) of both sexes (healthy volunteers) who were given a pre-designed structured questionnaire to fill which included basic socio-demographic details, record of sleep-wake cycle, study habits, academic performance (average percentage of marks obtained in the last two internal exams), electronic gadget usage (number of gadgets and average daily screen time), a sleep quality questionnaire - Pittsburgh Sleep Quality Index (PSQI) and a questionnaire to assess day-time sleepiness - Epworth Sleepiness Scale (ESS). Day-time Electroencephalography (EEG) was recorded in seven randomly selected participants as a Karolinska Drowsiness Test (KDT) and an Alpha Attenuation Test (AAT). Analysis of the data was done using Stata version 16 (TX, USA) software.

Results: The details of the participants varied as – age (in years) [22.3, 3.9], BMI (in kg/m^2) [23.4, 3.7], study h per week [14.5, 7–28], academic performance (in %) [64.6, 13.3], electronic gadget usage (number) [2, 2–3] with 42 students having ≥3 gadgets, screen time [6, 4–8], global PSQI score [6, 4–9] with a score of >5 (poor sleep quality) noted in 72 students (36 males; 36 females), ESS score [7, 4–10].

Multiple linear regression analysis was done to evaluate if average daily screen time, sleep quality and day-time sleepiness significantly affected academic performance in university students. The fitted regression model was: Academic Performance = 68.8–0.77*(average daily screen time) + 0.55*(PSQI score) – 0.47*(ESS score).The overall regression was statistically significant [$R^2 = 0.073$, $F(3, 110) = 2.88$, $p < 0.05$].

Correlation of academic performance with absolute powers of day-time EEG was done and Alpha(α) power during eyes closed condition in KDT was found to be statistically significant.

Conclusions: Average daily screen time independently significantly predicted academic performance in university students, whereas, neither PSQI score nor ESS score independently significantly predicted academic performance in university students. Day-time EEG was done as a pilot study in a small number of volunteers and requires larger prospective studies for significant results.

Disclosure: No

P240 | Smartsleep laboratory – a unique sleep research infrastructure

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Introduction: High portion of sleep research is conducted utilizing clinical patient data. While this data comes with many advantages, possibilities, and high pre-test probability for example, for obstructive sleep apnea, it usually does not include healthy control subjects who have no issues with sleep quality or sleepiness. Furthermore, the sleep recordings are primarily targeted for clinical decision-making instead of research. This leads to well-recognized drawbacks in sleep research: difficulty to share sensitive data, several different diagnostic measurement setups, single measurements can result in first-night effect in polysomnography (PSG), and sparse treatment follow-ups to name a few. Thus, there is an urgent need for non-clinical research facilities for high-quality prospective sleep studies.

Methods: We are establishing a research facility, SmartSleep Laboratory, to the University of Eastern Finland (Kuopio, Finland). The SmartSleep lab will be the only non-clinical sleep laboratory in Finland meeting, and in some aspects surpassing, the international standards for hospital-level sleep laboratories. It comprises 150 m^2 space including four PSG units, a testing laboratory for biosignal measurements and device development, a control room, and social facilities for patients/volunteers and personnel. Two of the PSG units are isolated floating spaces where standardized conditions (light, noise, temperature) can be achieved regardless of the time of the day or the season.

Results: The infrastructure and its basic operations are ready in August 2022. The unique floating laboratory enables chronobiologic studies and multidisciplinary research schemes. It operates in conformity with Open Science policy and provides a large amount of high

quality, free to use, sleep recording and physiological data to the scientific community for renewal of our current understanding of sleep. In addition, the laboratory serves as a test-bench for companies developing new health technology solutions for physiological measurements.

Conclusion: In the future, the Smart Sleep lab will be a research center that fulfills national and international quality and safety standards for sleep research and medical device testing. The scientific research and produced data will advance sleep research and further enhance the credibility of innovations tested at the facility. Thus, the infrastructure will have a significant impact at regional, national, and international levels.

Disclosure: Yes

Conflict of Interest statement: SmartSleep Laboratory is funded by the Regional Council of Pohjois-Savo via the European Regional Development Fund (projects A77427 and A77433).

P545 | Baseline parameters associated with a switch from MAD to CPAP and MAD discontinuation

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Background: A substantial number of patients change therapy from a mandibular advancement device (MAD) to continuous positive airway pressure (CPAP) for obstructive sleep apnea (OSA). Our primary goal was to examine the reasons for this switch and the cessation of MAD therapy. The secondary goal was to find factors associated with these outcomes.

Methods: We performed a single center retrospective observation study involving adult (>18 years) OSA patients who started with MAD therapy as initial therapy between 1st of January 2016 and 31st of December 2018 in ETZ hospital in the Netherlands. Patients were included in the CPAP group or stop group if they switched or stopped MAD therapy prior to 1st of March 2019. Primary outcome was given as a presentation of reasons for the switch or stop. Secondary outcome was obtained using logistic regression.

Results: A total of 633 patients were included in the analysis (MAD group 497, CPAP group 92 and stop group 44). MAD efficacy failure occurred in 58.7% and 4.4% for CPAP group and stop group respectively followed by MAD intolerance (32.6% versus 63.6%) and MAD symptom failure (2.2% versus 9.1%). Jaw related side-effects were the most common cause for MAD intolerance (63.6% and 29.6%). AHI (Odd's ratio (OR) 1.079, 95% confidence interval (95% CI) 1.044-1.115), pre-existent TMJ symptoms (OR 3.291, 95% CI 1.522-7.118), fatigue at baseline (OR 2.616, 95% CI 1.318-5.193), age (OR 1.030, 95% CI 1.007-1.054) and myocardial infarction (OR 3.313, 95% CI 1.245-8.820) were significantly associated with a switch to CPAP. Asthma (OR 2.886, 95% CI 1.286–6.492) and AHI (OR 0.924, 95% CI 0.866–0.986) were associated with MAD discontinuation without alternative therapy.

Conclusion: MAD efficacy failure is the most prevalent cause for a switch to CPAP with a strong association with a higher AHI and pre-existent TMJ symptoms. An imbalance between pros and cons is the most common cause for MAD discontinuation without alternative therapy. This outcome has the strongest association with asthma and a lower AHI.

Disclosure: No

P546 | Digital cognitive-behavioral therapy for insomnia and additional features of "sleepup" app improves sleep quality in insomnia medication users: a real case study

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Objectives/Introduction: Cognitive-behavioral therapy for insomnia (CBTi) is the gold standard treatment for insomnia, and an effective intervention for symptom remission and for improving anxiety and depression-related disorders. CBTi combined with pharmacological treatment can improve patients' clinical outcome, adherence and can offer new insights for approaches that consider inter-individual differences in response to treatment. Thus, this work aimed to evaluate the efficacy of the *SleepUp*® therapeutic program (CBTi+additional resources) in improving sleep quality, insomnia severity, and related parameters in insomnia medication users in a real-life setting.

Methods: We evaluated users' data of the "*SleepUp*"app aged over 18 years, of both genders, who filled out more than 20 diaries. In addition to the sleep diary (self-report of sleep efficiency and quality), users filled the Sleep Hygiene Index and the Insomnia Severity Index. Statistical analysis was done comparing the value at baseline (first day of filling in) *vs*. the average of the last three days.

Results: We evaluated 28 app users' (mean age: 36 ± 9 years; 67% female), of whom 46% used it more than four times/week for 76 days, on average. Reported medications were zolpidem, quetiapine, alprazolam, and others. We observed an increase in sleep efficiency (mean ± standard deviation at baseline *vs*.last three days: 71.5 ± 13.2 vs. 84.8 ± 9.4; $p = 0.0063$; d = 1.2, large effect), an improvement in its quality (2.3 ± 0.8 vs. 1.4 ± 0.8; $p = 0.015$; d = 1.1, large effect), in Sleep Hygiene Index (22.0 ± 6.9 vs. 13.2 ± 5.1; $p = 0.0015$; d = 1.5, large effect), and in Insomnia Severity Index (17.3 ± 4.9 vs. 10.1 ± 5.5; $p = 0.0001$; d = 1.4, large effect) after the use of the *SleepUp*® program.

Conclusions: Our results suggest that the *SleepUp*® therapeutic program is effective in improving sleep quality, insomnia severity, and related parameters in insomnia medication users. The findings are preliminary and indicate the potential of using the app and its resources as a tool for the management of insomnia and its follow-up in a real-life setting.

Disclosure: No

P547 | Sleep among pilots in a Norwegian and an Austrian helicopter emergency medical service – a comparative study

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Introduction: Shift work is associated with curtailed sleep, which may have adverse effects on performance and health. The present study explored differences in sleep between Helicopter Emergency Medical Service (HEMS) pilots working in Norway and Austria.

Materials and Methods: HEMS pilots in Norway (Norwegian Air Ambulance [NAA], $N = 25$) and Austria (Christophorus Flugrettungsverein [CFV], $N = 22$) working seven consecutive 24 h-shifts participated in the study. Sleep was measured by diaries and actigraphy throughout the workweek.

Results: Symmetric data are reported in mean (SD) and non-symmetric are reported in median (quartiles). The NAA pilots had later bedtime ($^{\text{diary NAA}}$00:57 h [*SD* = 01:16] vs. $^{\text{CFV}}$23:10 h [*SD* = 00:57], $p < 0.001$, $^{\text{actigraphy NAA}}$01:09 h [*SD* = 01:15] vs. $^{\text{CFV}}$23:26 h [*SD* = 01:06], $p < 0.001$) and wake-up time ($^{\text{diary NAA}}$08:38 h [*SD* = 01:34] vs. $^{\text{CFV}}$05:47 h [*SD* = 00:56], $p < 0.001$, $^{\text{actigraphy NAA}}$08:32 h [*SD* = 01:37] vs. $^{\text{CFV}}$05:40 h [*SD* = 01:08], $p < 0.001$) compared to the CFV pilots. The NAA pilots spent more time awake after sleep onset ($^{\text{diary NAA}}$00:05 h [*quartiles* = 00:00-00:18] vs. $^{\text{CFV}}$00:00 h [*quartiles* = 00:00-00:05], $p < 0.001$, $^{\text{actigraphy NAA}}$00:43 h [*quartiles* = 00:27–01:13] vs.$^{\text{CFV}}$00:34 h [*quartiles* = 00:25–00:42], $p < 0.001$), more time in bed ($^{\text{diary NAA}}$07:56 h [*SD* = 01:28] vs.$^{\text{CFV}}$06:45 h [*SD* = 01:01], $p < 0.001$, $^{\text{actigraphy NAA}}$07:23 h [*SD* = 01:31] vs. $^{\text{CFV}}$06:14 h [*SD* = 01:05], $p < 0.001$), slept longer ($^{\text{diary NAA}}$06:58 h [*SD* = 01:28] vs. $^{\text{CFV}}$06:22 h [*SD* = 00:59], $p < 0.01$, $^{\text{actigraphy NAA}}$05:58 h [*SD* = 01:31] vs. $^{\text{CFV}}$05:22 h [*SD* = 01:06], $p < 0.01$), and had lower sleep efficiency ($^{\text{diary NAA}}$91.7% [*quartiles* = 84–96] vs. $^{\text{CFV}}$95.6% [*quartiles* = 93–97], $p < 0.001$, $^{\text{actigraphy NAA}}$85.4% [*quartiles* = 76–89] vs. $^{\text{CFV}}$97.3% [*quartiles* = 96–98], $p < 0.001$) as compared to the CFV pilots. The CFV pilots' bedtime ($p < 0.05$) and wake-up time ($p < 0.001$) were later on the last workday compared to the first workday. Further, the NAA pilots spent less time in bed ($p < 0.05$) and slept less ($p < 0.05$) whereas the CFV pilots spent more time in bed ($p < 0.001$) and slept longer ($p < 0.001$) on the last workday compared to the first workday (derived from diaries).

Conclusion: Compared to the CFV pilots, the NAA pilots reported more fragmented and disrupted sleep. However, they also spent more time in bed and slept longer. Both pilot groups obtained on average more than 6 h of subjective sleep per day during the workweek. No major changes in the sleep variables were evident throughout the workweek.

Disclosure: No

P548 | Effects of employment status on patients' sleep of a cohort in a sleep unit of a tertiary university hospital, Athens-Greece

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Introduction: Occupation and waking activities may affect differentially the homeostatic drive to sleep.

Aim: We sought to investigate the impact of employment status on sleep characteristics in different occupational groups in a cohort at a Sleep Unit.

Methods: We retrospectively examined consecutive adults attending our Unit and underwent Polysomnography (PSG), between January 2017 and June 2018. We retrieved medical history, demographic, occupational, and sleep data. Differences in these parameters between patient groups were compared and significant associations were assessed in multivariate analyses.

Results: The 257 participants (66.5% male) had a mean age of 56 ± 14 years; 58.8% were employed, 5.8% were unemployed, 10.5% were housewives, and 24.9% had retired. Moderate-severe Obstructive Sleep Apnea (OSA) was documented by PSG in 75,1%. Comparing employed with non-employed individuals (unemployed, housewives or retired), we found that Total Sleep Time (TSTmin) (276,9 ± 75,1 vs 244,2 ± 81,9), Rapid Eye Movement (REMmin) sleep (41,9 ± 29,9 vs 31,5 ± 28,2), and Sleep Efficiency (SE%) (70,9 ± 16,1 vs 65,6 ± 15,4), were higher in the employed group ($p = 0.001$, $p = 0.006$, $p = 0.009$ respectively). A further comparison between the employed, unemployed-housewives and retired groups, showed that TSTmin (276,9 ± 75,1 vs 239,1 ± 74,1 vs 247,6 ± 87,0), REMmin sleep (41,7 ± 29,8 vs 26,3 ± 23,4 vs 34,9 ± 30,6), and SE% (70,9 ± 16,1 vs 65,9 ± 13,0 vs 65,4 ± 16,9) were still higher in the employed followed by the retired and unemployed-housewives groups ($p = 0.004$, $p = 0.008$, $p = 0.031$ respectively). In a separate analysis among the employed, housewives, unemployed, and retired persons we observed that, although there was no significant difference in SE%, ($p = 0.06$), TSTmin (276,9 ± 75,1 vs 247,6 ± 73,5 vs 223,7 ± 75,2 vs 247,6 ± 87,0), and REMmin sleep (41,7 ± 29,8 vs 29,3 ± 26,5 vs 20,9 ± 16,0 vs 34,9 ± 30,6), remained longer only in employed participants ($p = 0.008$ and $p = 0.015$, respectively). In multivariate analyses, factors like BMI and age explained much of the differences observed in sleep parameters by the occupational status.

Conclusions: In this study, employed sleep better, quantitatively and qualitatively, than housewives, retired and unemployed individuals with unemployed having the worst pattern of sleep. We suggest that PSG can elucidate further to questionnaire studies the associations between sleep, occupational status, and waking activities.

Disclosure: No

P831 | Quick return work schedule and work-family conflict: the mediating role of sleep quality

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Objectives: To examine a mediation model whereby sleep quality mediates the relationship between quick-return work schedules and work-family conflict among female nurses with children.

Method: In this cross-sectional design, data were collected from 131 female nurses with children under the age of 18 between October 2020 and February 2021 in three hospitals. They completed a set of questionnaires to evaluate the frequency of quick-returns within the past week, sleep quality between different types of shifts (morning-night, evening-morning, night-evening, morning-morning, evening-evening, night-night, or two days off), work-family conflict, workload, and sociodemographic factors. Seven mediation models were conducted using the SPSS PROCESS macro.

Results: A single mediation model was supported, where sleep quality between morning-night shifts mediates the link between quick-returns within the past week and work-family conflict. Specifically, shift-work schedule within the past week with more quick-returns was significantly associated with poorer sleep quality between morning-night shifts ($B = 1.052$, SE = 0.456, 95%CI = 0.149, 1.956), which in turn was significantly associated with higher work-family conflict ($B = -0.588$, SE = 0.210, 95%CI = −1.003, −0.172). While the indirect effect between quick-returns within the past week and work-family conflict was significant (B = −0.618, SE = 0.303, 95%CI = −1.279, −0.095), the direct effect was not ($p = 0.180$).

Conclusion: This study demonstrates the potentially negative effects of a specific quick-return work schedule on nurses' sleep quality, which in turn has a significant impact on nurses' personal and family lives. Since nursing services must be provided 24 h a day, it is important to provide adequate sleeping conditions to allow greater recovery between shifts. Thus, nurse managers should minimize work schedules that require quick returns to work from morning to night shifts.

Disclosure: No

P832 | Quality of sleep of health care professionals after 3 waves of the COVID-19 pandemic

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Introduction: The COVID-19 infection rapidly became a worldwide pandemic and a public health emergency that seriously burdened healthcare systems. Health care professionals (HCPs) were faced with a new difficult and demanding challenge which frequently meant working long h shifts with low staffing members under high pressure environments. This may have had an important impact on sleep quality of HCPs.

Aim: To evaluate the quality of sleep of HCPs after 3 waves of the COVID-19 pandemic.

Methods: A sleep questionnaire developed by the authors was sent to all HCPs of a tertiary hospital after the first 3 waves of the COVID-19 pandemic.

Results: We had a total of 651 participants, mostly female (81.3%). Most participants were nurses (38.1%) and doctors (19.1%), with ages between 30 and 50 years. Other HCPs included were technicians, assistants, pharmaceuticals, among others. The majority dealt directly with COVID-19 patients (73.7%).

Concerning quality of sleep, a significant proportion of HCPs referred a bad or very bad quality of sleep (41.5%) and only 16.1% stated a good or very good quality of sleep, of the last, 57% did not work night shifts. The majority suffered from night awakenings (88.6%), with 38.2% referring more than 2 awakenings per night; of these, 65% stated difficulty falling back to sleep. Furthermore, 46.2% HCPs referred initial insomnia and 59.9% referred terminal insomnia.

Regarding quantity of sleep 16.9% slept less than 5 h, 47.3% slept approximately 6 h and only 7% slept 8 or more hours. Approximately 33% of HCPs resorted to sleeping medication, most frequently anxiolytics.

In reference to daily symptoms, 71.3% of HCPs stated daytime sleepiness, most frequently after lunch (50.5%). Nonetheless, a significant proportion mentioned sleepiness during work (24%), and while driving (14.3%).

Finally, 50.4% of the HCPs considered that the 3 waves of the COVID-19 pandemic worsened their sleep quality.

Conclusion: This analysis demonstrates concerning results regarding the quality of sleep of HCPs after the first 3 waves of the COVID-19 pandemic with important daytime repercussions. This may reflect a consequence of the COVID-19 pandemic, as half of

the HCPs considered that that the pandemic worsened their sleep quality.

Disclosure: No

P833 | Employee sleep evaluation during the COVID-19 pandemic in a tertiary university hospital, Athens-Greece

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Introduction: Sleep is necessary for humans. Occupation competes with and affects sleep.

Objective: This study aims to evaluate employees' sleep in a Tertiary University Hospital as an early index of their health status.

Methods: 38 employees (36.84% men) with a mean age of 44 ± 9 participated in this pilot study during the COVID-19 pandemic. Sleep and daytime sleepiness were assessed through 3 interviewer-administered questionnaires: Pittsburgh Sleep Quality Index (PSQI), Athens Insomnia Scale (AIS), and Epworth Sleepiness Scale (ESS). Frequency distributions of professional, cognitive, and psychosomatic parameters were compared among those with and without sleep disturbance or sleepiness. Healthcare professionals were compared with non-medical staff. Descriptive statistical analyses were performed using the χ^2test at the $p < 0.05$ level of significance.

Results: 74% of employees were poor sleepers (PSQI ≥ 5), 50% had insomnia symptoms (AIS ≥ 6), 18% had chronic insomnia and 32% had daytime sleepiness (ESS ≥ 10). 21% reported a negative impact of the pandemic on their sleep. Poor sleepers were younger (42.39 ± 9.68) and evening types (p = 0.01). 79% and 57% reported decreased mental status and premature aging (p = 0.02, $p = 0.04$ respectively). One in three had headaches and one in two had poor concentration compared to none of good sleepers (PSQI < 5). 75% and 86% supported that occupation and workload affected their sleep (p = 0.002, $p = 0.02$ respectively). 86% reported that they were subjected to occupational control (p = 0.02) and 71% stated that they held a high responsibility position (p = 0.02). Most of poor sleepers reported decreased job productivity, 18% reported presentism compared to none of good sleepers, and 82% reported occupational errors (p = 0.01). Employees with ESS≥10 were overweight, 75% had AIS≥6, stating illness during their job (p = 0.03), and 50% had morning headaches (p = 0.002). Healthcare professionals reported disturbed sleep ($p = 0.08$), being affected by workload (p = 0.01) while claiming that they held a position of responsibility with no reward, (p = 0.01, $p = 0.08$ respectively).

Conclusions: In this study, personnel of a large hospital present insomnia symptoms and daytime sleepiness during the COVID-19 pandemic. Occupational parameters may impact employees' sleep with healthcare staff more affected. The insomniac-obese phenotype with headache and sleepiness is characterized by increased morbidity rates.

Disclosure: No

P834 | The bidirectional relationship between daily sleep, mood, and emotional wellbeing of UK workers

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Introduction: Few studies have examined the mutual relationship between day-to-day sleep, mood, and emotions experienced within the workplace or naturalistic settings (Ashkanasy & Humphrey, 2011). The main objective of this project was to explore the bidirectional associations between daily sleep and mood experienced in the context of daily life and in the workplace. Within and between-person variance was examined.

Methods: A one-week smartphone-based ESM study was conducted with full-time, healthy UK workers ($N = 30$; age $M \pm SD = 28.90 \pm 5.21$ years) on standard schedules (working 9 a.m. to 5 p.m., from Monday to Friday). Across 7 consecutive days, daily measures included a sleep diary, mood and affect ratings (positive/negative), wellbeing and an emotional events diary. Mood was recorded twice daily (morning and evening) and momentary affect items during the working day; these aimed to capture daily fluctuations in affect and mood. Retrospective measures of sleep, chronotype, emotional regulation, affect, work characteristics, work schedule flexibility and recovery activities were completed online.

Results: Multilevel modelling (MLM) of smartphone ESM data found positive associations between above average (subjective) sleep quality with next-day increased positive mood and lower negative affect. Daytime affect and mood (positive and negative) did not significantly impact subsequent night-time sleep quality.

Conclusions: Findings from this intensive, longitudinal ESM study support prior literature on the reciprocal and temporal relationship between daily sleep, mood, and emotional wellbeing. Utilising digital, ambulatory ESM assessments improve ecological validity and capture sleep-mood dyads in situ.

Disclosure: No

Late Breaking Abstracts

1: PHARMACOLOGY AND BIOCHEMISTRY

P242 | Sleep and effects of diazepam across seasons in mice

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Daylength (i.e., photoperiod) provides essential information for organisms in order to adapt to seasonal changes. Earlier studies demonstrated that photoperiod can influence sleep and the sleep electroencephalogram (EEG) in several species including humans. Additionally, it has been shown that under different photoperiods, the Excitatory/Inhibitory (E/I) balance can change in certain brain areas, as for instance the suprachiasmatic nucleus, with long photoperiod being characterized by increased γ-aminobutyric acid (GABA)-mediated excitation. Typical $GABA_A$ agonists, applied as insomnia treatments, may, therefore, act differently depending on photoperiod. In our study, we investigated, first, whether seasonal changes influence sleep and the sleep EEG in laboratory mice (C57BL/6J), and, second, whether different photoperiods alter the diazepam-induced changes in sleep architecture and EEG.

For that, cortical EEG and electromyogram (EMG) recordings were conducted in mice well adapted to a long (LP, 16:8 light-dark cycle, $n = 7$) or short photoperiod (SP, 8:16 light-dark cycle, $n = 9$) in baseline conditions, after a single diazepam (or saline) dose administration, as well as following a 4-h sleep deprivation.

Daylength changes led to a redistribution of sleep and wakefulness with differences mainly detected in the dark period, where mice exposed to LP were more awake, lacking concomitantly rapid-eye-movement (REM) sleep, as compared to SP ($p < 0.05$). Furthermore, an overall lower EEG power density across all vigilance states was found in LP compared to SP ($p < 0.05$). Although in both photoperiods slow-wave activity (SWA) in non-REM (NREM) sleep was augmented after sleep deprivation, the effect was more pronounced in LP. The 'diazepam fingerprint' was confirmed by our study, with SWA in NREM sleep being suppressed, independent of the photoperiod. Moreover, following diazepam administration, mice exposed to SP, in contrast to those in LP, showed an initial increase in REM sleep ($p < 0.05$). Notably, over the course of 24-h, no differences were evident in vigilance state amounts between the two photoperiods after saline or diazepam treatment.

The data indicate that, independent of the photoperiod, sleep regulation remains intact. Nevertheless, the effects of diazepam differ between photoperiods, especially for REM sleep, suggesting that treatments with $GABA_A$ agonists may exert dissimilar effects depending on the season.

Disclosure: No

2: CELL AND MOLECULAR BIOLOGY AND GENETICS

P549 | Endocrine and epigenetic regulation as common pathways underlying the genetic basis of sleep phenotypes and longevity

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Objectives/Introduction: Sleep and aging have been proven to be associated, with the amount of sleep needed over the lifespan being age dependent and sleeping too little or too much being associated with increased morbidity and mortality. Yet the convergent molecular mechanisms that link longevity and sleep are largely unknown. We performed a gene enrichment study that (1) identified genes associated to both longevity and sleep phenotypes and (2) determined molecular pathways enriched among these shared genes.

Methods: We manually curated two sets of genes, one associated to longevity and telomere length and the other to sleep phenotypes (e.g., insomnia, narcolepsy, sleep duration, chronotype, among others), with both gene lists heavily driven by hits from genome-wide association studies (GWAS). GWAS hits were linked to genes using Ensembl Variant Effect Predictor (VEP). Using Fisher's exact test and considering a total 21,196 genes in the human genome, we tested the statistical significancy of the overlap between these two gene lists and generated a third gene list containing their intersection. Benjamini-Hochberg test, adjusting for multiple comparisons, was used to identify enriched Gene Ontology (GO) and Kyoto Encyclopedia of Genes and Genomes (KEGG) terms that were over-represented among the intersect gene list.

Results: There were 47 overlapping genes between the gene list associated to sleep phenotypes (1,064 genes total) and the genes associated to longevity (367 genes total), indicating significantly more overlap than expected by chance (p-value = 3.7e-9, OR = 2.9). Significantly enriched terms on these 47 intersect genes are "positive regulation of circadian rhythm" (p-value = 1.6e-2, OR = 110.8, GO:0042753), regulation of cortisol (p-value = 2.9e-2, OR = 21.9, KEEG) and insulin (p-value = 9.7e-3, OR = 18.5, GO:0050796) secretion, and "positive regulation of DNA-templated transcription" (p-value = 3.8e-5, OR = 7.3, GO:0045893). Eleven out of the 15 sleep and longevity-associated genes contained in the later term are transcription factors or chromatin remodelers, including*ARNTL*, which regulates core components of the circadian clock pathway.

Conclusions: An over-representation analysis identified enriched pathways that suggest endocrine and epigenetic regulation as potential shared mechanisms between sleep phenotypes and longevity. This overlapping gene set and the highlighted biological pathways may

serve as preliminary stepping-stone for new functional investigations of sleep and longevity shared genetic mechanisms.

Disclosure: No

4: NEUROBIOLOGY

P244 | Reduced diffuse axonal injury and demyelination associated with preserved cognition upon up-phase targeted closed-loop auditory stimulation of slow waves in traumatic brain injury rats

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Introduction: High slow-wave activity (SWA), a feature of deep sleep, is believed to be essential for repair mechanisms to take place in the rodent brain. Our past work showed that both sleep induction via sodium oxybate administration and partial sleep restriction followed by sleep rebound in TBI rats promoted enhanced SWA associated with preserved posttraumatic cognition and ~90% reduction in diffuse axonal injury (DAI). Although these strategies provided encouraging results, they lacked the specificity needed to point out SWA as unequivocal mechanistic player behind ameliorated recovery. Moreover, establishing sleep pharmacotherapy as potential TBI treatment in clinical environments is challenging due to tolerance, dependency, and specificity concerns. Therefore, we recently developed a preclinical closed-loop auditory stimulation (CLAS) method to enhance SWA by precisely targeting the up-phase of ongoing slow waves in the rodent brain.

Methods: We implanted EEG/EMG electrodes in a rat model of TBI allowing for real-time staging of vigilance states and closed-loop delivery of auditory stimulation in a phase-targeted manner. We tested the effect of mock (flagging of targets with no sound delivery, $n = 5–8$) or up-phase targeted CLAS ($n = 5–8$) applied for 5 days acutely after trauma onto SWA (% of change delta power from baseline), DAI (number of APP+ axonal varicosities), demyelination (MBP staining optical density), and cognition (NORT performance). Two-way ANOVA, one-way ANOVA and multiple comparisons' corrections were applied as appropriate.

Results: Up-phase CLAS enhanced 24 h SWA up to 18%, in association with reduced number of APP+ axonal bulbs (~58% mean decrease compared to TBI + mock) in the corpus callosum and increased intensity of MBP staining (~37% mean increase compared to TBI + mock) in the same area. These findings were accompanied by preserved cognitive ability in TBI animals (~75% recognition index in NORT).

Conclusions: Improving SWA in a highly specific manner by delivering up-phase CLAS acutely after brain trauma might constitute a novel non-pharmacological neuroprotective approach for preventing TBI sequelae. Moreover, our TBI + CLAS model will shed light onto the pathways linking deep sleep and disease recovery mechanisms, helping pave the way to upcoming less invasive, non-pharmacological sleep modulation therapies for TBI patients.

Disclosure: Yes

Conflict of Interest statement: Christian R. Baumann is a shareholder at Tosoo AG.

All of the other authors have nothing to disclose.

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P550 | Perinatal exposure to the pesticide chlorpyrifos impacts on breathing phenotype in adult mice

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Objective: Chlorpyrifos (CPF) is an organophosphate pesticide used to increase crops yield. CPF represents an important food and environment contaminant and can pass through the placenta to the foetus. After birth, newborns can be exposed further via breastfeeding. CPF is a potent acetylcholinesterase inhibitor, and thus its presence determines excessive levels of neurotransmitter at cholinergic synapses. Since acetylcholine is a fundamental neurotransmitter in the respiratory regulation, respiratory activity can be influenced by cholinergic hyper stimulation. The perinatal exposure to CPF may impact through different mechanisms on adult health, as recently reported for perinatal exposure to nicotine in mice (PMID: 34903845). The aim of this study was to explore the long-term effects of perinatal CPF exposure on the respiratory pattern in adult mice.

Methods: CPF (5mg/kg per day) or its vehicle (peanut oil) were administered to dams from mating until weaning by intraoral gavage. Pups were never directly treated with CPF. Adult female and male mice (17-18 weeks of age) born to CPF- (female, $n = 13$ and male, $n = 15$) or vehicle-treated (female, $n = 13$ and male, $n = 13$) dams were instrumented with electrodes for electroencephalographic and electromyographic recordings for continuous behavioural state monitoring (wakefulness, non-rapid eye movement sleep, rapid eye movement sleep) and recorded for 8 h in a whole-body plethysmography chamber for simultaneous measurement of ventilation. Data were analyzed with ANOVA on log-transformed values with sex and treatment as factors. The threshold for statistical significance was set to $p < 0.05$.

Results: The apnoea occurrence rate during sleep was increased in mice born to CPF-treated dams with respect to control mice ($p = 0.0004$), and was higher in females than in males ($p = 0.0380$), with no significant interaction between treatment and sex ($p = 0.8046$).

Conclusions: These results indicate that early-life exposure to CPF may entail long-lasting reprogramming of breathing patterns during sleep.

This work was supported by the Fondazione del Monte di Bologna e Ravenna.

Disclosure: No

5: PHYSIOLOGY

P245 | EEG alpha phase-locked auditory stimulation to selectively modulate the sleep onset process

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Closed-loop auditory stimulation has been extensively used to interact with the slow oscillations of non-REM sleep, showing that these rhythms can be modulated in a phase-dependent manner using sound. Similarly, the instantaneous phase of the waking brain's ubiquitous *alpha oscillations* is thought to serve an important role in managing neural resources. Here we sought to establish if, as with the slow oscillation, an auditory phase-dependency can be demonstrated and exploited in the alpha oscillation, and what implications this might have for the transition to sleep, in which alpha oscillations become dramatically dampened.

We deployed the endpoint-corrected Hilbert Transform to afford real-time phase-locking of repeated sounds (20 ms burts of pink noise, 80 dB) to frontal EEG alpha oscillations (7.5–12.5 Hz), with a high degree of accuracy (resultant: 0.85 ± 0.07; *z*-stat:$p < 0.001$), during a 30 min morning nap, alongside the recording of full polysomnography. Sixteen healthy young adults (14 female, age = 22.38 ± 2.74) attended 4 visits, comprising: an adaptation visit, two stimulation visits in which two phases (330°, 150°) of frontal alpha were targeted with sounds for the first 15 min of the nap, and a sham visit in which no sounds were administered.

Consistent with oscillator theory, we saw phase-dependent differences in alpha frequency, with 330° stimulation quickening and 150° slowing alpha. Regarding sleep staging, we found that whilst the 330° stimulation condition showed no differences from sham, the 150° condition perturbed sleep onset, resulting in a greater latency to N2 sleep, less N2 sleep, more N1 sleep and a lower sleep depth Accordingly, the 150° condition also saw significantly fewer spindles and theta oscillations. All $p < 0.05$, as per linear mixed effects models and estimated marginal means comparisons.

We conclude that the alpha oscillation can be manipulated in a phase-dependent manner using sound, and that this has some relevance for sleep onset. This represents a novel insight into the alpha oscillation and the use of closed-loop auditory stimulation, which may have important implications for other sleep-related rhythms (e.g., spindles) and processes (e.g., transitions within sleep, rapid-eye-movement sleep).

Disclosure: No

P246 | Analysis of nocturnal activity of upper trapezius muscle during sleep stages in patients with chronic neck pain with sleep disturbance

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Objective: Previous studies reported a relationship between increased nocturnal activity of trapezius muscle and neck pain, but it has not been explored that the activity of upper trapezius muscle during sleep stages. The goal of the present study was to investigate the activity of upper trapezius muscle during sleep stages.

Methods: Twenty male patients (32 ± 5.4) years old with chronic neck pain with sleep disturbance (who scores > 5 on Pittsburgh Sleep Quality Index) were assessed for their nocturnal activity of upper trapezius muscle in the sleep lab. The measurements included full polysomnography (electroencephalography (EEG), electrooculography (EOG), and electromyography (EMG), as well as surface EMG of the upper trapezius muscle. The activity of upper trapezius muscle was recorded throughout the entire night. The normalized value of the muscle activity was derived for analysis during each stage of sleep (Wakefulness, Non-Rapid Eye Movement and Rapid Eye movement). The activity of upper trapezius during NREM was divided into three parts (first, second and third part of the night). Significant level was set at $p < .05$.

Results: Repeated measures findings show that there was significant decrease in the activity of upper trapezius muscle within different sleep stages (wakefulness (3.9 ± 1.41 mV), NREM 1(1.6 ± 49 mV), NREM II (1.2 ± 40 mV), and (NREM III) (1.0 ± 36 mV). However, the activity level of the upper trapezius muscle did not significantly decrease between NREM III (1.0 ± 36 mV) and REM sleep (0.8 ± 49 mV).

Conclusions: We found evidence that the nocturnal upper trapezius muscle activity did not decrease at specific period during sleep. The results attempt to observe trends suggestive of potential mechanisms and directionality. An update on this literature is required to guide future clinical efforts to develop treatments approached for increased nocturnal muscle activity and sleep disturbance in patients with chronic neck pain.

Disclosure: No

P551 | Coupling during NREM sleep between the prelimbic cortex, nucleus reuniens, and hippocampus remains stable under cognitive and homeostatic demands

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The interplay between the medial prefrontal cortex and hippocampus during non-REM (NREM) sleep is important for the consolidation of contextual memories. To assess the role of the thalamic nucleus reuniens (Nre) in this interaction, we investigated the coupling of neuro-oscillatory activity between prelimbic cortex, Nre, and hippocampus across sleep states and their role in the consolidation of contextual memories using multi-site electrophysiological recordings and optogenetic manipulations. We showed that ripples are time-locked to the Up state of cortical slow waves, the transition to the negative slope after the Up state in thalamic slow waves, the troughs of cortical spindles, and the peaks of thalamic spindles in unperturbed baseline sleep, sleep rebound after fear conditioning. In addition, spiking activity in Nre increases before hippocampal ripples and the phase-locking of hippocampal ripples and thalamic spindles during NREM sleep was stronger after acquisition of a fear memory. We showed that optogenetic inhibition of Nre neurons reduced a clear phase-locking ripples to cortical slow waves in the ventral hippocampus while their activation altered the preferred phase of ripples to slow waves in ventral and dorsal hippocampi. However, these optogenetic manipulations of Nre during sleep after acquisition of a fear conditioning did not alter sleep-dependent memory consolidation. Collectively, these results showed that Nre is central in modulating hippocampus and cortical rhythms during NREM sleep homeostasis and congnition.

Disclosure: No

P552 | Effect of sleep disorders on post-vaccination antibody response – a systematic review and meta-analysis

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Objectives/Introduction: Sleep deprivation and sleep disorders have been related to a reduced or delayed antibody response following vaccination. However, studies in this field have provided inconsistent results, with some failing to show significant effects on antibody titers in these conditions. The possible reasons for the discrepancies on the results rely on methodological variability, including different sleep-related conditions, diseases and time from vaccination to antibody assessment. This study intended to perform a systematic review and meta-analysis on the effects of sleep deprivation and sleep disorders on antibody response after vaccination.

Methods: Literature searches were performed at PubMed, Scopus and Web of Science, comprising two search domains, one related to sleep and other to vaccination. The records were screened in a two-step process (title and abstracts, follow by full text analysis), by two independent reviewers. Eligibility criteria included individuals with previous diagnosis of a sleep disease or subjected to an experimental sleep deprivation schedule, which have undergone vaccination for a specific disease. The main outcome was the post-vaccinal antibody titers. The effects size for each article was calculated using standardized mean differences and the meta-analyses used the DerSimonian and Laird random effects model.

Results: Out of 9009 identified records, six were included in the final sample. Among these, four were related to H1N1/influenza, one to hepatitis and one to COVID-19. Three studies evaluated the effects of sleep deprivation, two were related to obstructive sleep apnea and one was related to insomnia. The date since vaccination to antibody measurement varied from five days to one month. The results demonstrated a non-significant reduction in antibody titers due to sleep disorders (SDM: −0.206; CI95%: −0.783 to 0.071; $p = 0.144$).

Conclusions: The results demonstrate that sleep disorders and sleep deprivation altogether do not lead into a significant reduction in the antibody titers after vaccination. However, the studies included are subjected to substantial methodological heterogeneity, and it is possible that significant effects would appear in more specific conditions (such as for specific sleep disorders, diseases and time points after vaccination).

Disclosure: Yes

Conflict of Interest statement: GNP is a shareholder at SleepUp™, a Brazilian CBTi company, but attest that this position has no relationship with the aims, preparation or execution of this study. The other authors declare that they have no competing interests to disclose. This work was supported by grants from the Associação Fundo de Incentivo à Pesquisa (AFIP), the Coordenação de Aperfeiçoamento de Pessoal de Nível Superior (CAPES), and the Conselho Nacional de Desenvolvimento Científico e Tecnológico (CNPq). MLA, DSR and ST are CNPq fellowship recipients.

P836 | Coupling between heart rate variability and slow wave activity during NREM sleep in mice

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Introduction: Vigilance states are often defined by patterns of brain activity. In contrast, peripheral markers of sleep remain under-investigated, especially their relationship with cortical oscillatory activities. One such variable is heart rate variability (HRV), which was found to reflect parasympathetic activity. However, the interaction between HRV and cortical neural activity during sleep in mice has not been studied. The aim of this project was to address this important omission.

Methods: Data were obtained in 4 adult, male C57NL/6 mice (24-h recording). The animals were implanted with cortical EEG and neck EMG electrodes for vigilance state classification (4s epochs, SleepSign), and 16-channel silicon probes were implanted to obtain local field potentials (LFPs) across cortical layers. ECG-R-peaks were identified from the EMG using Kubios-HRV, and visually screened for artefacts. Further analysis, included only LFP channels within cortical layer 5.

Results: We compared heart rate and the root mean square of successive differences between heartbeats (RMSSD) during NREM and REM sleep. Next we investigated the relationship of heart inter-beat intervals (IBI) with variations of LFP activity using a time-lagged phase locking value (PLV) analysis. First, we found a significantly lower HR and higher RMSSD during NREM sleep as compared to REM sleep (Students *t*-test, $p < 0.05$). Further, we investigated the periodicity in the IBIs over time. Fast Fourier transform revealed a peak at 0.3 Hz, suggesting a slow oscillation in the HRV. This observation was supported by high PLVs between IBIs and the slow-frequency component in the cortical LFP (0.16–1.25 Hz), which was on average 0.38 ($p < 0.05$, permutation test).

Conclusion: This study identifies state-dependency of several characteristics of cardiac activity in freely-behaving mice. In addition to vigilance-state specific changes in HR and HRV, we made a novel observation of a slow oscillation in the heart inter-beat intervals. This periodic cardiac activity during NREM sleep correlated with the slow oscillations in the cortex. Our data highlight crosstalk between cortical states and peripheral physiology, suggesting an important modulatory role of interception in sleep-wake regulation.

Disclosure: No

6: CHRONOBIOLOGY

P247 | Accelerometry-estimated sleep consistency and cardiometabolic health among middle-aged people

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Introduction: Most of the evidence of sleep consistency and cardiometabolic health has been derived from studies among shift workers. Only a few studies have examined the association among general population using accelerometry-estimated sleep. The aim of this population-based study was to investigate the relationship between accelerometry-estimated sleep consistency and cardiometabolic outcomes including blood pressure, adiposity level, blood glucose and insulin and cholesterol levels at midlife.

Methods: In the 46-year follow-up of the Northern Finland Birth Cohort 1966 study all 24-h movement behaviors were measured using accelerometers for 7 consecutive days among 3698 participants. Sleep consistency was quantified by the 7-day SD of bedtime, wake-up time and sleep period determined from accelerometer data. Linear regression models were created, using demographics, work schedule, smoking status, alcohol risk use, sleep period, chronotype, and total physical activity (PA) or sedentary time (SED) as covariates.

Results: Higher variability in bedtime was positively associated with higher body mass index (BMI) and waist circumference (WC) after adjustment for total PA and other potential confounders (adjusted *B* 0.133, 95% CI [0.015, 0.251], $p = 0.028$; 0.220, [0.067, 0.373], $p = 0.005$). Higher variability in bedtime was also associated with higher BMI and WC after adjustment for SED and other confounders (B 0.215, [0.097, 0.334], $p = < 0.001$; 0.324, [0.171, 0.477], $p = < 0.001$). When adjusted for SED and other confounders, higher variability in all three sleep measures were associated with higher diastolic blood pressure and fat mass. Respectively, higher variability in bedtime and wake-up time were associated with higher fasting glucose ($p = 0.017/0.043$) and triglycerides ($p = 0.007/0.010$). Moreover, higher variability in wake-up time and sleep period were significantly associated with 2-h insulin (both $p = 0.004$) and glucose levels ($p = 0.005/0.013$) after adjustment for SED and other confounders.

Conclusion: Increased variability in bedtime was associated with higher BMI and WC even after adjustments for sleep period, chronotype, and total PA or SED. In addition to bedtime consistency, consistent wake-up time and sleep period may also be factors to be considered in cardiometabolic health studies as part of the 24-h movement behaviors.

Disclosure: No

P553 | Validation of the Caen Chronotype Questionnaire in a British population: exploring the added value of evaluating amplitude

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Introduction: Chronotype is defined as the individual preference for the timing to perform distinct activities (Horne & Ostberg, 1976;

Dosseville, Laborde & Lericollais, 2013) with the identification of two major profiles: morningness eveningness.

In 2018, a new self-reporting measure of chronotype the Caen Chronotype Questionnaire (CCQ) was proposed. Like other measures, the CCQ captures chronotype and adds an additional dimension, amplitude (i.e., DI) which is expected to reflect variations in individual functioning across the day (Laborde et al., 2018). Thus, the current study aims to validate the English version of CCQ in a representative UK sample.

Method: A sample reflecting the demographic characteristics to the UK population ($N = 0\ 596$) was used in this study.

In a cross-sectional design, participants completed an anonymous questionnaire on Qualtrics, which included the CCQ, the MEQ, the PSQI, the PHQ-9, and others. Demographics included age, gender, job information, work schedules, lifestyle and confirmation of UK residence (e.g., region) were also included.

Results: A confirmatory factor analysis (CFA) was run by IBM AMOS 27.0 to confirm the two-factor structure of CCQ.

A two-factor model was obtained that reflects the original structure with a dimension for chronotype (i.e., morningness and eveningness) and a second dimension for amplitude [$\chi 2 = 28.251$, df = 17, $p < 0.042$, $\chi 2/df = 1.662$; CFI = 0.992; TLI = 0.986; NFI = 0.979; PCFI = 0.602; RMSEA = 0.033[0.006; 0.054] PCLOSE 0.897; SRMR = 0.0249]. Results for the construct validity (Cronbach's α and composite reliability) are presented. The convergent validity of both dimensions was also evaluated with an AVE = 0.481 for ME and an AVE = 0.393 for DI. The discriminant validity was evaluated using the Heterotrait-Monotrait Ratio (HTMT = 0.503). Finally, the added value of the CCQ when compared with more traditional measures such as the MEQ was also considered.

Conclusions: The validation of the CCQ highlights the need to consider a classification that is both anchored in biological timing and individual preference. The study highlights the need to go beyond a classification and views "amplitude" as a potential pathway to manage the increasing diversity work schedules.

Disclosure: No

P837 | Early circadian phase is associated with higher psychological resilience in healthy young adults

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Introduction: Morning circadian preference is considered as a protective factor for mental resilience, but previous research was limited by a lack of corroborative objective measurements such as daily rest-activity rhythm and dim light melatonin patterns. This study aimed to examine the associations of psychological resilience with circadian preference, daily rest-activity pattern and biological circadian marker.

Method: Healthy participants aged between 18 and 50 years were invited to complete survey, wear actigraph and undergo dim light melatonin onset (DLMO) test at home. During home DLMO test, participants were instructed to keep the environment at dim light level (<20 lux) (with concurrent actigraphy measurement that allow dynamic light detection). Salivary samples were collected every half an h, starting from 6 h before habitual bedtime until 2 h after habitual bedtime. Salivary melatonin was analyzed by the liquid chromatography-tandem mass spectrometry method. DLMO was determined when the concentration reached 3.0 pg/ml and remained above this threshold for 2 consecutive h. Actigraphy data including intradaily variability (IV), interdaily stability (IS), Most active 10-h (M10), Least active 5-h (L5), and relative amplitude (RA) were calculated. Phase angle between DLMO and sleep onset time and phase angle between onset of M10 and sleep off time were calculated. Psychological resilience was measured by the Connor Davidson Resilience Scale (CDRS-10) and chronotype was measured by the Morningness-Eveningness Questionnaire (MEQ).

Results: Eighty participants (Mean age: 29.94 ± 5.52 y, 66.3% female) were included, in which 33 participants had valid results of DLMO (Mean time: 22:44 ± 1:26). Individuals with morning chronotype had higher psychological resilience when compared with those with intermediate- and evening-chronotype. Earlier onset of daily M10 and earlier onset of DLMO were both associated with higher psychological resilience (M10 onset: $r = -0.23$, $p = 0.040$; DLMO: $r = -0.41$, $p = 0.017$). A shorter phase angle between onset of M10 and sleep-off timing was associated with higher psychological resilience ($r = -0.25$, $p = 0.036$).

Conclusion: Morning circadian preference and consistently those with earlier activity rhythm and earlier circadian phase may represent the trait markers of resilience in healthy individuals. Alignment of internal circadian rhythm with the external light-dark cycle and social schedule could be a potential direction to improve mental well-being.

Disclosure: Yes

Conflict of Interest statement: This study was supported by grant from the Collaborative Research Fund of Hong Kong, China (RGC Ref No. C7069-19GF).

8: BEHAVIOUR

P248 | Daily associations with diet intake and sleep among preschool-aged children

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Objective/Introduction: Previous studies have suggested that sleep deprivation may influence food intake though hormonal imbalance. However, evidence suggests that the associations between sleep and diet are bidirectional, with diet also affecting sleep parameters. This nested study aimed to investigate the effect of daily diet on sleep among preschool-aged children.

Methods: This study included 3–6 year-olds with three days of diet and the subsequent night's sleep data from the Increased Health and Wellbeing in Preschools (DAGIS) study. Diet was assessed via parent and teacher reported food records. Diet variables included energy (kJ), and energy-adjusted carbohydrate, protein, fat, and added sugar intake in grams. Night-time sleep duration, sleep midpoint, and sleep efficiency were measured with hip-worn actigraphy. Multilevel models using random intercepts and maximum likelihood methods accounted for child-level variation and were adjusted for age, sex, and parental education level.

Results: The 1881 days were analysed among 627 preschoolers (48% girls) aged 4.8 ± 0.89 years. The mean ± SD was 9 h 43 min ± 52 min for sleep duration, 2:07 ± 00:41 for sleep midpoint time, and 88% ± 6% for sleep efficiency. Fixed effects of multivariate model summary found higher fat intake was associated with increased (β-estimates 0.01, 95%CI: (0.001, 0.01), p-value < 0.01) and higher carbohydrate intake associated with decreased (β-estimates −0.002, 95%CI: (−0.003, −0.0001), p-value < 0.04) sleep duration the following night. Likewise, higher added sugar intake was associated with later (β-estimates 0.002, 95%CI: (0.001, 0.002), p-value < 0.001) and higher protein intake with earlier (β-estimates −0.01 95%CI: (−0.01, −0.003), p-value < 0.001) sleep midpoint. No associations were observed between dietary components and sleep efficiency.

Conclusions: Daily diet was associated with sleep timing and duration, though the associations observed were small and may not have clinical significance. Added sugar intake during the day may delay sleep midpoint, whereas protein intake may promote earlier sleep midpoint timing. Greater overall fat intake and lesser carbohydrate intake may increase sleep duration among preschoolers.

Disclosure: No

P249 | Pre-sleep cognitive arousal is associated with heightened anticipatory cortisol response to acute stress

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Introduction: Evidence suggests hyperarousal as a vulnerability factor contributing to the risk of developing insomnia, indicating a combined effect of stress regulation and trait-like characteristics on the developmental trajectory of sleep disturbances. However, the interaction between hyperarousal and stress reactivity as indexed by cortisol response remains unclear. Therefore, the current study examined the association of pre-sleep arousal and cortisol response to acute stress.

Method: Ninety-six healthy adults (Mean Age = 29.71, SD = 4.942, 62.5% female) were recruited from the community. Salivary cortisol was collected from participants before (T1), right after (T2), and 20 min after (T3) the Trier Social Stress Test (TSST). The contrast, T2 minus T1, reflected anticipatory stress; whereas T3 minus T1 was the proxy of reactive stress. Participants were classified as having "low" vs "high" pre-sleep arousal based on the scores of the Pre-sleep arousal scale (PSAS). Self-reported sleep (i.e., insomnia severity and stress-related sleep reactivity) and health-related (i.e., General Health Questionnaire) measures were also included.

Result: There was a significant interaction between the level of pre-sleep cognitive arousal and anticipatory stress after controlling general health conditions, insomnia severity, and sleep reactivity (F (1,91) = 4.024, p < 0.05). Results of the pairwise comparison showed that people with high pre-sleep cognitive arousal had significantly higher cortisol response to acute stress compared to those low in pre-sleep cognitive arousal.

Discussion: Individuals who are more vulnerable to pre-sleep cognitive arousal were found to have heightened cortisol response to anticipatory stress, while similar results did not extend to reactive stress when compared to those with low pre-sleep cognitive arousal. The current study suggested people with high cognitive arousal responded

more intensively to the upcoming stress with higher cortisol response, which indirectly posited the role of cognitive hyperarousal in explaining individual vulnerability to insomnia. Future research is warranted to integrate the role of other vulnerability factors such as personality trait, and the underlying mechanism linking stress reactivity and hyperarousal on individuals with sleep disturbances.

Disclosure: No

P554 | Association of energy and energy nutrient intake with sleep quality in healthy adults

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Introduction: The association between energy nutrient intake which is the most important cause of obesity and sleep quality has not been studied yet. This study attempted to evaluate nutritional factors causing poor sleeper.

Methods: The 1006 person who visited Seoul National University Hospital Health Promotion and Disease Prevention Center (SNUH HPDP Center) from December 2010 to April 2012 performed Pittsburgh Sleep Quality Index (PSQI) and 24-h recall test. The collected nutritional data was analyzed using CAN-Pro 3.0® and CAN-Pro 4.0®and PSQI data was calculated to obtain PSQI global score by the protocol. We regarded the person who has global score > 5 as a poor sleeper. Obtained nutritional variables were total, breakfast, lunch and dinner energy intakes and 3 major energy nutrient intakes. Chi-square test and Logistic regression were performed to evaluate and anticipate the proportion of poor sleepers according to the energy nutrient intake status.

Results: Low levels of lunch energy intake and protein, lipid, plant lipid intake were significant factors to cause poor sleeper (PSQI global score >5). For women only lunch calorie intake status shows significant relation; for men, energy nutrient factors such as protein and lipid except carbohydrate were relevant factors on sleep quality.

Conclusion: Our study showed that well nourished people on protein and lipid especially plant lipid could have good sleep quality status. Therefore, to possess the welling being sense as a good sleeper, it is important to focus on protein and healthy lipid nutrient intakes and lunch diet.

Disclosure: No

P555 | Social sleep alteration in ants

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Introduction: There is no way to discuss adaptation in organisms without the concept of trade-offs. In the case of sleep, and in particular the control of sleep duration, there may be driving forces in the direction of lengthening and shortening. Sleep lengthening may have the health benefits, such as improvement of memory consolidation and body maintenance, whereas it increases the risk of being preyed on by predators. Therefore, by quantitatively understanding the advantages and disadvantages of the sleep duration across species, the evolutionary significance of sleep can be clarified. Here, we investigate the mechanism of sleep changes caused by environmental factors from a comparative evolutionary perspective. Another interesting social interaction is the organization of hierarchical structure. Despite being an almost genetically homogeneous group, ants divide their roles within their society (colony). There are a variety of acquired physical and behavioural diversifications in a nest: division of reproduction involving the suppression of mating, ovary development or egg-laying (i.e., queen and functionally or physiologically sterile females [workers]). Indeed, there is also a precise division of work through social interactions between workers (e.g., different individuals engage in nursing or foraging duties).

Methods: We use *D. indicum* that have smaller colonies (max. 200 workers) where each worker has the capacity to be mated.

Results: We succeeded in the experiment of sleep deprivation in *D. indicum*. Preliminary results suggest that sleep homeostasis might differ in a class-dependent manner. In addition, using mass spectrometry, it has shown that dopamine-level was higher in foraging worker than those of nursing worker, suggesting that dopamine may be involved in these sleep-state differences. Notably, in oder to systematically identify and understand molecular networks as pathways, gene expression networks using RNA-seq and proteomics has performed.

Conclusions and future workes: We will analyze the changes in brain neurochemistry (e.g., dopamine) between different sleep phenotypes through the analysis of small molecules, and phosphoproteins using mass spectrometry of both species. Whole brain tissue clearing method and staining for immediate early genes (IEGs) will be applied to identify the responsible brain regions, the type of neurons and glial cells.

Disclosure: No

P838 | Evaluation of an incentives-based, mhealth intervention for sleep extension in office workers with short sleep

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Introduction: In today's competitive economy, sleep is often sacrificed for work demands and increased short-term productivity. American workers average 6.7–7.6 h of sleep on workdays, while in Singapore, 52% receive < 7 h on weekdays. The present study aims to evaluate the efficacy of a digitally-delivered, incentives-based sleep intervention program on sleep and wellbeing outcomes.

Methods: Participants were selected from a larger cohort of office workers aged 21–40 y who had sleep measured using Ftibit™ devices

for at least two years. Those observed to be short sleepers (average time-in-bed; TIB < 7h) were invited for the present study. 225 participants who consented were randomly assigned in a 2:1 ratio to Goal-Setting (with incentives for increasing weeknight sleep by 30 mins +- sleeping before midnight), or Control groups (with only credits for sleep logging). The study spanned 22-weeks, split into 3 Phases: (1) Baseline (Week 1–2), (2) 10-week Intervention (Week 3–12), and (3) 10-week Follow-Up (Week 13–22). Wellbeing questionnaires surveying burnout, depression, morning mood, motivation, stress and sleepiness levels were also administered through a smartphone app on Weeks 1–2, 11–12 and 21–22 (study endpoints).

Results: Groups did not significantly differ on demographic characteristics, baseline sleep and wellbeing across all phases (ps > 0.05). Baseline weeknight TIB was 399 ± 44 min (Control) and 387 ± 43 min (Goal-Setting), while bedtime was 00:38 ± 00:56 (Control) and 00:53 ± 01:13 (Goal-Setting), indicating suboptimal TIB and bedtimes on average.

Although there were no significant Group × Phase interactions on sleep outcomes at study endpoints, exploratory week-by-week analysis showed that in Week 3–7, TIB significantly increased (9–18 min; ps < 0.05) and bedtimes shifted earlier (5–15 min; ps < 0.05) in the Goal-Setting group.

For wellbeing outcomes, morning sleepiness was 3.2 points lower in the Goal-Setting group during the Intervention ($p = 0.04$).

Most participants reported satisfaction from study participation (Goal-Setting: 78%,Control:84%), from increased awareness and insights into their own sleep patterns. In the Goal-Setting group, work h (35%) were the main barrier to sleeping longer, followed by leisure activities (23%) and family commitments (22%).

Conclusion: A digitally-delivered, incentive-based sleep intervention can result in short-term sleep extension but further studies incorporating strategies to overcome work and family commitments need to be evaluated for long-term sustainability.

Disclosure: No

9: LEARNING, MEMORY AND COGNITION

P252 | Correlations of spindles in SWS and N2 with the consolidation of new vocabulary and morphological regularities

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Introduction: It is established that sleep plays an active role in the consolidation of newly learned linguistic information. However, a more accurate mapping of consolidation for various learning types to specific underlying sleep properties, and the irrelation to the temporal dynamics of consolidation, is still under investigation. In the present study, we assessed the involvement of sleep spindles in learning novel vocabulary, and novel plural inflections based on implicit morpho-phonological regularities, by measuring acquisition, retention, and generalization to non-trained items. We consider the temporal dynamics of learning and test their association with sleep spindles, which have been shown to be linked with overnight consolidation.

Methods: Participants were trained in the evening on inflections of 36 novel words, in which morpho-phonological regularities were embedded and were presented either frequently or infrequently during training. Acquisition was tested immediately after training in the evening, before sleep in the laboratory with full PSG. Off-line consolidation was tested in the morning (12 h after training), 36 h, and one week post-training.

Results: Preliminary data ($N = 29$) indicated overall improvement for novel vocabulary on the first night after training, which declined to post-training levels at one week. Consistent with previous studies, the dynamics were different for frequent and infrequent items. Both improvement and the deterioration were significant for infrequent items (immediate vs. morning: $t = 2.5$, $p = 0.017$; 36 h. post-training vs. week after: $t = 3.1$, $p = 0.004$) but not for frequent items, the performance on which remained stable across the four test sessions.

Overall, over-night improvement for infrequent items was associated with sleep spindle density in slow-wave sleep (SWS; total score: Spearman's rho 0.606, $p = 0.001$; change score: 0.602, $p = 0.001$). Conversely, performance at one-week post-training correlated with sleep spindles during the N2 sleep stage only (Spearman's rho: 0.583, $p = 0.001$). No associations were found between spindles and generalization, which relies on regularity learning.

Discussion: Our results show a dissociation between SWS and N2 sleep spindles in their involvement with temporal dynamics of consolidation of novel vocabulary items. Specifically, early retention was associated with SWS spindles, whereas late retention with N2 spindles.

Disclosure: No

P253 | REM sleep abnormality as a potential contributor to Parkinson‘s disease pathogenesis

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Background: Sleep disorders are tightly associated with Parkinson‘s Disease (PD) and consider a potential contributor to its pathogenesis. The most striking manifestation is REM sleep behavior disorder (RBD), characterized by loss of atonia during REM sleep. Longitudinally, subjects diagnosed with idiopathic RBD are at high risk for progressing to an overt synucleinopathy, thus, RBD is the hallmark of PD-related sleep alterations.

This study is designed to elucidate the association between sleep characteristics in early stage, naïve PD patients and motor-learning.

Methods: We used high-density EEG system and measure across-night brain activity, combined with motor-learning task that was

performed prior to sleep and once again upon awakening. We recruited 21 drug-naïve PD patients and 19 age-matched controls and quantified their sleep patterns and task performance.

Results: To test the relationship between post-sleep task improvement and sleep characteristics, we employed Pearson correlation test between individual mean differences in task performance and sleep variables. In healthy participants, overnight task improvement correlated with the amount of stage NREM2 sleep ($p < 0.05$). However, no such correlation was observed among PD subjects. Furthermore, we observed among PD patients a highly significant ($p < 0.005$) negative correlation between task improvement and REM sleep duration. Even in patients without RBD, longer REM sleep duration was associated with worst post-sleep performance. To further explore possible mechanisms, we examined spectral and topographical group differences using Cluster-level permutation test across epochs of REM sleep. Grand average spectral analysis revealed distinctive differences between the groups, comprising an increased amplitude within the high theta rang (6–8 Hz) among PD subjects, with a predominant contribution of electrode clusters located in occipital region.

Conclusion: Our preliminary results suggest that changes in REM sleep (RBD) are not only markers of PD risk, but may play a role in motor learning. The fact that longer REM sleep duration was associated with disrupted sleep-dependent consolidation of motor learning among early naïve PD patients, suggests that changes in REM sleep in early PD are beyond RBD. Our present observation raises the hypothesis that abnormal REM sleep might play a role in the primary pathophysiology of PD.

Disclosure: No

P556 | Role of midline thalamus in synchronising sleep oscillations and facilitating memory consolidation

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Introduction: Memory consolidation is a process of stabilisation of information in two stages: the fast synaptic consolidation and the gradual system consolidation. The latter consists in the reorganisation of information and its transfer from temporary storage in the hippocampus to long-term storage in the neocortex. Evidence point to sleep, and in particular its deepest stage called slow wave sleep, as an ideal stage for memory consolidation. Indeed, information transfer could occur through the temporal coupling of two sleep oscillations: the hippocampal ripples and cortical spindles. We recently showed that midline thalamic neurons synchronise neocortical slow oscillations during slow wave sleep in mice. Here, we hypothesise that through synchronising cortical activity, midline thalamus mediates coordination of spindles and ripples.

Method: To investigate the role of midline NECAB1+ thalamic neurons in hippocampo-cortical coupling, and its role in memory consolidation during slow wave sleep, we conducted a spatial memory task the displaced object recognition. After exposing the mice to a set of objects, we optogenetically inhibited NECAB-1 thalamic neurons during the first h of sleep, focussing on the deep sleep stages, while recording the local field potential signals in multiple cortices and hippocampus.

Results: We report that inhibiting NECAB-1 thalamic neurons during post-task slow wave sleep hindered the consolidation of spatial memory ($n = 5$ mice), while negative control animals explore the displaced object at a higher than chance level as they learned the spatial task ($n = 9$ mice), implying the role of midline thalamus in facilitating memory consolidation. Analysis of the spindle-ripple coordination during baseline sleep recording suggests that midline thalamic inhibition increases the probability of spindle before ripple incidence, while the overall coupling of spindles and ripples remains unchanged.

Conclusion: In conclusion, one h post-task optogenetic inhibition on midline thalamic neurons effectively blocks memory consolidation during slow wave sleep. This effect might be mediated by the change in temporal relationship between spindle and ripple coupling. We report the role of midline thalamic neurons in coordinating sleep oscillations temporally, the precise coupling of which is crucial for memory consolidation during slow wave sleep.

Disclosure: No

P557 | Using simultaneous EEG-fMRI to provide direct evidence of endogenous procedural memory reactivation during human sleep facilitated by spindle events

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Introduction: A plethora of studies have shown that memory reactivation during sleep is a core neural mechanism for consolidating both declarative and procedural memories. However, in humans, direct support for such an endogenous reactivation process of procedural memory is disproportionally rare ascompared to that of declarative

memory. Moreover, spindles occurring during non-rapid eye movement (NREM) sleep are thought to facilitate procedural memory reactivation, but the supportive evidence is only correlational. Thus, we sought here to provide direct evidence of endogenous procedural memory reactivation during sleep using a decoding approach, and to account for the potential role of sleep spindles in promoting this mnemonic process.

Methods: Seventeen young subjects learned a 5-element finger movement sequence on Day 1 before sleeping in the MRI scanner for maximally 144 min, while electroencephalography (EEG) and functional magnetic resonance imaging (fMRI) data were acquired simultaneously. On Day 2, a second motor sequence was learned in similar conditions, and on Day 3, the two sequences were tested again to assess the level of memory consolidation after which, participants performed them intermixed with two novel sequences. A binary classifier (linear support vector machine) was trained to differentiate between the "learned" and "novel" sequences using the fMRI input from the movement preparation phase in each subject. After cross-validation, the classifiers from 14 subjects (accuracy > 50%) were applied to the fMRI sleep data from Days 1 and 2, to detect fMRI volumes during which brain activity resembled more that of the learned as compared to the new sequences. The percentage of prediction labels and their probabilities were assessed across sleep stages and time-locked to sleep spindles.

Results: The group-level mean accuracy for cross-validation was significantly greater than the chance level (p<.001). The percentage of sleep data classified as "learned sequence" (discrete class outcome) and the mean certainty (continuous probability outcome) of the prediction were marginally significant (FDR-adjusted-p = 0.051 and 0.061, respectively) during NREM2 sleep volumes and significantly higher than the chance level during spindle-locked fMRI volumes (FDR-adjusted-p < 0.05).

Conclusions: NREM2 sleep is a major window allowing for procedural memory reactivation, and sleep spindle events are pivotal in enhancing this process.

Disclosure: No

P839 | Impact of sleep fragmentation on cognitive functions and fatigue

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Introduction: Sleep continuity and efficacy are fundamental to maintain daytime optimal cognitive functions. How sleep fragmentation (SF) impairs general cognitive functioning, and particularly cognitive fatigue (CF) remains elusive. Using a task specifically designed to account for interindividual variability in working memory processing capabilities, we investigated the impact of experimentally induced SF on the induction of CF in a healthy population.

Methods: Sixteen participants spent two times 3 consecutive polysomnography (PSG) nights in the laboratory, either in a SF condition induced by non-awakening auditory stimulations, or under normal restorative sleep (RS) conditions, in a counterbalanced within-subject design. In both SF and RS conditions, participants were administered a neuropsychological battery covering main cognitive functions and exposed during 16 min to a CF-inducing dual working memory (TloadDback) task specifically tailored to each participant's best capabilities under low (LCL) and high (HCL) cognitive demands conditions. Sleep quality questionnaires were administered at each session.

Results: Sleep architecture was altered after SF (higher percentage of N3 [$F(1,13) = 27.96$; $p < 0.001$; $\eta_p^2 = 0.68$] and REM [$F(1,13) = 5.91$; $p = 0.03$; $\eta_p^2 = 0.31$], and higher number of NREM [$F(1,9) = 5.05$; $p = 0.05$; $\eta_p^2 = 0.36$] and REM [$F(1,9) = 5.81$; p = 0.04; $\eta_p^2 = 0.40$] phases in RS than SF), as well as subjective fatigue increased ($F(1,15) = 8.77$; $p = 0.01$; $\eta_p^2 = 0.37$), although total sleep time was similar ($F(1,15) = 0.30$; $p = 0.59$; $\eta_p^2 = 0.02$). Inhibition (Stroop interference index) deteriorated after the first SF night ($F(1,14) = 8.10$; $p = 0.01$; $\eta_p^2 = 0.37$). Looking at CF, there was a trend for worse performance in the TloadDback task in SF than RS ($F(1,13) = 3.42$; $p = 0.09$;$\eta_p^2 = 0.21$). In both RS and SF conditions, accuracy was higher under low (LCL) than high (HCL) cognitive load ($F(1,13) = 34.30$; $p < 0.001$; $\eta_p^2 = 0.73$), accuracy similarly dropping after the first 4min of task practice ($F(3,39) = 14.41$; $p < 0.001$; $\eta_p^2 = 0.53$).

Conclusion: In line with prior research, our study shows that nocturnal sleep fragmentation exerts a deleterious impact on sleep continuity and architecture, subjective fatigue, and performance in executive functions (inhibition), even when total sleep time is preserved. Young healthy participants appear to be able to compensate for cognitive fatigue induced by SF, at least on a scale of 3 consecutive nights.

Disclosure: No

P840 | Sleep strengthens and relaxes distinct aspects of stimulus-response learning

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Objectives: Performing a motor action in response to a sensory stimulus initiates stimulus-response (S-R) associations that shape future interactions with similar stimuli. It has been shown that S-R learning involves at least two associations which are at least partly independent: one referring to the motor action made in response to a particular stimulus, and the other linking the current task context to the stimulus. Both associations are behaviourally expressed in terms of switch costs, that is, increased response times (RTs) if the same stimulus is encountered in a different task context or if it requires a different motor response. Recent research indicates that both types of associations can persist for several days. However, it is not known whether the consolidation of S-R learning involves sleep.

Methods: We adapted an established classification task (e.g., Moutsopoulou et al., 2018) to investigate the temporal evolution of stimulus-action (S-A) and stimulus-classification (S-C) associations. Separate groups of participants either learned the task in the morning and were tested in the evening (wake group, $n = 24$, mean age ± SD: 24.00 ± 3.48); or learned in the evening and were tested in the morning, after a night of polysomnographically recorded sleep (sleep group, $n = 24$, 24.54 ± 3.46).

Results: We found that classification switch costs were reduced in the wake group but remained constant after sleep. Similarly, action switch costs were reduced during wakefulness, whereas they tended to increase over sleep. In contrast, when both task and action jointly switched, switch costs were reduced selectively in the sleep group. Within the sleep group, classification switch costs were positively correlated with slow and fast spindle counts.

Conclusion: Our results indicate that sleep strengthens different types of associations underlying S-R learning. At the same time, sleep supports flexible behaviour when these associations no longer hold. These effects are partly explained by spindle-related mechanisms and may thus be linked to offline replay.

Disclosure: No

11: SLEEP DEPRIVATION

P254 | Short-term effects of in-vehicle napping on psychophysiological driver state and performance: an experimental study with partially sleep-deprived operators

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Objectives/Introduction: Taking in-vehicle nap breaks is a popular advice to avoid sleepiness at the wheel. However, the effects of this sleepiness countermeasure on driving performance is not clear. Most of the scientific evidence on this matter comes from research in non-driving settings, such as aviation. Unfortunately, such results are domain-specific and translations to other settings may not be straightforward. Here, we assessed the effects of a short in-vehicle nap in operators with partial sleep deprivation.

Methods: Eleven expert drivers (41 ± 3.6 years old, 1 female) of the Spanish Army underwent two simulated, early-morning, driving sessions in different days. Each time, they drove a monotonous 2-h highway scenario, just after finishing a 24-h shift. In the nap break condition, after a 90-minute driving, operators were given the opportunity to recline the seat and take a 20-minute nap while the vehicle was travelling autonomously. In the supervision condition, they were asked to supervise the automation for 20 min instead of napping. In both cases, after the driving break, they took over the control of the vehicle and drove manually for another 30 min. We recorded operators' saccadic main-sequence (velocity/magnitude relationship) and vehicle lateral shifting, well-known indices of alertness in driving. We also collected subjective alertness through the sessions. We used EOG and EMG signals to look for slow eye movements and other indicators of sleep onset. Sleep was monitored by actigraph for 3 nights before each 24-h shift (mean total sleep time: 6.1 ± 0.6 h).

Results: During both sessions, as the driving progressed (first 90 min), saccadic velocity, driving performance, and operator's perceived alertness decreased as expected (F-values >4.6; p-values<0.05). After the nap break condition (all operators fell asleep), the saccadic velocity and the perceived alertness were higher (t-values>9.4; p-values <0.05). Driving performance did not differ between conditions ($p > 0.05$).

Conclusions: Short in-vehicle naps, compared to driving breaks while supervising vehicle automation, would have a restorative effect on both psychophysiological and subjective measures of alertness. However, a 20-min driving break (involving napping or not) does not seem effective to restore driving performance. Future studies should investigate whether high-engaging traffic conditions or longer breaks might change performance results.

Disclosure: Yes

Conflict of Interest statement: The Neuroergonomics & Operator Performance Laboratory of the Mind, Brain, and Behavior Research Center (CIMCYC) of the University of Granada (Spain) is funded by the HADRIAN (Holistic Approach for Driver Role Integration and Automation Allocation for European Mobility Needs) project. HADRIAN has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 875597. This document reflects only the authors' view, the European Climate, Infrastructure and Environment Executive Agency (CINEA) is not responsible for any use that may be made of the information it contains. CDP is supported by a Santander Bank - CEMIX UGR MADOC grant (Project PIN 5/2/20 F2F).

P558 | Pilot study to evaluate the feasibility and acceptability of using dynamic lighting at night to improve wakefulness and cognitive performance

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Introduction/Objectives: Military personnel frequently experience acute and chronic fatigue, which can affect both performance and safety. Modifying the light environment during the working shift may

be a practical and effective approach to counteract fatigue and improve performance. This pilot study aimed to assess the feasibility and acceptability of delivering an intermittent, dynamic, blue-enriched light intervention during breaks on a simulated night shift.

Methods: Six participants (four male, two female) completed two simulated night shifts (23:00 – 07:00 h) with a subsequent eight-h sleep opportunity (07:30 – 15:30 h) recorded using polysomnography, conducted one week apart. Every h during the night participants completed a 30-min cognitive test battery, including subjective (Karolinska Sleepiness Scale, Samn-Perelli Fatigue Scale, Headache and Eye Strain Questionnaire) and objective (2-back task, five-minute Psychomotor Vigilance Task (PVT), 15-min Multiple Attribute Battery, waking electroencephalogram) measures. During one session, participants remained in control lighting throughout (39.65 photopic lux, 73.10 melanopic lux, in the vertical plane at 54 inches). In the other, participants received two 30-min dynamic light interventions at 01:00 and 03:00 h (180.34 photopic lux, 218.20 melanopic lux), which included a five-minute ramp up and down to a 20-minute maximum.

Results: The feasibility of the lighting intervention was demonstrated by its reproducibility (33.96 ± 3.19 (control) and 213 ± 23.78 (intervention) photopic lux). Acceptability was demonstrated through subjective ratings (0 – none, 4 – severe) for headaches (0.60 ± 0.82 (control), 0.63 ± 1.06 (intervention)) and eye discomfort (1.55 ± 1.15 (control), 1.67 ± 1.05 (intervention)). Based on an exploratory review of the test battery data, the light intervention may have positive, sustained effects on wakefulness (subjective and objective), and performance (PVT, 2-back), whilst not affecting subsequent sleep (e.g., sleep onset latency (min): 0.90 ± 0.74 (control), 0.90 ± 0.42 (intervention), sleep efficiency (%): 91.77 ± 2.65 (control), 88.73 ± 6.30 (intervention)).

Conclusions: This preliminary study demonstrated the feasibility and acceptability of using a dynamic light intervention during breaks on a simulated night shift. In addition, the dynamic light intervention may have positive effects on wakefulness and performance, without negatively affecting sleep. Further research is warranted to investigate the potential for dynamic lighting to be used as a fatigue countermeasure in military environments.

Disclosure: No

12: INSTRUMENTATION AND METHODOLOGY (BASIC SLEEP SCIENCE)

P255 | Establishing up-phase closed-loop auditory stimulation during non-rapid eye movement sleep in mouse models of neurodegeneration

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Recent evidence from murine models of neurodegeneration suggests that long-term slow-wave activity (SWA) enhancement may be neuroprotective. Boosting SWA via manipulation of slow waves through techniques such as closed-loop auditory stimulation (CLAS), may provide a powerful non-pharmacological tool to investigate the link between sleep and neurodegeneration. Nevertheless, the precise effects of CLAS and its parameters' optimization still need to be tackled before implementing this technique in the clinic, advocating for CLAS assessment in preclinical models.

We explored the efficacy of SWA modulation in mouse models of Alzheimer's (AD, Tg2576) and Parkinson's disease (PD, A53T), aiming at enhancing delta power during non-rapid eye movement sleep (NREM) by targeting the up-phase of slow waves through CLAS. For this effect, we isolated either the 1, 1.5 or 2 Hz components of ongoing EEG signal. We then tested up-phases (30°, 40° or 60°) of auditory stimuli delivery to determine which target reflects a significant delta power increase in each transgenic line. We assessed precision (correctly identified NREM events) and delta percentage of change from baseline, across conditions and genotypes.

We found that higher frequency components lead to increased precision of online NREM detection in mice, with a precision of 60% for 2 Hz versus 42% and 55% in 1 and 1.5 Hz, respectively. Following this result, we isolated the 2 Hz component and tested three up-phases of auditory stimuli delivery. We observed maximum precision (70%) with 30° phase in AD, which translated into a significant delta power increase in comparison with the mock group (*$p < 0.05$, unpaired one-tailed t-test, $n_{mock} = 8$, $n_{AD} = 6$). In contrast, highest precision in PD was obtained with 40° phase, yielding a significant delta power increase (*$p < 0.03$, $n_{PD} = 7$). Interestingly, delta power was also heightened with 30° and 60° stimuli in PD, contrarily to the decrease observed with 40° and 60° in AD.

We believe that a 2 Hz component coupled with model-tailored phase-targeting is key to successfully increase delta power during NREM using murine CLAS. Further experiments may majorly impact the therapy of neurodegenerative diseases, benefiting preclinical/clinical studies and setting CLAS as a novel therapeutic candidate.

Disclosure: Yes

Conflict of Interest statement: Christian R. Baumann is a shareholder at Tosoo AG.

All of the other authors have nothing to disclose.

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P256 | In-vitro direct measurement of fat (solvent extraction) In the anterior and posterior area of the tongue – a pilot study (preliminary results)

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Introduction: There is growing interest on fat accumulation in the tongue, as it is an important contributing factor to Obstructive Sleep Apnea-Hypopnea (OSAH).

Literature showed that tongue fat percentage (Fat %) correlates with BMI, appears to be higher in the posterior part in apneic subjects compared to controls and is strongly associated with male gender.

However, the analysis of medical imaging is scarce, as the images are based on algorithms. The objective of this study is to compare Fat % by an in-vitro direct measurement method (solvent extraction) in the tongue (anterior vs posterior) and adipose tissue controls.

Methods: 32 samples were collected on three fresh human cadavers (mean age = 71 ± 12).

- Tongue ($N = 28$), sub grouped in anterior ($N = 10$) and posterior ($N = 18$) region, separated by foramen caecum and sulcus terminalis.
- Abdominal adipose tissue samples were used to determine the reference.

Fat quantification was performed by automated solvent extraction (Soxhlet method - Petroleum ether 40/60).

Results: The non-parametric Mann-Whitney test (p-value 0,05) showed that Fat % was significantly higher in the posterior area of the tongue compared to anterior (mean 5.5 ± 4.2%; min–max: [0.1–12.4] vs 12.30 ± 9%; min–max: [2.4–35.7]; $p = 0.0135$). Controls (abdominal fat) showed 95.7 ± 3.5% Fat.

Conclusions: (1) Solvent extraction showed a higher Fat % in the posterior part of the tongue compared to anterior. According to the literature, this could lead to a greater collapsibility of the upper airway in OSAH patients. (2) Raw data from solvent extraction were lower but equal in proportion compared with indirect medical imaging data depicted in the literature. (3) Interindividual variability was important, so more replication is needed to provide reliable data on physiological distribution in the tongue, exacerbated by obesity and OSAH.

Keywords: Tongue Fat; Obstructive Sleep Apnea; Direct measurement method; Anatomy

Disclosure: No

P559 | Nocturnal positive pressure ventilation improves relationship quality of OSA patients and their partners

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Introduction: Continuous positive airway pressure (CPAP) ventilation is still considered the therapeutic standard for sleep-related breathing disorders. Previous studies have shown that the therapeutic effect depends strongly on the partners of the obstructive sleep apnea (OSA) patients. We have developed the first questionnaire that measures the attitude of the partners towards CPAP therapy.

Methods:

The content of the questionnaire can be divided into three major areas/topics:

1. Demographics and history of mask use
2. Bedpartners' opinion and support towards mask and mask therapy
3. Satisfaction with relationship and mask therapy

We conducted an exploratory analysis to investigate possible relationships between CPAP therapy and views on different aspects of the relationship. We employed Principal Components Analysis (PCA) to identify the underlying structure of highly correlated items.

Results: 508 questionnaires were completed by the bedpartner. Average a partnership length was 33.4 (+/− 15.4 years). Mean duration of OSA patients CPAP use was 8.2 +/− 7.3 years.

Overall, bedpartners reported a very strong positive opinion towards this therapy. Bedpartners reported to sleep better as their partner increased the days of their weekly mask usage. Most bedpartners' relationship satisfaction increased with their sleep quality. The bedpartners satisfaction with the relationship increased during mask therapy compared to before mask therapy. Bedpartner support of OSA patients in their therapy indicating an observed satisfaction of OSA patients with the mask (bedpartner opinion). Thus, both partners benefit from CPAP therapy.

Questionnaire validly assessed by means of PCA depicted three different main dimensions of the general opinion of the bedpartner towards the mask and the mask therapy: How the bedpartner experiences the overall appearance of the mask ("Look"), the general attitude of the bedpartner towards the mask ("Attitude"), and bedpartner's perceived intimacy during mask therapy ("Intimacy").

Conclusion: The bedpartners' satisfaction with the relationship increased during CPAP therapy. There was a strong correlation between support for CPAP therapy and improved sleep quality of bedpartners. Bedpartner support of OSA patients in their therapy increased satisfaction of OSA patients with the mask. Both partners benefit from CPAP therapy. Thus, the bedpartner should be involved in the CPAP treatment.

Disclosure: No

P560 | Evaluation of BioSerenity's sleep staging algorithm versus PSG Manual sleep scoring in OSA patients

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Objective: The objective of this study is to compare the performance of the Bioserenity's Sleep Staging Algorithm for the prediction of sleep stages to PSG manual scoring.

Patients-Methods: The performance of the algorithm was tested comparing the sleep stage annotations predicted by Bioserenity's (BIOS) Sleep Staging Algorithm with the majority consensus

annotations obtained from three independent experts sleep scorers trained to follow AASM sleep scoring guidelines. It builds upon the recently published "Stanford-STAGES", which has been trained on an extensive and heterogeneous database and proven to yield human-level sleep stage scoring accuracy [Stephansen et al. 2018]. In order to demonstrate the overall good performance of BIOS Sleep Staging algorithm, we present also performance results obtained from a number of other sleep staging algorithms (Morpheus, BrainRT, Pinna) assessed on the same set of expert consensus annotations. The dataset used to validate the algorithm is composed by 16 polysomnography (PSG) recordings obtained in Nancy's (France) Cereves clinic from September to November 2019 as screening tests due to suspicion of obstructive sleep apnea. The cohort is composed by 7 females and 9 males, age range 32 to 71 years old (mean ± SD = 54.7 ± 11), height 170 ± 9.8 cm, weight 81.8 ± 15 Kg, BMI 28.2 ± 4.4. Sleep states from 16 OSA patient's PSG scored by BIOS were compared to those manually scored using overall median positive percentage agreement, overall negative percentage metrics.

Results and Conclusions: The Sleep Stage Algorithm annotations have an overall median positive percent agreement (PPA) with the majority consensus of expert scorers of 84%.

The Sleep Stage Algorithm annotations have an overall median negative percent agreement (NPA) with the majority consensus of expert scorers of 96%. The Sleep Stage Algorithm annotations have a median Cohen's Kappa with the majority consensus of expert scorers of 0.76. The BIOS Algorithm has a good performance in predicting sleep staging.

Disclosure: Yes

Conflict of Interest statement: Maxime Elbaz is the scientific Advisor at BioSerenity

P841 | Modulating REM sleep oscillations using closed-loop phase-locked auditory stimulation: a proof-of-principle study

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Rapid eye movement (REM) sleep contributes to cognitive function and is reduced in mild cognitive impairment and Alzheimer's disease. In animals, theta oscillations during REM sleep have been linked to learning and plasticity. Analogous functions have been hypothesized in humans, but the evidence is scarce. This is in part due to a lack of approaches that can modulate REM sleep oscillations non-invasively. Phase-locked auditory stimulation has emerged as a powerful tool to modulate slow oscillations during non-REM sleep, but its usefulness in modulating the faster brain rhythms that characterise REM sleep is yet to be established. Here we aim to test the feasibility of using phase-locked auditory stimulation to modulate REM sleep oscillations in healthy young adults.

We recorded high-density EEG (128 electrodes) during an extended overnight sleep period (10 h) in 10 healthy young adults (age: 23.1 ± 2.0 years; 3 males). Auditory stimulation (pink noise, 20 ms pulses, 50–60 dB) was delivered during REM sleep in alternating 6 s ON (stim) and 6 s OFF (no stim) windows. Stimuli were phase-locked to four orthogonal phases of ongoing alpha (7.5–12.5 Hz) or theta (4.5–7.5 Hz) oscillations detected in a frontal electrode (Fz).

Participants' sleep efficiency remained high during a night of auditory stimulation targeting oscillations in REM sleep (86.2 ± 6.6 %). The four orthogonal phases of ongoing alpha and theta oscillations were targeted with high accuracy at the stimulation electrode (accuracy quantified as resultant; alpha: 0.67 ± 0.04; theta: 0.74 ± 0.03). Stimulation phase-locked to alpha and theta oscillations induced phase-, and frequency-specific power changes at the target location (alpha: $p < 0.05$, lme; theta: p = n.s., lme, $p < 0.05$ for phase 0° and 90°, paired t-test).

Phase-locked auditory stimulation during REM sleep is well tolerated and can target specific phases of alpha and theta oscillations in healthy young adults. We observed phase and frequency specific effects of stimulation, providing the first demonstration that faster REM sleep rhythms can be modulated by phase-locked auditory stimulation. Future studies can now leverage this approach to investigate how modulation of REM sleep oscillations affects the contribution of sleep to brain function.

Disclosure: No

P842 | Intramuscular fat assessment in relation to sleep apnea: a new approach of direct measurement of lipidic deposit in human tissue with soxhlet method

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Introduction: Solvent extraction is an in-vitro direct method to assess fat percentage on muscle samples and is a well-known reference method in food analysis. This application will be tested for its reliability in order to be used for later comparison with medical imaging and create, in a second phase, a non-invasive easy-to-use technique for tongue fat quantification in sleep apnea.

Methods: Muscular fat quantification by automated solvent extraction (with Petroleum ether 40/60) was performed on 12 pork samples and 64 samples collected on three fresh human cadavers (71 ± 12 y). Preparation of all samples was standardised according to the Association of Official Agricultural Chemists.

Reliability of the measure, drying time of extraction product, and influence of freezing storage were studied.

Results: The Wilcoxon matched-pairs signed rank test (*p*-value 0,05) between 32 pairs of prepared samples showed an excellent repeatability of the measure (mean 16.26 ± 22.58 % vs 16.66 ± 22.78 %; $p = 0{,}557$). Ideal drying time after analysis was >55 min. and no significant difference was found between freshly analysed prepared pork samples and same samples after 3 weeks of -25°C storage in an airtight container ($p = 0{,}437$).

Conclusions: Our results indicate that automated soxhlet method is a reliable technique to assess Fat % in human tissue. Therefore, it can be applied as a reference for comparison/correlations with medical imaging quantifying lingual fat in patients suffering from obstructive sleep apnea.

Keywords: Soxhlet method; Sleep apnea; Tongue fat; In-vitro

Disclosure: No

13: COMPUTATION/MODELLING

P561 | Integrated bioinformatic analysis of gene expression profiling data on obstructive sleep apnea

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Objective: Selection of appropriate biomarker to identify obstructive sleep apnea (OSA) is complicated by the involvement of thousands of differentially expressed genes (DEGs) across multiple cell types, pathways, and organs. This study aimed to identify involved pathways, upstream regulators, and potential biomarkers in OSA.

Methods: From one gene expression microarray profiling dataset, GSE135917, we performed bioinformatic analyses on dataset from subcutaneous fat of patients with OSA and healthy controls to identify the involved pathways, predict upstream regulators, and potential measurable extracellular biomarkers. Next, we performed bioinformatic analyses on dataset from subjects with OSA at baseline versus after effective CPAP therapy.

Results: Overall, 2,567 DEGs were mapped in OSA versus healthy control for the ingenuity pathway analysis. Bioinformatic analysis on OSA showed significant activation of pathways with known pathogenic relevance; cardiac hypertrophy signalling, BMP signalling pathway, senescence pathway, autophagy, endothelin-1 signalling, etc. The upstream regulators with upregulated predicted activity, identified were COPS5, CD24, MYC, IFNG, RAB1B, FOXC1, PAX3-FOXO1, XBP1, TP73, IFNA2, DNM3OS, CDK8, HIC1, EGFR, SMAD3, NONO, ERG, CTNNB1, TP53, DCLK1, NOTCH1, and TGFB1. Interestingly, there are only 126 DEGs between 24 subjects with OSA at baseline versus after effective continuous positive airway pressure (CPAP) therapy, then significant pathways or upstream regulators were not found. Finally, we found common extracellular biomarkers such as TOGARAM1 and UBXN4 using GSE135917 and different dataset from GSE75097.

Conclusions: In spite of considerable differentially expressed genes in OSA versus healthy control, involved significant pathways, upstream regulators, and biomarkers were found, and potential extracellular biomarkers of OSA requiring further evaluation using biobanking. Integrated bioinformatic analysis on before and after CPAP therapy supported that underlying gene expression pattern is not significantly altered by CPAP therapy.

Disclosure: No

P843 | Modeling the effects of napping and non-napping light schedules on the human circadian oscillator

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Objectives/Introduction: During early childhood, toddlers transition from habitually napping (biphasic sleep-wake pattern) to consolidating their sleep into a single night-time sleep episode (monophasic sleep-wake pattern). Quasi-experimental data has established that a circadian phase advance is associated with reduced napping behavior, but it is unknown if this advance is a feature of the developing circadian system or is a response to altered patterns of light exposure. Using published physiological and behavioral data and a mathematical model of the human circadian pacemaker, we investigated potential mechanisms for producing the circadian phases associated with napping and non-napping light schedules.

Methods: We constructed regular napping and non-napping schedules based on published behavioral data from habitual nappers and non-nappers. Using a validated mathematical model of the human circadian pacemaker, we simulated these schedules to determine the phases of entrainment they produce. We also systematically examined the effects of nap timing and duration on simulated circadian phase and compared effects of 1 h light pulses and 1 h dark pulses across circadian phases. To identify model features contributing to phase shifts of various magnitudes, we analyzed transient solution dynamics.

Results: The model predicts a phase delay of 41 min for the napping schedule compared to the non-napping schedule with both the decrease in afternoon light during the nap and the later bedtime associated with napping toddlers contributing to the phase delay. Although dark pulses did affect circadian phase, light pulses were associated with larger magnitude phase shifts. Model analysis revealed that light processing dynamics contributed to this asymmetry. Longer and earlier naps produced the largest simulated phase shifts.

Conclusions: These simulation results suggest that differences in light exposure associated with habitual napping and non-napping light schedules may produce the circadian phase delay observed in nappers compared to non-nappers. Furthermore, the dynamics of both the circadian clock and light processing mediate the effects of the dark pulse

associated with a daytime nap. More research is needed to understand the physiology governing these mechanisms and how light sensitivity and dynamics may change across development.

Disclosure: No

14: SLEEP DISORDERS - BREATHING

P259 | Impact of a weight loss rehabilitation program on sleep apnea prevalence and sleepiness severity: the DietSleep study

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Introduction/objectives: Obstructive sleep apnoea (OSA) is associated obesity in more than 60% of the cases. Variations in body weight influence OSA prevalence and severity and burden of symptoms. We prospectively assessed the impact of a weight-loss program on Berlin score for OSA screening and severity of sleepiness by Epworth sleepiness scale (ESS).

Methods: DietSleep is a prospective multicentric cohort study during which OSA risk was measured by the Berlin Questionnaire and daytime sleepiness by the Epworth Sleepiness Scale (ESS) before and after weight-loss intervention.

Results: 127 patients were included: 85.2% women, median age 52 years, interquartile range [44; 61]. The weight-loss program induced a median decrease in body mass index of -3.7 kg/m^2 [-5; -2.8] over a period of 5.6 months [3.8; 8.4]. At baseline, 46 patients (36%) were at risk of OSA risk (Berlin ≥2). By comparing patients with or without baseline OSA risk, there was a significantly higher decrease in weight, BMI and diastolic blood pressure in the group with baseline OSA risk compared to the group without baseline OSA risk. The median ESS at baseline was 6 [4; 9] and higher in the OSA risk group (7 [5; 10] vs. 6 [3; 8], $p < 0.1$). The median decrease in ESS was -2 [-6; -1] for patient with OSA risk compared to: -1 [-3; 0] in patients without baseline OSA risk, $p = 0.02$. At the end of the follow-up, the proportion of patient with risk of OSA decreased from 39% to 7% ($p < 0.01$) and the proportion of patient with excessive daytime sleepiness (ESS>10) decreased from 17% to 4%, $p < 0.01$.

Conclusion: These results confirmed that a weight loss program moderately enriched in protein and depleted in carbohydrates and lipids is associated with a significant improvement in Berlin score and daytime sleepiness in overweight/obese patients.

Disclosure: No

P260 | Mandibular advancement device emergent central sleep apnea and sleep bruxism: a case report

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Objectives/ Introduction: We present the case of a 46-year-old man diagnosed with moderate obstructive sleep apnea (OSAS), dental wear and bruxism that developed treatment-emergent sleep apnea (TECSA) under mandibular advancement device (MAD). An oxygen treatment with MAD titration was an efficient treatment for this patient.

TESCA arising under CPAP is a well-known entity but few cases have been described in relation to MAD, hypoglossal neuro stimulation devices, tongue stabilization devices and following surgical treatment.

Sleep bruxism is a parasomnia which can be associated to sleep apnea and cause myofascial syndrome and TMJ disturbance, and MAD can be an efficient combined treatment.

Case presentation: A 46 year-old male consulted our sleep center with the complaint of daytime sleepiness and deficit of attention and memory. The native polysomnography showed a moderate positional OSAS with a hypopnea/apnea index (AHI) of 22.1/h composed of obstructive and central events (central apnea index (CAI): 2.6/h). A CPAP treatment was attempted but was not tolerated by the patient. The patient was addressed to our OSAS oto-rhinolaryngology and oral surgery consultation for alternative treatment. The patient was known for sleep bruxism and the clinical examination revealed tenderness in masticatory muscle palpation as well as short teeth with generalized wear. The protrusion was satisfactory and the TMF function preserved. He was subsequently equipped with a custom MAD to treat OSAS and bruxism. Six months after, a control polygraphy with MAD showed no resolution of the sleep disorder with an IAH of 22.5/h with a predominant central origin (CAI: 22.5/h). After excluding other potential causes, treatment-emergent sleep apnea (TECSA)was diagnosed. The MAD was adjusted and an oxygen treatment with a flow rate of 1l/min was initiated in concomitance.

Results: The control polysomnography showed a resolution of TECSA with an IAH of 3.3/h. The patient showed improved quality of sleep, resolution of daily sleepiness and bettering of his myofascial syndrome and bruxism with custom-MAD treatment.

From our 150 patients equipped with MAD, this was the only patient that developed TECSA.

Conclusions: In conclusion, this case report highlights the combination of MAD and oxygen therapy as a successful treatment for a patient known with moderate OSAS, bruxism and TECSA.

Disclosure: No

P261 | Relationship between severity of obstructive sleep apnea syndrome and total body water

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Introduction: The purpose of this study was to investigate the relationship between severity of Obstructive Sleep Apnea Syndrome and estimated total body water (TBW).

Methods: 94 male, newly diagnosed OSAS adult patients (Thessaly region, Greece) were randomly selected, comorbidity free and divided into two groups (AHI: >30/h, $n = 51$ Age $= 45.1 \pm 10.4$ y, BMI $= 31.1 \pm 7.1$ kg/m^2, vs. AHI: 15–30/h, $n = 43$, Age $= 48.7 \pm 9.7$ y, BMI $= 30.9 \pm 6.3$ kg/m^2). All participants underwent body composition analysis (Tanita MC-980, Arlington Heights, IL, USA).

Results: Results have shown differences between TBW and AHI ($r = -0.411$, $p < 0.001$), desaturation index ($r = -0.494$, $p < 0.001$), nadir SpO2 ($r = 0.446$, $p < 0.001$), stage 1 ($r = -0.223$, $p < 0.05$) and stage 3-4 ($r = 0.331$, $p < 0.05$). Patients with AHI >30/h showed lower TBW compared the AHI 15–30/h ($t_{(92)} = -2.895$, $p = 0.005$). Age and other parameters of body composition (muscle mass, body fat, visceral fat, resting metabolic rate) didn't show differences between groups.

Conclusion: To conclude, the findings suggest that reduced estimated total body water composition is positively associated with OSA severity, probably due to repeated episodes of airway collapse and intermittent hypoxia causes dehydration.

Disclosure: No

P562 | Nasal or oral breathing impact on vascular endothelium - an ultrasound approach

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Introduction: Obstructive Sleep Apnea-Hypopnea Syndrome (OSAH) is characterised by a reduction in nasal breathing in favour of oral breathing and obstruction of the upper airway by the lingual muscles. Epithelial production of Nitric Oxide (NO) by inducible Oxide Nitric Synthase in the paranasal sinuses plays an important role in protecting the lung from bacterial growth and increases lung perfusion. Nitric Oxide has a major vasodilatory effect (Lundberg et al. 2008 and Sanchez Crespo et al. 2010) and is absorbed during nasal breathing, emptying paranasal sinuses through a Venturi effect.

The aim of the study is to compare the effect of oral and nasal breathing on the vasodilation of the brachial artery. This effect will be measured by ultrasound using the Flow Mediated Dilation method (Corretti et al. 2002).

Material and Method: Fourty-five healthy male with a mean age of 21.3 ± 2.3 years volunteered after informed consent. Vascular health was monitored by the Ankle Brachial Index test, with no cardiac pathology and no sleep disorders. Each subject was well hydrated, not under the influence of alcohol or drugs, non-smoker and had not consumed dark chocolate.

The participants underwent two different protocols (nasal or oral breathing) in random order. Each protocol was separated by a 10 min soft walking period and a 30 min. rest to eliminate the effects of the previous protocol.

Ultrasound analysis of brachial artery dilation (protocol of Corretti et al. 2002) was performed.

Results: Nasal breathing (in comparison with control oral breathing) induces significant mean dilation of 5.93% of the brachial artery ($p < 0,0001$). This dilation would hypothetically be due to endogenous accumulation of NO from the paranasal sinuses.

Discussion and Conclusion: Nasal breathing induces a dilating response in the peripheral arterial system. In the context of OSAH, therapeutic management in favour of nasal breathing should be proposed and promoted at the expense of oral breathing. The biological cycle of production, circulation and absorption of endogenous NO in the paranasal sinuses could have a place in the treatment of hypertension in patients with OSAH (Hajian et al. 2016, Ichinose et al., 2004, Bloch et al., 2007).

Disclosure: No

P563 | Long-term use of continuous positive airway pressure is related to sleep comfort, rather than marital and cardiovascular consequences of obstructive sleep apnea

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Objectives: Factors influencing long-term adherence have been widely studied and are controversial.None of these studies have addressed why adherent patients regularly use continuous positive airway pressure (CPAP).The purpose of this study was to evaluate the main motivation for CPAP compliance.

Methods: In this single-centre retrospective study, patients with severe obstructive sleep apnoea(OSA) were included consecutively from the annual adherence monitoring visit between March 2021 and April 2022.All patients were asked to complete a 4-item questionnaire including the main motivation for their CPAP use; sleep comfort(SC), daytime vitality(DV), marital distress, and cardiovascular consequences of obstructive sleep apnea(OSA). Due to the difference in the number of patients within the groups, cardiovascular motivations and marital distress were combined in a so-called non-sleep related motivation group (NS). Total sleep time (TST), apnea hypopnea index (AHI) and 4% oxygen desaturation index (ODI), Epworth Sleepiness Scale (ESS), Insomnia Index (ISI) were collected at diagnosis. Patients were matched according to the number of years of CPAP use.

Results: Of the 225 patients (55 women) who completed the questionnaire (age 62 ± 12 years, AHI 46 ± 23 events/h), the main motivation was sleep comfort for 60% of patients ($n = 135$), followed by daytime vitality for 16% ($n = 37$). Non-sleep related motivations such as fear of cardiovascular consequences and marital distress represented 16% ($n = 37$) and 5% ($n = 16$) respectively. The mean compliance was 404 ± 78 min over a mean follow-up of 6 ± 4 years. The mean CPAP pressure was 9 cm water ± 1.6.

After matching by years of CPAP use, we compared 150 patients. The ESS at diagnosis was lower in the NS group ($n = 50$) 8 ± 5 compared to the SC group ($n = 63$) 10 ± 4 and the DV group ($n = 37$) 12 ± 5 p-value = 0.06. Mean annual compliance was also lower in the NS group 380 ± 90 min compared to the SC group 424 ± 61 and the DV group 400 ± 85 p-value = 0.008, while the number of years of use was identical between the groups.

Conclusion: The majority of patients who have been using their CPAP regularly for years are mainly motivated by sleep comfort. Those who use it for marital or cardiovascular motivation have a lower ESS and daily compliance.

Disclosure: No

P564 | Cross Sectional analysis to evaluate diagnostic accuracy of commonly used screening scales to predict OSA in COPD patients in India

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Introduction: India is considered the capital of Chronic Obstructive Pulmonary Disease (COPD) across the world with estimates of over 30 million patients. Overlap of COPD with Obstructive Sleep Apnea (OSA) is well established though its incidence is contested between 30-68%. There are various scores that predict OSA, importance of a technically validated score cannot be undermined as they play a role to screen patients at risk in a resource limited setting. Delayed diagnosis of OSA in COPD patients lead to frequent and difficult to manage exacerbations with accelerated decline in pulmonary functions. Various studies across the globe suggest not one score suits all. This study aims to evaluate diagnostic accuracy of STOP-BANG questionnaire (SBQ), Sleep Apnea Clinical Score(SACS), Epworth Sleepiness Scale (ESS)and Mallampati score to diagnose OSA in COPD patients and thereby validate best score in Indian context. It intends empower general practitioners and pulmonologists to effectively screen for OSA in COPD patients.

Method: An observational cross-sectional study was conducted among 30 adults who were already on treatment for COPD, Patients were scored according to SBQ, SACS, ESS and Mallampati and then completed Level 1 overnight Polysomnography using ALICE, LDXN by Philips Respironics, software Sleepware G3.9.2. Value of various scores were analyzed to predict OSA in patients with COPD by receiver-operating characteristic (ROC) curve method.

Results: A total of 30 participants (20 Males, 10 Females) were included in the study with a mean age of 54 years. Incidence of OSA in COPD in our study was as 66%. Sleep efficiency was decreased in 94% patients. All patients had abnormal sleep cycles with disturbed REM sleep being most common and observed in 100% patients. AUC for SBQ, SACS,ESS and Mallampati scores (in decreasing order) were 0.845, 0.762, 0.733, 0.615. Cut off for SBQ, SACS,ESS questionnaire that suits Indian COPD patients to predict OSA were >4, >45, and >8.

Conclusion: OSA has high prevalence in COPD patients. COPD results in disturbed sleep architecture. REM sleep abnormality is most profound. All scores except Mallampati were predictors of OSA in COPD patients in Indian population. Discriminatory power of STOP-BANG was excellent.

Disclosure: No

P844 | Impact of using either the apnea-hypopnea index or the respiratory disturbance index on the prevalence of obstructive sleep apnea

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Objectives/Introduction: Obstructive Sleep apnea (OSA) has been diagnosed using the apnea hypopnea index (AHI). More recently, the respiratory disturbance index (RDI) has been suggested instead, which adds the number of respiratory effort-related arousals (RERA) into the AHI calculation. This study evaluated the impact of using either AHI or RDI as a diagnostic measure on the prevalence of OSA.

Methods: This study was based on the EPISONO study, 3rd edition. Respiratory events were scored according to the American Academy of Sleep Medicine (AASM) Guidelines, 2012 edition. OSA was categorized using the same threshold values for both indexes, as follows: mild OSA (5-15), moderate OSA (5-30), or severe OSA (>30). The diagnosis of mild OSA was based on the indexes only, regardless of symptoms.

Results: The sample comprised 890 individuals (age: 42.29 ± 14.26; female: 55.16%). The average AHI was 9.48 ± 13.86 and the average RDI was 10.52 ± 14.10 ($t = 18$; $p < 0.001$). The prevalence of OSA according to the AHI was 43.37% ($n = 386$), being mild in 23.26% ($n = 207$), moderate in 11.57% ($n = 103$) and severe in 8.54% ($n = 76$). The prevalence of OSA according to RDI was 49.10% ($n = 437$), being mild in 26.07% ($n = 232$), moderate in 13.59% ($n = 121$) and severe in 8.54% ($n = 76$). The diagnosis of OSA (presence vs. absence of OSA) was the same using both indexes in 94.27% of the sample ($n = 839$), but 5.39% ($n = 51$) had a positive diagnosis only when using RDI. The OSA severity level was the same in 90.45% of the sample ($n = 805$) regardless of the index used, but was

divergent in 9.55% ($n = 85$). Among these, 5.73% ($n = 51$) changed from no to mild OSA, 2.92% ($n = 26$) changed from mild to moderate OSA, and 0.90% ($n = 8$) changed from moderate to severe OSA.

Conclusions: The inclusion of RERAs and the use of RDI on the evaluation of OSA does not change the diagnostic profile in most of the sample. The clinical profile of the individuals with a positive diagnosis according to the RDI only should be explored in further analysis, to evaluate whether the use of RDI represents either an improvement in diagnostic accuracy or an overestimation of OSA prevalence.

Disclosure: Yes

Conflict of Interest statement: GNP is a shareholder at SleepUp™, a Brazilian CBTi company, but attest that this position has no relationship with the aims, preparation or execution of this study. The other authors declare that they have no competing interests to disclose.This work was supported by grants from the Associação Fundo de Incentivo à Pesquisa (AFIP), the Coordenação de Aperfeiçoamento de Pessoal de Nível Superior (CAPES), and the Conselho Nacional de Desenvolvimento Científico e Tecnológico (CNPq). MLA and ST are CNPq fellowship recipients.

P845 | Nocturnal oxygen desaturation indices of infants with bronchopulmonary dysplasia on long term oxygen therapy at home

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Background: Overnight pulse oximetry is used for monitoring infants with bronchopulmonary dysplasia (BPD) that require long term oxygen therapy (LTOT) at home and is helpful in reducing the duration of treatment (1). The index of 3% oxygen desaturation from baseline (3ODI) is a useful marker in screening for obstructive sleep apnoea with overnight pulse oximetry. In healthy infants, published evidence shows that sleeping oxygen desaturation indices are significantly higher compared to older children (2).

Aim and methods: Our aim was to determine overnight sleeping desaturation indices in infants discharged from the neonatal unit on LTOT and at the time of LTOT discontinuation. We retrospectively reviewed overnight pulse oximetry data of infants discharged from the neonatal unit over a 5 year period (2016–2021). Prism Graphpad was used for statistical analysis.

Results: We identified 20 infants (9 female) with mean (95% Confidence intervals) of gestational age at birth 27.3 weeks (26.1–28.5), weight at birth 823 g (671–976), age at discharge from the unit 46.4 weeks (43–49.9), weight at discharge 3874 g (3239–4509) and oxygen flow at discharge 0.17 L/min (0.1–0.2). We analysed data from 48 overnight pulse oximetry studies performed in those infants with mean corrected gestational age 7.3 months (5.7–9). 27 studies were performed off oxygen during the process of weaning. Mean (95% CI) oxygen saturation (SpO2) was 96.5% (95.7–97.3) and mean percentage of time below 90% SpO2 was 4.71% (0.67–8.8). Desaturation indices showed mean 3% oxygen desaturation index (3ODI) of 10.4 dips/hr (6.22–14.5), mean minimum SpO2 value of 72.1% (67.5–76.5) and mean dip nadir 88.4% (86.7–90). When comparing pulse oximetry study data performed on oxygen therapy and those off oxygen there was no significant difference in 3ODI ($p = 0.349$), mean dip nadir ($p = 0.0551$) and minimum SpO2 value ($p = 0.0541$).

Conclusion: 3ODI is higher in infants on LTOT compared to reported values in healthy children and similar to reported values in younger healthy infants. Infants on LTOT with clinical suspicion of sleep disordered breathing may require further evaluation with cardiorespiratory polygraphy.

Disclosure: No

P846 | Physical fitness, respiratory and cognitive profile in POST-COVID-19 patients and associations with OSAS risk strata

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Introduction: The aim of our study was to investigate the relationship between exercise response indices and cognitive performance in POST-COVID-19 patients, and its interplay with obstructive sleep apnea syndrome (OSAS) risk.

Methods: 86 patients who were infected with SARS-CoV-2 respiratory infection («Delta» strain: 100%, Age: 52 ± 11.1 yrs, BMI: 28.6 ± 4.5 kg/m^2, neck circumference: 38,9 ± 4 cm, Male: 73%), comorbidity-free comprised the population of our study. Based on STOP-BANG scores, they were divided into 3 groups: Low Risk (N1 = 32), Moderate (N2 = 24) and High (N3 = 30). Measurements and assessments included somatometry, oxidative burden and antioxidant capacity measurements, the30seconds Sit- To-Stand, reaction time, handgrip strength and 6-MWT, body composition analysis. Cognitive impairment was considered at a Montreal Cognitive Assessment (MoCA) score cut-off ≤24/30).

Results: The results have shown a correlation between OSAS risk and age ($H(2) = 11,553$m $p < 0.05$), BMI ($H(2) = 14,941$, $p < 0.01$), visceral fat ($H(2) = 29,117$, $p < 0.01$), neck circumference ($H(2) = 33,581$, $p < 0.01$), waist circumference ($H(2) = 26,809$, $p < 0.01$), MoCA subdomain of Memory Recall ($H(2) = 9,987$, $p < 0.01$), Borg score for dyspnea during peak of exercise ($H(2) = 7,757$, $p < 0.05$). Post hoc analysis among groups showed High Risk differs from Low in Age ($M(3) = 57,9$, $SD(3) = 2,3$, $M(1) = 48,4$, $SD(1) = 2,2$, $p < 0,05$), BMI ($M(3) = 31,7$, $SD(3) = 1,2$, $M(1) = 27,4$, $SD(1) = 1,1$, $p < 0,05$), visceral

fat (M(3) = 16,1, SD(3) = 1,1, M(1) = 10, SD(1) = 1,1, $p < 0,01$), neck (M(3) = 42,5, SD(3) = 0,9, M(1) = 36,4, SD(1) = 0,8, $p < 0,01$) and waist circumference (M(3) = 111,7, SD(3) = 3,7, M(1) = 95,5, SD(1) = 3,5, $p < 0,05$), Borg scale for dyspnea during peak of exercise (M(3) = 1,9, SD(3) = 0,4, M(1)= 1,3, SD(1) = 0,4, $p < 0,05$) and in difference of SpO2 before and after exercise (ΔSpO2) (M(3) = 2,4, SD(3) = 0,6, M(1)= 2,7, SD(1) = 0,6, $p < 0,05$). The sub-domain of Memory Recall in MoCA was significantly different among all groups [Low-Moderate (M(1) = 4,3, SD(1) = 0,3, M(2) = 3,3, SD(2) = 0,4, $p < 0,05$) and Low-High (M(1) = 4,3, SD(1) = 0,3, M(3) = 3,1, SD(3) = 0,3, $p < 0,05$)].

Conclusion: To conclude, in POST-COVID-19 patients who are high risk for OSAS, despite satisfying exercise response, there is an increased subjective sense of intensity associated with impaired diffusive function as well as cognitive performance.

Disclosure: No

15: SLEEP DISORDERS - CIRCADIAN RHYTHMS

P262 | Discrepancy between desired time in bed and desired total sleep time in patients with cancer: DBST and relationship with insomnia severity or sleep onset latency

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Objectives/Introduction: Patients with cancer experience insomnia or sleep disturbances. This study aimed to explore whether the discrepancy between a patient's desired time in bed and total sleep time (DBST) in-dex is a measurement tool for insomnia severity or sleep onset latency [SOL] in patients with cancer.

Patients and methods: This retrospective medical records review study gathered clinical information and rating scale scores including Insomnia Severity Scale (ISI), Cancer-related Dysfunctional Beliefs about Sleep scale (C-DBS), Patient Health Questionnaire-9 items (PHQ-9), State subcategory of State and Trait Anxiety Inventory, and Short form of Fear of Progression Questionnaire. Sleep indices of time variables (bedtime, sleep onset time, and wake-up time), duration variables [SOL, time in bed (TIB), time in bed for 24 h (TIB/d), and duration from wake-up time to bedtime (WTB)], and the DBST index were calculated.

Results: A total of 146 patients were included in the analysis. The ISI score was predicted by PHQ-9 ($\beta = 0.34$, $p < 0.001$), C-DBS ($\beta = 0.17$, $p = 0.034$), and DBST index ($\beta = 0.22$, $p = 0.004$) with a significant correlation with the DBST index ($r = 0.19$, $p = 0.020$). The DBST index was significantly correlated with long SOL ($r = 0.23$, $p = 0.005$). Long SOL was predicted by early bedtime ($\beta = 0.18$, $p = 0.045$), short WTB (β=-0.26, $p = 0.004$), and high DBST index ($\beta = 0.19$, $p = 0.013$).

Conclusion: The DBST index was significantly correlated with a predicting variable each for insomnia sever-ity and SOL in patients with cancer.

Disclosure: No

P565 | Delayed sleep-wake phase disorder (DSWPD) in a patient with pineal cyst

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Introduction: DSWPD, being the most frequent of circadian rhythm sleep-wake disorders (CRSWD), is often encountered in adolescents and young adults, but can persist in adulthood, and is characterized by sleep onset and wake times that are typically delayed 3 to 6 h compared to conventional sleep-wake times. The impact of pineal gland abnormalities, and pineal cyst in particular, on the sleep-wake cycle remains controversial.

Methods: A 19-years old male suffering from a delayed sleep-wake cycle since the age of 11 was diagnosed with a pineal cyst (size 6.5 × 9.5 × 7.4 mm) by magnetic resonance imaging (MRI). The clinical assessment identified an average subjective sleep duration of 7 h per night, with a sleep onset around 4am, and a sleep offset around 1pm, which was confirmed by sleep diary and actigraphy. After completing a full polysomnographic recording (PSG) with salivary melatonin sampling and core body temperature measurements, and monitoring sleep-related symptoms by psychometric scales, chronotherapy consisting of exogenous melatonin administration and bright light exposure was initiated and continued for 7 months.

Results: At habitual bedtime (2 a.m.), a rise in melatonin production (DLMO) was not yet observed, and the maximum production was measured at 10 a.m., confirming the diagnosis of DSWPD. However, since no measurements were done during sleep, data concerning the evolution of the curve and the peak production are lacking. 2 mg of exogenous melatonin was administered 5 h prior to estimated DLMO (10 p.m.), with a gradual increase in dosage to 6 mg over the months, as well as an slight advancement in administration to 9 pm. Concomitant bright light therapy (Luminette®) was started after 2 months (30 min after sleep offset), and the hypnotic medication was gradually decreased and discontinued (prothipendyl 80mg after 2 months and mirtazepine 30 mg after 7 months) without any deterioration of subjective sleep quality and duration or relapse of comorbid anxio-depressive symptoms. Sleep-wake cycle was gradually advanced by 3 h and stabilized between 1 a.m. and 10 a.m.

Conclusions: Though suspected, an altered melatonin production was not confirmed by salivary sampling. Chronotherapy proved to be successful in treating DSWPD in a patient with pineal cyst.

Disclosure: No

16: SLEEP DISORDERS - INSOMNIA

P264 | Exploring current sleep health issues of forcibly displaced people from Ukraine with text-based digital agent, pilot study

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Introduction: The war in Ukraine is a traumatic event on a global scale, leading to many displaced individuals potentially requiring psychological support. At scale, such support can be delivered using digital interventions. Conversational agents, also called chatbots, represent one type of digital interventions, in which individuals autonomously have conversations through text-based messengers like Telegram. This pilot study aimed to identify current sleep problems in a selected population – forcibly displaced people from Ukraine – to create a digital tool to improve sleep health.

Methods: We created a chatbot on the Telegram messenger platform, containing questionnaires (including the Insomnia Severity Scale, ISI) and psychoeducational recommendations in three categories (routine, environment, lifestyle). The evidence-based recommendations were geared to reflect basic facts about sleep health.

Results: A total of 1155 people (54% female) participated in the pilot study. The average age of the respondents was 25.27 ± 12,7 years. 219 participants (19%) had children. User conversion, that is, participation in the chatbot, was 68%. 66% of users reported knowing about the importance of sleep. Based on the ISI results, 7% had no insomnia, 29% had subthreshold insomnia, 50% had moderate insomnia, and 14% had severe insomnia. 93% of individuals answered that their sleep problems negatively affected their daily functioning.

Conclusions: Through our chatbot, we detected moderate to high prevalence of insomnia symptoms, demonstrating the impact of war in forcibly displaced individuals. A conversion level, which is considered the main key performance indicator of digital platforms, suggests that the research format may be attractive to participants. Improving sleep health can contribute to daily functioning and quality of life of forcibly displaced people.

Disclosure: No

P265 | An online behavioural intervention rapidly improves acute insomnia severity and subjective mood during the COVID-19 pandemic

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Objectives/Introduction: Stressful life events, including the COVID-19 pandemic, can cause short-term disruptions to sleep. Early interventions may prevent short-term problems from progressing to insomnia disorder, and online interventions can be used to simultaneously treat a large number of individuals. This study aimed to assess if an online behavioural intervention, which has been successfully used alongside cognitive behavioural therapy for insomnia, could reduce acute insomnia severity in poor sleepers. It was hypothesised that the intervention would reduce insomnia severity in poor sleepers.

Methods: In this online stratified randomised controlled trial, poor sleepers ($n = 241$), who met DSM-5 criteria for acute insomnia, were randomly allocated to an intervention, or wait-list group, where they received the intervention immediately or after 28 days. The intervention was an online version of a self-help leaflet which improves sleep by identifying and addressing sleep-related dysfunctional thinking. The primary outcome measure was insomnia severity, measured using the Insomnia Severity Index (ISI; Bastien et al., 2001) at baseline (Day 0 or Day 28), and 1-week, 1-month and 3-months post-intervention. Secondary outcome measures included subjective anxiety and depression (7-item Generalised Anxiety Disorder Questionnaire (GAD-7; Spitzer et al., 2006); 9-item Patient Health Questionnaire (PHQ-9; Kroenke et al., 2001). The short-term effectiveness was compared pre/post-intervention using a repeated measures *t*-test, and long-term (1-week, 1-month and 3-month follow-up) using a one-way analysis of variance.

Results: Complete data were obtained from 78 participants at 1-week and 41 participants at 3-months follow-up. Relative to baseline, ISI scores significantly decreased 1-week post-intervention ($M = 18.92 \pm 5.78$ vs. 12.02 ± 4.73; $t(77) = 12.62$, $p < 0.001$, $d_z = 1.43$). The effectiveness of the intervention was maintained 3-months post-intervention ($F(2.37, 94.70) = 35.01$, $\eta^2 p = 0.47$); follow-up comparisons showed a significant difference only between baseline and 1-week follow-up. GAD-7 and PHQ-9 scores were significantly reduced 1-week post-intervention and maintained at 3 months follow-up.

Conclusions: An online behavioural intervention can rapidly ameliorate insomnia severity, and improve subjective anxiety and depression, in individuals with acute insomnia. Importantly, this beneficial effect is maintained at up to three months follow-up. Larger trials for this intervention are now warranted.

Disclosure: No

P266 | Validation studies of questionnaire-based insomnia and restless legs syndrome in a HUNT4 sub-study

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Introduction: The aim of the study was to validate questionnaire-based insomnia and restless legs (RLS) diagnoses against a semi-structured face-to-face interview, and to stratify validity by age category (below vs. above 65 years). The objectives were to estimate

sensitivity, specificity and Cohen's kappa statistic (κ) of established and explorative diagnoses based on the Karolinska Sleep Questionnaire (KSQ), the Insomnia Severity Index (ISI), the seven-item Cambridge-Hopkins questionnaire for RLS (CH-RLSq) and a single diagnostic question for RLS.

Methods: We diagnosed insomnia and RLS according to the fifth edition of the Diagnostic and Statistical Manual of Mental Disorders and the updated 2012 criteria by the International Restless Legs Syndrome Study Group. Out of 1,200 invited participants of the fourth Nord-Trøndelag Health Study, 232 (19%) participated.

Results: Thirty-three percent (95% CI 27-39%) of participants had DSM-5 insomnia and 28% (95% CI 22-34%) had unspecified IRLSSG-based RLS. A four-item KSQ diagnosis, requiring a daytime consequence at least once a month may be a brief but valid alternative ($\kappa = 0.54$). KSQ diagnoses requiring a daytime consequence of insomnia at least three times weekly showed poor sensitivity and underestimation of insomnia. The ISI (cut-off 12) was the most valid diagnosis for insomnia overall ($\kappa = 0.61$). The complete CH-RLSq diagnosis showed acceptable validity ($\kappa = 0.37$) and high specificity but poor sensitivity. Brief CH-RLSq diagnoses of up to three items were also acceptably valid ($\kappa \leq 0.45$) but gravely overestimated prevalence, as did the single diagnostic question ($\kappa = 0.47$).

Conclusions: Questionnaire-based diagnoses were generally less valid for RLS than for insomnia, among participants above 65 years of age, particularly the compound single diagnostic question for RLS. We have found a more valid four-item alternative to the KSQ diagnoses for insomnia used in previous HUNT studies. We fail to find a strongly valid questionnaire-based RLS diagnosis using up to three items. RLS may therefore need increased focus towards creating even better questionnaires, in future sleep research.

Disclosure: No

P267 | Measurements of sleep stages at home by means of the home sleep test

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Introduction: Measurements of sleep have a high value in the diagnostics of insomnia. Sleep is classifified by recording brain waves, eye movements and muscle activity. According to AASM criteria precisely defined lead points are necessary. The correct application of the electrodes must be done by trained personel, subjects are not able to apply them appropriately by themselves. Therefore, measurements are performed in the sleep laboratory. The capacity for polysomnography is limited, waiting times are long. The recording times in the laboratory are determined by the structure of the institution and working h of the staff. Environmental factors such as bed, mattress, sleeping room, light, temperature, noise, meal times etc. are different at home. Sleep in the laboratory usually does not correspond to the own home environment. Night-to-night variability often requires repetition of the examination. Simple and self-applicable systems for measuring sleep stages are of great advantage.

Methods: HST (Home Sleep Test) is a small lightweight sensor applied on the forehead by disposable electrodes to record EEG, EOG, EMG to determine sleep stages and arousals. The device is designed to be used by the patient directly at home. Electrode impedance is continuously recorded to determine the quality of the signals and to exclude artefacts. Data are transferred wirelessly to a tablet instructing the patient step by step about the procedure of biological calibration according AASM-criteria. Together with EXG signals movement and position of the head is recorded as well as ambient light to determine TIB. Audio signal is recorded by the tablet to analyze snoring.

Data transfer to the cloud is done after finishing the recording, for manual scoring.

Results: We compared HST-measurements with the results of polysomnography and found a good correlation for the sleep parameters.

Conclusion: HST measurements have advantages over polysomnography for the diagnosis of insomnia and the exclusion of other sleep-related diseases because they can be carried out in the patient‘s own home and can easily be repeated several times.

Disclosure: No

P566 | Distinct alterations of functional connectivity in the basal forebrain subregions in insomnia disorder

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Introduction: Insomnia Disorder (ID) is a common sleep-wake disorder and often considered to be a disorder of central nervous system hyperarousal and increased cortical activation. Previous animal studies have suggested that the cholinergic basal forebrain (BF) plays an important role in sleep–wake regulation and is implicated in cortical arousal and activation.

However, less is known currently regarding the abnormal BF related neuronal circuit in human patients with ID. In this study, we explored alterations of functional connectivity (FC) in subregions of the BF and the relationship between FC alterations and sleep and mood measures in ID.

Methods: One hundred and two ID patients and ninety-six healthy controls (HC) were included in this study. Each subject underwent both the resting-state fMRI and high-resolution anatomical scanning. All participants completed the sleep and mood questionnaires in ID patients. Voxel-based resting-state FC in each BF subregion (Ch_123 and Ch_4) were computed based on the DPARSF toolbox. For the voxel-wise FC differences between groups, a two-sample t-test was performed on the individual maps in a voxel-by-voxel manner. The results were considered significant at $p < 0.05$, family-wise error (FWE) corrected at cluster level, based on a voxel-level threshold $p < 0.01$. To examine linear relationships with sleep and mood measures, pearson correlations

were calculated between FC alterations and sleep and mood measures, respectively.

Results: Two-sample t-test revealed that ID group showed significantly decreased FC between medial superior frontal gyrus and Ch_123 compared to HC. However, increased FC between midbrain and Ch_4 was found in ID compared to HC based on the voxel-wise analysis. The correlation analysis only revealed that the altered FC between the midbrain with Ch_4 was significantly negatively correlated with the self-rating anxiety scale.

Conclusions: The decreased FC between Ch_123 and medial superior frontal gyrus and increased FC between midbrain and Ch4 indicate distinct roles of subregions of BF underlying the neurobiology of ID. The FC alterations of the BF subregions may reflect the abnormal and specific BF subregion neurotransmitter projections in ID.

Disclosure: No

P567 | Non-linear associations between insomnia symptoms and circadian preferences across the lifespan in males and females from the general population

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Study objectives: To measure the non-linear relationship between circadian preferences (eveningness reflected by bedtime, wake time, morning affect, and peak performance time) and insomnia symptoms (difficulties initiating sleep, difficulties maintaining sleep, and nonrestorative sleep), and how this relationship differs across ages and sexes.

Methods: The data came from the Lifelines cohort sub-study Comorbid Conditions of ADHD (CoCA) in which 37,688 participants (4–91 years old, 42.4% males) from the Dutch general population completed digital surveys about insomnia (Minimal Insomnia Scale) and circadian preferences (Children's Chronotype Questionnaire or Composite Scale of Morningness). Non-linear associations between insomnia and circadian preference were tested using generalized additive modeling.

Results: Insomnia severity peaked at the age of 20–30 years and thereafter decreased (nonrestorative sleep, difficulties maintaining sleep) or stabilized (difficulties initiating sleep). Eveningness peaked at the ages of 16–19 years (bedtime, wake time) or 20–30 years (morning affect, peak performance time). Circadian preference related to insomnia exponentially (wake time, morning affect, peak performance time) or quadratically (early and late bedtime). These relationships were similar for males and females but varied somewhat in shapes and strengths across the lifespan.

Conclusions: Future studies and prediction models need to account for the distinct non-linearity and symptom-specificity of the relationship between circadian preference, insomnia, and age. Two distinct patterns in how dimensions of bedtime/wake time and morning affect/peak performance time related to insomnia illustrated that the relationship between circadian preference and insomnia depends on the operationalization of circadian preference, which may explain the inconsistencies in prior findings.

Disclosure: No

P568 | The effect of pre-sleep arousal on the association between aggression and insomnia in youths

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Introduction: Previous research suggested aggression, a propensity to hold hostile beliefs about others and exhibit physical or verbal behaviors, as a risk factor for insomnia. Meanwhile, hyperarousal, characterized by a 24-h period of heightened physiological and cognitive activity, is considered a key feature of insomnia. While some research has suggested hyperarousal as a potential mechanism underlying the relationship between aggression and sleep disturbances, most existing studies were conducted in middle-aged and older adults. The current study aimed to explore the potential mediating roles of pre-sleep arousal in the relationship between aggression and sleep disturbances in youths with insomnia.

Method: The current study recruited 85 treatment-seeking youths with insomnia based on the criteria of the Diagnostic and Statistical Manual of Mental Disorders 5th edition (DSM-5) (aged 15–23 years old, mean age 19.41 years, female 55.8%). Participants completed self-reported measures of aggression (i.e., Buss-Perry Aggression Questionnaire), insomnia severity (i.e., Insomnia Severity Index), and cognitive and somatic pre-sleep arousal (i.e., Pre-sleep Arousal Scale). Mediation analyses were performed by PROCESS Macro, using 5000 bootstrapped samples and 95% confidence intervals, to investigate the association between aggression and insomnia severity with pre-sleep arousal as mediator.

Results: Regression analyses revealed that aggression was significantly associated with pre-sleep arousal ($B = 0.20$, $p < 0.01$), especially cognitive arousal ($B = 0.13$, $p < 0.01$), and was positively associated with insomnia severity ($B = 0.02$, $p = 0.07$) at marginal significance. Furthermore, pre-sleep cognitive arousal partially mediated the relationship between aggression and insomnia severity (ab = 0.02, 95% CI = 0.0031, 0.0517, partial mediation: 49.5% of the total effect).

Discussion: Our results found pre-sleep cognitive arousal as a significant mediator in the association of aggression and insomnia severity. The current study has laid the foundation for future clinical research to better identify individuals with predisposing risk factors (e.g., a higher degree of aggression) and to consider addressing pre-sleep cognitive arousal when delivering sleep intervention to this population. Future research could also consider adopting objective measures and utilizing a longitudinal design to further validate the relationship among these variables.

Disclosure: No

P569 | The "i-Sleep & BioClock" blended e-health intervention for university students

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University students often suffer from sleep problems which affect their mood, energy levels, daily functioning, and quality of life. Irregular sleep-wake patterns contribute to the disruption of their circadian rhythms. The aim of this study is to develop, implement and evaluate a blended e-health intervention that targets the biological clock and improves the sleep patterns of university students in order to prevent the development or exacerbation of mental health problems. We adapted an existing sleep intervention ('i-Sleep') to target the needs of students and added elements of the biological clock such as psychoeducation on chronotypes and light exposure. The adapted "i-Sleep & BioClock" intervention consists of 5 weekly online lessons, supported by an e-coach, and includes elements that are commonly incorporated in face-to-face Cognitive Behavioural Therapy for Insomnia. The intervention address topics such as the biological clock, sleep hygiene, stimulus control, sleep restriction, worrying and relaxation, and dysfunctional thoughts about sleep. In this open pilot trial, we aim to include 50 students from seven Dutch Universities (Leiden University, VU Amsterdam, University of Amsterdam, Utrecht University, Maastricht University, Erasmus University Rotterdam, and Inholland University of Applied Sciences). The primary aim is to evaluate the e-health modules, in terms of overall acceptability, feasibility, and usability. The secondary aim is to evaluate preliminary pre-test post-test effectiveness on the following outcomes: insomnia severity (Insomnia Severity Index), subjective sleep parameters (7-day sleep and light exposure diary before and after the intervention), depression (Patient Health Questionnaire-9), anxiety (General Anxiety Disorder-7), functioning (Work and Social Adjustment Scale), and quality of life (Mental Health Quality of Life questionnaire). Light exposure and circadian shift will be examined as mediators. Data collection started on May 6th 2022.

Disclosure: No

P847 | Usefulness of biomarkers for the diagnosis of insomnia

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Objectives: Various physiological parameters have been found to differ between insomniacs and normal sleepers. Evidence, however, regarding the diagnostic usefulness of these parameters is very limited. Purpose of this study was to systematically evaluate potential biomarkers for diagnosing insomnia and to compare them with existing psychometric instruments.

Methods: The study was initiated by the World Federation of Societies of Biological Psychiatry Task Force on Sleep Disorders with the aim to create a consensus paper, which is currently being finalised for submission. Studies comparing patients with insomnia to normal sleepers on psychometric measures and fourteen biological markers (based on polysomnography, EEG, actigraphy, neuroimaging, EKG, skin conductance, measures of metabolism, and hormonal activity) were selected and reviewed by the authors. Whenever needed, appropriate Effect Size values (Cohen's *d* or Hedge's g) were calculated, based on the data available in each study. Next, a grading system was developed for assessing the diagnostic validity of various measurements, based on the degree of pertinence of their reported indices to diagnose insomnia (graded from A for the most pertinent to D, not pertinent) and on their diagnostic accuracy potential (graded in four levels, from 1 highest to 4 nonexistent).

Results: Psychometric instruments showed the highest diagnostic performance: Diagnostic grading A1 or A2 for all studies of rating scales and questionnaires for the assessment of insomnia; A1, A2, B1 or B2 for rating scales and questionnaires for assessing beliefs and attitudes about sleep; A2 or C2 for MMPI. Biological measurements potentially useful in diagnosing insomnia were polysomnography-derived cyclic alternating pattern (A1 in one study), actigraphy (A1 or A2) and BDNF levels (A1 or B1), followed by heart rate around sleep onset (B1 to B3), certain neuroimaging patterns (B1 for three studies, C3 for one) and deficient melatonin rhythm (B2 for two studies); yet, these findings need replication, as well as establishment of commonly accepted methodology and diagnostic cut-off points.

Conclusions: Psychometric instruments are confirmed to be the gold standard for diagnosing insomnia. Six biomarkers among fourteen evaluated emerge as being potentially useful for this purpose.

Disclosure: No

P848 | A new short form of dysfunctional beliefs and attitudes about sleep (DBAS-SF-16): reliability and factorial structure

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Objectives/Introduction: The Dysfunctional Beliefs and Attitudes about Sleep Scale (DBAS) is the most widely used instrument for assessing sleep-related cognitions. Abbreviated versions include different items and subscales. DBAS-16 presents better internal consistency than DBAS-10 and DBAS-SF, a reproducible 4-factor structure, and strong validity. However, not all items discriminate patients with insomnia from good sleepers, and some subscales have poor internal consistency. This study aimed to develop a more suitable short version of the DBAS able to differentiate individuals with/without insomnia.

Methods: A total of 824 participants (18–85 years), 201 with insomnia disorder from a Sleep Medicine Center and 623 from the community completed the DBAS-30 Portuguese version. Two groups were formed: *Insomnia Group* (IG), $n = 355$ (261F, 94M; 47.90 ± 13.25 years) combining 201 patients with insomnia disorder and 154 community volunteers presenting sleep difficulties as evaluated through a "yes-no" question and ISI scores ≥14; and *Normal Sleepers Group* (NSG), $n = 292$ community volunteers (237F, 54M; 39.90 ± 13.88 years) without significant sleep problems ("yes-no" question and ISI < 14).

For a short DBAS scale, sixteen items were selected sequentially, based on the items that significantly discriminated between IG and NSG, followed by a top-down procedure using several psychometric criteria. Analyses referring to the short form (DBAS-SF-16) were performed with the extracted items from the DBAS-30.

Reliability was evaluated using Cronbach's coefficients. Factor structure was investigated in IG using Exploratory Factor Analysis (EFA) with Principal Axis Factoring (PAF) followed by Direct Oblimin rotation, and with Robust Diagonally Weighted Least Squares (RDWLS) using Parallel Analysis followed by Direct Oblimin rotation.

Results: Cronbach's alpha was 0.87 showing good internal consistency. All items contributed to the internal consistency. The corrected item-total correlation varied between 0.30–0.66. In IG and NSG, alpha coefficients were 0.82 and 0.81.

EFA with PAF yielded a 4-factor solution (total explained variance = 53.4%). Alpha coefficients for F1, F2 and F3 were acceptable (0.77, 0.66 and 0.63) and poor for F4 (0.49). EFA with RDWLS produced a 2-factor statistically more robust solution (total explained variance = 49.5%). Acceptable alpha values were obtained for both factors (0.77 and 0.69).

Conclusions: DBAS-SF-16 is a promising reliable tool for clinical and non-clinical settings.

Disclosure: No

P849 | Insomnia mediates the influence of reassurance-seeking behavior and viral anxiety on preoccupation with COVID-19 among the general population

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Objectives: We explored in this study whether insomnia, viral anxiety, reassurance-seeking behavior, and preoccupation with COVID-19 are related among the general population. As well, we explored the possibility that insomnia may mediate the association between COVID-19 viral anxiety and preoccupation.

Methods: During November 9–15, 2021, 400 participants voluntarily completed this survey, and participants' age, sex, living location, and marital status were collected. Responses to questions about COVID-19, were also gathered, and their symptoms were rated using the Obsession with COVID-19 scale (OCS), Coronavirus Reassurance-Seeking Behaviors Scale (CRBS), Fear of COVID-19 scale (FCV-19S), and Insomnia Severity Index (ISI). The mean and standard deviation of participants' demographic characteristics and rating scale scores are summarized. Two-tailed significance was determined by a p value of 0.05. Correlation analysis was performed using Pearson's correlation coefficient. We used linear regression to examine which variables can predict obsession with COVID-19. The bootstrap method with 2,000 resamples was implemented to determine whether insomnia mediates the influence of viral anxiety or reassurance seeking behavior on preoccupation with COVID-19.

Results: A total of 400 participants were analyzed in this study. Preoccupation with COVID-19 was predicted by young age ($\beta = -0.08$, $p = 0.012$), CRBS ($\beta = 0.52$, $p < 0.001$), FCV-19S ($\beta = 0.30$, $p < 0.001$), and ISI ($\beta = 0.07$, $p = 0.029$) (adjusted $R^2 = 0.62$, $F = 163.6$, $p < 0.001$). Mediation analysis showed that insomnia partially mediates the influence of reassurance seeking behavior and viral anxiety on preoccupation with COVID-19.

Conclusions: Sleep disturbances can contribute to a vicious cycle of hypochondriacal preoccupation with COVID-19. In order to reduce an individual's viral anxiety, insomnia symptoms must be addressed.

Disclosure: No

P850 | Characterising sleep disturbance and psychological symptoms in patients over a three year period: a retrospective study of a UK sleep clinic

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Objectives/ Introduction: This retrospective study will aim to provide an in depth description of 250 patients' sleep complaints, daytime and nighttime disturbance, and psychological and health symptoms

over a three year period. All patients presented with insomnia and commenced CBT-I. A cross-sectional analyses describes the clinical characteristics at the point of initial assessment and CBT-I outcomes. A further prospective follow-up is planned to examine the outcomes of the same cohort.

Methods: A cross-sectional, retrospective, single site study in a UK sleep clinic. Data were from 250 patients' initial assesments including ISI, ESS, FSS, HADS and self-reported sleep and health problems. All patients presented with a complaint of insomnia and commenced CBT-I. The outcomes are discussed.

Results: Patients will be characterised on self-reported measures completed at the start of treatment. Analyses are ongoing and a prospective follow-up is planned with the same cohort.

Conclusion: This study will shed significant insights on the distribution of depressive, anxiety, affective and other sleep disorder symptoms in patients who have a presenting complaint of insomnia.

Disclosure: No

17: SLEEP DISORDERS - PARASOMNIAS

P570 | Source EEG connectivity during NREM sleep parasomnia episodes

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Background: NREM parasomnias are recurrent nocturnal events characterized by complex behaviors acted out in a state of partial disconnection from the surroundings. Recent research revealed that patients often experience oneiric or even hallucinatory mental states during these events. Limited electroencephalographic (EEG) data suggested that NREM parasomnias originate as partial arousal out of NREM sleep, where local islands of wake—like activity coexist with large and often highly synchronous slow waves. We herein aimed to provide preliminary evidence in support of the hypothesis that brain effective connectivity during clinical episodes is intermediate between sleep and wakefulness.

Methods: We collected 2 consecutive high-density EEG sleep recordings from a 12-year-old drug-naïve child with a positive personal and family history of sleepwalking and confusional arousals. Source power topography and phase transfer entropy (PTE) connectivity were computed during 3 different conditions: (1) minor NREM sleep parasomnia episodes, more specifically confusional arousal episodes (from −6 to +18 seconds after motor onset), (2) baseline slow wave sleep preceding each episode (from – 3 to -2 min before onset), (3) relaxed wakefulness (1-minute taken before sleep onset).

Results: Beta and delta PTE connectivity during wakefulness and slow waves sleep displayed drastically different patterns: complex, integrated and well differentiated networks during wakefulness and much more stereotyped and differentiated connections during slow wave sleep. During confusional arousal episodes (starting from few seconds prior to their motor onset), connectivity networks closely resembled those observed during wakefulness, despite a massive persistence (or even an increase) in delta activity. Intriguingly, bilateral Broadman area 7 and right Broadman areas 39 and 40 were relatively spared by this massive delta power increase, while beta activity, typically low during slow wave sleep, globally increased to levels higher than wakefulness during confusional arousal episodes.

Conclusions: PTE connectivity clearly pointed to a close similarity – although not an identity – between brain networks during wakefulness and confusional arousals. These data are in line with the hypothesis that patients are conscious during NREM sleep parasomnia episodes and suggest that EEG effective connectivity is probably a more reliable measure of consciousness than traditional EEG power.

Disclosure: No

18: SLEEP DISORDERS - MOVEMENT DISORDERS

P269 | Combined effects of botulinum toxin injection and oral appliance therapy on sleep bruxism: a randomized controlled trial

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Introduction: Sleep bruxism (SB) is defined as stereotyped oromandibular activity during sleep characterized by teeth grinding and clenching. There are treatment modalities for the management of SB, such as an oral appliance (OA), behavioral approaches, and pharmacological management. Recently botulinum toxin (BoNT) injection is widely used for SB management. In this randomized study, the effect of a single treatment with BoNT on SB was compared as a stand-alone treatment and in combination with OA therapy.

Methods: Volunteers aged 20–45 years with masseter hypertrophy were randomly assigned to one of two groups: the non-OA group and the OA group. The non-OA group received BoNT injections alone, whereas the OA group received an OA in addition to BoNT injections. Changes of EMG amplitude of SB were evaluated by portable electromyography (EMG) before and 4, 8, 12, and 24 weeks after injections in both groups. Statistical significance was set at $p < 0.05$. All statistical analyses were performed using SPSS version 26.0 (IBM Corp., Armonk, NY, USA). Data are presented as means and standard deviations.

Results: A total of 30 volunteers (fifteen subjects in each) were enrolled. In both groups, the peak amplitude and average amplitude of EMG bursts decreased, with a significant interaction between group ($p = 0.046$) and time ($p < 0.001$), although the overall reduction was at a similar level at 24 weeks. However there was no significant difference between the groups.

Conclusion: We can use BoNT-A as an effective modality in reducing the intensity of masticatory muscle during SB along with OA. In the future, we need randomized, double-blind, placebo-controlled clinical studies with an accurate SB diagnosis by several consecutive PSG recordings and large sample size.

Disclosure: No

P270 | Birds eye view to evaluation of young syndrome patient with nocturnal movements: a case report

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Youngs syndrome is an age-old puzzle for pulmonologists, the path from diagnosing to managing its complication is very long and often frustrating both for the patient and the clinician themselves. We Present a case report of evaluation of Sleep related breathing disorder in a patient with Youngs Syndrome. A follow up patient of Youngs Syndrome was brought by his mother on witnessing abnormal breathing and excessive movement at night. The episode were described as choking and bilateral lower limb movements. Patient had no complains of excessive day time sleepiness, morning headaches, nocturnal awakening. Bronchoscopy done during previous admission for exacerbation was suggestive of excessive airway collapsibility. After thorough investigation and ruling out convulsions, patient was planned for an overnight Polysomnography. The Sleep study was conducted in a level 1 Polysomnography Lab, ALICE, LDXN by Philips Respironics, software Sleepware G3.9.2. Videography recording of the patient confirmed the complaint, Detailed study of the hypnogram reflected postural sleep apnea on the onset of which patient had episodes Restless Leg movements during REM. It also reflected altered sleep architecture, both of NREM and REM and decreased sleep efficiency. Patient was advised Continuous Positive Airway Pressure (CPAP) device, myofascial exercise and tennis ball technique to which resulted in improvement of symptoms.

Bronchiectasis and airway remodeling in patient with young syndrome exposes to excessive collapsibility. This may inadvertently lead to obstructive episodes and trigger parasomnias.

This case report has to potential to initiate a deeper analysis and evaluation of Young Syndrome patients, and have a bird eyes view while evaluating chronic respiratory disorders and not neglecting breathing during Sleep.

This case report shall help our community serve better to the Young Syndrome population we encounter once in a while during our practice, and thus look beyond just managing bronchiectasis and Corpulmonale in these patients and have a holistic view considering Sleep Constitutes almost one third of a human life.

Disclosure: No

P571 | Differences in botulinum toxin injection into temporal muscles in sleep bruxism and chronic migraine

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Objectives: Botulinum toxin (BoNT) has been applied successfully to treat sleep bruxism (SB) and chronic migraine (CM). However, studies on injection protocols such as drug dosage and injection site in the temporal muscle have been rarely reviewed. Therefore, recent studies on the application of BoNT to the temporal muscle in patients with SB and CM was reviewed in this study.

Methods: In order to identify relevant studies on the application of BoNT to the temporal muscle in patients with SB and CM, thorough database search was conducted using Pubmed, Embase, and Google Scholar.

Results: A total of 16 articles for BoNT injection in SB and CM were reviewed. The search was limited to case studies and clinical trials of the application of BoNT to the temporal muscle in patients with SB and CM. The search strategy including the MeSH and text words applied in the initial search was ("sleep bruxism") AND ("chronic migraine") AND ("botulinum toxin") AND ("temporal muscle").

1. BoNT injection into temporal muscles in sleep bruxism

The target area should be deep temporal nerves in temporal muscles, so the injection points should be deep portion of the muscles peripherally. It is convenient to additionally specify the exact location of the injection site within the nine TM compartments to give the clinician's greater confidence to perform the injection.

2. BoNT injection into temporal muscles in chronic migraine

BoNT-A is injected superficially into the temporal region of the auriculotemporal nerve (ATN) distribution region. Because the ATN travels superficially over the temporal muscle, BoNT must be injected subcutaneously under guidelines based on clearly identifiable and consistent anatomical landmarks and reference axes.

Conclusion: Based on the anatomical considerations for of BoNT injection into temporal muscles, two different diagnoses including; SB, CM are reviewed. SB patients and CM patients should be treated by different injection method, respectively; the former, intramuscular injections for muscle targets, the latter, subcutaneous injections for sensory nerve targets. Clinicians should inject the BoNT under guidelines based on clearly identifiable and consistent anatomical landmarks and reference axes.

Disclosure: Yes

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19: SLEEP DISORDERS - HYPERSOMNIA

P271 | Temporal distribution of sleep onset REM periods and N3 sleep in the MSLT and night polysomnogram of Narcolepsy type 1 and other hypersomnias

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Introduction: The presence of ≥2 sleep onset REM periods (SOREMP) in the Multiple Sleep Latency Test (MSLT) and previous night polysomnogram (PSG) is part of the diagnostic criteria of narcolepsy, with every SOREM having the same diagnostic value, despite evidence suggesting that the sleep stage preceding SOREM is relevant to distinguish NT1 from other hypersomnias (OH). Also, the temporal distribution of SOREMPs and N3 could have distinctive patterns in NT1.
Methods: We reviewed consecutive five-nap MSLTs and their previous PSG from 92 adult patients with hypersomnolence and ≥1 SOREMPs. Wake/N1(W/N1)-SOREMPs, N2-SOREMPs and N3 sleep presence and time of appearance were analyzed.
Results: Forty-four patients had NT1 and 48 OH. There were 194 (73%) SOREMPs in MSLT naps/PSG from patients with NT1 (67% of them from W/N1), and 88 (31%) in OH, 19% from N1 ($p < 0.001$), none from wake. The presence of ≥2 MSLT SOREMPs had a 100% sensitivity for NT1 but only 48% specificity, whereas ≥2 MSLT W/N1-SOREMPs increased the specificity to 95% with 82% sensitivity. Three findings occurred only in patients with NT1: ≥4 MSLT SOREMPs plus PSG-SOREMP, direct wake-REM transitions and REM followed by N3. Patients with two-three MSLT SOREMPs had mainly OH (70%) but two findings were only seen in NT1 in this subgroup: an absence of N2-SOREMPs (50%) and a 4th nap W/N1-SOREMP (30%) whereas: a N2-SOREMP in the 5th nap (26%) only in patients with OH. Specificity for NT1 of a night SOREMP was only 50% in patients with 2-3 SOREMP. Patients with NT1 had a specific temporal distribution of SOREMPs and N3 sleep. W/N1-SOREMPs decreased throughout the day (from 78% in the 1st nap to 30% in the night, $p < 0.001$) whereas N2-SOREMPs did not change. This pattern was not seen in OH. A N2-SOREMP in the first nap had 75% negative predictive value for NT1 and an 85% positive predictive value in the night-PSG. Also, 5th nap N3 sleep was higher in NT1 than in OH (27% versus 6%, p:0.008).
Conclusion: Measuring the sleep stage sequence and temporal distribution of SOREMP and N3 helps identify patients with NT1 in the MSLT.
Disclosure: No

P272 | A study evaluating the novel situational sleepiness scale for children with narcolepsy

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Introduction: Monitoring of narcolepsy treatment response requires regular self-report of hypersomnolence. The novel Situational Sleepiness Scale (nSSS) was designed to address limitations of widely used Epworth Sleepiness Scale (ESS-CHAD), specifically:

1. To measure fluctuations of sleepiness across the day
2. To rate according to the child's usual, rather than prescribed activities
3. Include a visual analogue scale.

Aims of Study:

- To gain structured feedback from children with narcolepsy, their parents and sleep centre clinicians on the strengths and weaknesses of the nSSS compared to the ESS.
- To test children's ability to correctly interpret the visual analogue scale (VAS) and selected language of sleepiness.

Methods/materials: The study was advertised by Narcolepsy UK and Sleep Disorders Australia. Parents and children took part in semi-structured interviews over Microsoft Teams. The nSSS design was assessed using a cognitive interview approach. Children ranked the VAS and sleepiness language using an interactive white board. Interviews were transcribed and analysed. Clinicians gave feedback through a structured Microsoft forms questionnaire. Semantic thematic qualitative analysis identified key observations and opinions.
Results: Seven parents and four children, (aged 12–14 years), were interviewed. Eight clinicians, ten parents and four children completed a questionnaire. There was a universal preference across both clinicians and families for the nSSS which was viewed as more child friendly and easier to complete. The VAS was thought to have improved the ease of completion with one parent stating: "kids are more drawn to words; a picture says a thousand words." The clinicians preferred that the nSSS captured fluctuation in sleepiness across the day commenting: "really useful to log detailed records of the changes in sleepiness throughout the day. Particularly useful to help with decisions about changes in treatment." Minor formatting suggestions were made. The VAS and language used were understood by children.
Conclusions: With minor adaptations the scale has face validity. There was enthusiasm for this scale to be used clinically. Reliability and validity compared with neurophysiological measures of sleepiness should be assessed.
Disclosure: No

P852 | Sex-related differences in symptoms and impairment in patients with narcolepsy: findings from the TENAR project

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Objectives/Introduction: Recent pre-clinical findings suggest the existence offset-related differences in narcolepsy. We aimed at comparing severity of symptoms and psychosocial impairment of female and male patients with narcolepsy.

Methods: Secondary analysis of baseline data of 106 female and 102 male patients with narcolepsy (mean age of 33.9 and 34.1 years respectively) participating in the TENAR (TElemedicine for NARcolepsy) randomized controlled trial (granted by Italian Ministry of Health, project code: RF-2016-02364742) aiming at assessing the efficacy and safety of the televisit applied to the care of narcolepsy. Baseline data included: sociodemographic characteristics (educational level, sentimental, marital and occupational status), sleepiness (Epworth Sleepiness Scale, ESS), frequency and duration of cataplexy attacks, disease severity (Narcolepsy Severity Scale, NSS), depressive symptoms (Beck Depression Inventory, BDI), pharmacological treatment, and main narcolepsy-related problems.

Results: Female and male patients did not differ with regard to socio demographics, cataplexy, and pharmacological treatment. Compared with male, female patients had significantly higher ESS (11.2 vs 9.4), NSS (22.3 vs 17.1), and BDI scores (11.7 vs 6.9). With the exclusion of cataplexy and of the item "relationships with the others", compared with male, female patients reported significantly ($p < 0.05$) more frequently as a problem all the narcolepsy-related problems investigated: sleepiness (71.7% vs 46.1%), sleep attacks (45.3% vs 26.5%), concentration and memory problems (65.1% vs 35.3% and 42.5% vs 27.5% respectively), and maintain the work pace and achieve goals (54.7% vs 23.5% and 40.6% vs 21.6% respectively).

Conclusions: Female and male patients with narcolepsy reported differences concerning sleepiness severity and narcolepsy-related problems. There may be several explanations: women may have a higher perception of sleepiness and of its consequences; there may be a suboptimal management of sleepiness in women; more depressive symptoms may influence the perception of sleepiness and of narcolepsy-related problems in women. These findings suggest that narcolepsy may impair differently female and male patients. A better understanding of sex-related differences is needed to improve the management and care of people with narcolepsy.

Disclosure: No

20: NEUROLOGICAL DISORDERS AND SLEEP

P274 | Sleep and sleep-disordered breathing in rett syndrome: a polysomnographic case-control study

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Background: Rett Syndrome (RTT) is a rare and severe neurological disorder primarily affecting females. Key clinical features include regression, loss of spoken language, stereotypic hand movements, gait abnormalities, epilepsy, and autonomic dysfunction with cardiac and respiratory issues. Furthermore, patients show a high incidence of sleep disturbances.

Objective: This study aims to investigate sleep structure and sleep-disordered breathing in patients with RTT compared to an age-matched healthy control group (HG) and correlation with age and disease severity.

Methods: A polysomnography (PSG) was obtained from 17 patients (all females, age 3.56–39.06 years, mean 14.2) and 17 healthy age-matched controls (all females, age 4.0–39.0 years, mean 13.8; $p = 0.892$).Specific scales were employed to measure disease severity: the Rett Assessment Rating Scale and the Clinical Severity Scale. A Mann–Whitney U test was performed to evaluate differences between the two groups' polysomnographic data. The differences were considered statistically significant at $p < 0.05$. A Spearman's rank-order correlation was conducted to assess the relationship between PSG data, age, and disease severity.

Results: This study shows statistically significant differences between RTT and HG concerning sleep structure. Increased representation of N1 and N3 NREM sleep ($p = 0.003$; $p = 0.003$) and reduced representation of NREM N2 and REM sleep stages ($p = 0.004$; $p = 0.014$) were observed. Patients present more elevated values of Wake After Sleep Onset (WASO) and nocturnal awakenings ($p < 0.001$; $p < 0.001$).Concerning respiratory data, patients show higher values of the apnea-hypopnea index (AHI) ($p < 0.001$), higher values of Oxygen Desaturation Index (ODI, $p = 0.011$), and reach lower SpO2 values ($p < 0.001$).No correlations were found between these results and disease severity. A positive correlation has been observed between the age of patients and WASO, number of awakenings, and N1 stage representation.

Conclusions: This study shows significant changes in sleep macrostructure in patients with RTT that could be related to both increased sleep fragmentation and the effect of abnormal activity in thalamocortical connections and brainstem immaturity. Regarding breathing issues, patients with RTT are known to present autonomic dysfunction with breathing abnormalities during wakefulness (hyperventilation and breath-holding).However, recent studies also report cardiorespiratory dysregulation during sleep. This study findings demonstrate a higher incidence of sleep-disordered breathing in patients compared with controls which could be an expression of impaired breath control during sleep.

Disclosure: No

P275 | Prediction of treatment response and effect on clinical manifestations for normal pressure hydrocephalus of sleep disorders

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Objectives/Introduction: Sleep disorder and normal pressure hydrocephalus (NPH) are the issues of growing importance in neurological disorder. Yet, the correlation between the two diseases have not been studied enough. Thus, we discussed the correlation between sleep disorder and clinical features of NPH.

Methods: Forty patients who visited Kyungpook University Hospital during 2020 and were diagnosed with idiopathic NPH were included in the study. To evaluate sleep disorder (excessive daytime sleepiness, sleep apnea, insomnia, poor sleep quality, morningness - eveningness, REM sleep behavior disorder and restless legs syndrome) and psychiatric problems (depression, anxiety), all patients carried out sleep surveys. To evaluate the severity of dementia and ataxia, all patients completed K-MMSE, K-FAB and UPDRS-motor score before and after CSF drainage. The Pearson's chi-square test, independent student's *t*-test, Mann-Whitney U test and linear regression analysis were applied to analyze the relationship between the sleep disorders and improvement of symptoms after CSF drainage.

Results: Of the 40 patients, 21 had poor sleep quality, 8 had insomnia, 11 had daytime sleepiness, 9 to 13 had sleep apnea, 13 were anxious, 27 were depressed. Linear regression analysis showed that the sleep apnea was significantly correlated with cognitive function, and insomnia was correlated with cognitive, motor and frontal lobe functions. Also, patients with severe sleep apnea had a greater recovery of cognitive function after CSF drainage.

Conclusions: Obstructive sleep apnea (OSA) is deeply related to the clinical symptoms and treatment effectiveness of NPH. Diagnosis and proper treatment of OSA is expected to improve the prognosis of NPH patients.

Disclosure: No

P573 | Impact of sleep apnoea and CPAP treatment on the evolution of excessive daytime sleepiness following ischemic stroke and transient ischemic attack: a propensity score-matched study

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Introduction: Excessive daytime sleepiness (EDS) is a common complaint in stroke patients. Despite the potential negative impact of EDS on stroke outcomes, the evolution of EDS post-stroke and its interaction with sleep apnoea (SA) are poorly described.

Objective: To determine the factors associated with EDS evolution post-stroke compared to SA severity-matched patients.

Methods: Cross-sectional analysis of a prospective, monocentric cohort of patients recruited because of suspected SA. 81 ischemic stroke or transient ischemic attack (TIA) patients with a polysomnography and an Epworth Sleepiness Scale (ESS) performed within one year following stroke and with a follow-up ESS (1.5 to 18-month period) were included. A 2:1 propensity score matching including age, gender, body-mass index (BMI), and apnoea-hypopnoea index (AHI) was performed to identify 162 controls free of stroke or TIA. Moderate-severe SA (AHI>15/h) was treated by continuous positive airway pressure (CPAP). Depression was assessed by the Pichot questionnaire. Factors associated with the evolution of ESS (ΔESS=ESS follow-up−ESS baseline) were investigated using a multivariable negative binomial regression model.

Results: In stroke/TIA patients, median [Q1-Q3] age was 62 [50–71] years, with 70.4% of male and a BMI of 26.1 [24.5–29.8] kg/m^2. Moderate-severe SA was present in 54 (66.7%) stroke/TIA patients, of whom 35 (64.8%) were treated with CPAP with a mean adherence ≥4 h/night. 21 (25.9%) stroke/TIA patients presented EDS (ESS≥10/24) at baseline compared to 52 (32.1%) control patients ($p = 0.37$). Severe depression (Pichot questionnaire≥7/13) was found in 13 (16.1%) and 32 (20.4%) of stroke/TIA and controls respectively ($p = 0.49$). The range of improvement in ESS was higher in stroke patients compared to controls (median [Q1–Q3] $\Delta ESS = -2(-4; 1)$ *vs.*$0(-3; 2)$, $p = 0.01$). 45 (55.6%) stroke/TIA patients compared to 64 (39.5%) controls presented a 2-point improvement in ESS ($p = 0.02$) corresponding to the minimal clinically important difference. In multivariable analysis, higher depression scores at baseline were associated with a reduced improvement in EDS ($\beta = 0.2$, 95% CI = 0.1–0.3, $p < 0.01$).

Conclusions: The range of EDS improvement after SA treatment was unexpectedly higher in stroke patients compared to a matched control population. Post-stroke depression might preclude EDS improvement and should be systematically sought in stroke patients with persistent or worsening EDS following stroke.

Disclosure: No

P574 | Sleep disturbances in behavioral variant frontotemporal dementia: a preliminary study

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Introduction: Over the last decade, sleep disorders have been extensively documented in patients with neurodegenerative disorders and in particular in patients suffering from Alzheimer's dementia. It has been hypothesized that the loss of normal restorative functions of sleep may intensify neurodegenerative processes occurring within vulnerable neural circuitry. However, little is known in rarer forms of dementia such as Frontotemporal dementia (FTD) where sleep remains less characterised and few conflicting literature data are available. In this study we investigated the frequency and the features of sleep disorders in patients with behavioral variant of Frontotemporal dementia (bvFTD).

Methods: Twenty-eight patients with bvFTD (aged 68.27 ± 8.8 years;18 males) were recruited from the Center for Neurodegenerative Diseases and the Aging Brain at University of Aldo Moro and fifteen age and sex matched healthy controls were also recruited from volunteers. All patients and controls underwent clinical assessment and completed structured and validated sleep questionnaires which included Epworth Sleepiness Scale (ESS), Insomnia Severity Index (ISI), Pittsburg Sleep Quality Index (PSQI), STOP-Bang Questionnaire, REM sleep behavior disorder screening questionnaire (RBDSQ), reduced Morningness-Eveningness Questionnaire (rMEQ). Differences between groups were analyzed with Chi-Square and Mann–Whitney U-tests.

Results: No differences were found between bvFTD patients and controls regarding education and Body Mass Index. BvFTD patients presented higher scores at PSQI ($p = 0.04$), ISI ($p = 0.05$), STOP-Bang questionnaires ($p = 0.04$) and at RBDSQ ($p = 0.004$) compared to controls while no differences emerged at the ESS, rMEQ,PSQI-Sleep Efficiency and PSQI-Sleep Latency scores. In particular, bvFTD presented a higher risk of OSA (12 bvFTD versus 3 controls) and RBD (10 bvFTD versus 1 controls) according to the STOP-Bang and RBDSQ questionnaires.

Conclusion: Patients with bvFTD demonstrated worse sleep quality, more severe insomnia complains and higher risk of OSA and RBD than age- and sex- matched controls. Noteworthy, subjective sleep efficiency and sleep onset latency did not seem to be compromised. Overall, these data suggest that bvFTD patient's sleep fragmentation could be attributable either to nocturnal agitation/motor hyperactivity or to an underlying sleep breathing disorder.

Disclosure: No

P575 | The long road to *sleep related hypermotor epilepsy* diagnosis

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Introduction: Sleep related hypermotor epilepsy (SHE) is a term established in 2014 for a pathology characterized by brief and abrupt movements with a hypermotor pattern (tonic and dystonic postures), as well as hyperkinetic automatisms, which can occur in clusters overlapped by event-free periods. At first, these episodes were considered as a paroxysmal sleep dystonia and it wasn't until recently that they have been linked to an epileptic origin. SHE has a prevalence of 1.8 per 100,000 individuals, however, about 12% of patients with focal epilepsy present with episodes predominantly during sleep. It is more prevalent in men, and its onset is during childhood. The low prevalence of the pathology leads to a delay in diagnosis of 12.8 years (+10.1) being parasomnias the alternative diagnosis in 55% of patients, generating distress and depression.

Case Study: 24-year-old female patient with a history of sleepwalking during her childhood. She reported episodes in different periods of her life, with 5-6 short, abrupt and violent movements/night, with abnormal postures that have caused physical damage, including a shoulder dislocation. Multiple consultations to different specialists with uncertain diagnosis, generated a state of anxiety and depression. Given the refusal to consider another diagnosis other than sleepwalking, she bought a camera to film the episodes.

At the beginning of this year, she had 4 nocturnal episodes of fainting with subsequent confusional, so she underwent an EEG for 3 days. The EEG study showed occasional sharp wave, spike and spike-wave discharges at right temporal level during wakefulness and sleep. She started treatment with antiepileptic drugs that finally controlled both fainting episodes and nocturnal episodes.

Conclusions: The reported case is an example that SHE has a high percentage of misdiagnosis. The consequences of delaying a correct diagnosis have a great emotional impact but also physical, due to the possible lesions that this type of hypermotor manifestations can generate. Filming during the night was useful to be referred to a sleep clinic. Therefore, a more active role in the dissemination of sleep pathologies to health care professionals should be undertaken in order to avoid future diagnostic errors or unnecessary delays.

Disclosure: No

P853 | Behavioral and spectral sleep features in amnestic and atypical alzheimer's disease

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Objectives/Introduction: Sleep-wake disturbances are frequent in Alzheimer's Disease (AD), negatively impacting quality of life. Tau degeneration of the arousal system significantly contributes to sleep-wake dysregulation in AD, even preceding cognitive decline. Recent evidence demonstrated several clinical variants in which patients manifest with a non-amnestic presentation, despite meeting neuropathological criteria for AD. Atypical cases represent a challenge for symptomatic treatment

and an opportunity to investigate the basis of selective neuronal vulnerability to AD pathology. As AD clinical variants show a different tau deposition and atrophy pattern, we hypothesized that atypical cases would show different sleep architectures reflecting distinct patterns of subcortical degeneration. Therefore, we investigated behavioral sleep features and frequency bands across AD variants.

Method: Forty-eight subjects, 15 amnestic and 19 atypical (9 logogenic variant of Primary Progressive Aphasia - lvPPA, 10 Posterior Cortical Atrophy - PCA), with a neuropathological or biomarker-based diagnosis of AD, and 14 healthy controls underwent overnight EEG monitoring. Differences in sleep architecture by visual scoring and frequency bands by power spectral analysis in each study group were analyzed using non-parametric statistics.

Results: Amnestic and atypical AD had similar sex distribution and age at onset (60.6 ± 9.7, 60.5 ± 6.7 years, respectively), global cognition, functional performance and treatment prescription (acetylcholinesterase inhibitors, antidepressants). The control group was slightly older at EEG time (64 ± 5 years) than the amnestics. The AD groups showed increased sleep fragmentation and N1 sleep than controls. However, a differential sleep pattern consisting of N3 sleep dysfunction in amnestic AD, and predominant REM sleep impairment in atypical AD was found. Furthermore, atypical AD showed a more preserved N3 sleep with higher delta power during N2 and N3 stages compared to amnestic AD. No differences in spindles or K-complexes were found.

Conclusion: Results suggest differing effects of amnestic and atypical AD variants on slow wave versus REM sleep, respectively, corroborating the hypothesis of differential selective vulnerability patterns of the subcortical nuclei within variants. Optimal symptomatic treatment for sleep dysfunction in clinical phenotypes may differ. Studies investigating the neurobiological basis of sleep dysfunction in AD spectrum may provide insight for deciphering selective vulnerability of the neuromodulatory subcortical system.

Disclosure: No

P854 | Embolic stroke of undetermined source- is OSA a contributing factor?

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The term embolic stroke of undetermined source (ESUS) was introduced in 2014 to describe patients with a non-lacunar ischemic stroke and no convincing aetiology. ESUS patients have multiple risks for second strokes with no clear beneficial therapy. If a potential causative factor was determined, treatment could be initiated and reduce the risk of further strokes.

Obstructive sleep apnoea (OSA), a form of sleep-disordered breathing, is associated with multiple major stroke risk factors including hypertension and atrial fibrillation, but it is also an independent risk factor for stroke.

We conducted a prospective study of 18 patients in Connolly Hospital Blanchardstown between January and December 2021 who had a diagnosis of ESUS. All of these patients underwent a full stroke workup prior to their sleep study including CT brain, MRI brain, Echocardiogram, Carotid dopplers, Holter monitor and a full blood panel.

We assessed their co-morbidities, imaging, biochemical results as well as their sleep study, which was a limited inpatient sleep study.

Of the 18 patients, 11(61%) were female with a mean age of 63 (IQR 43–73). The mean Epworth Sleepiness Score (ESS) reported was 8.

All 19 patients had a PSG which was consistent with OSA with a mean Apnoea/Hypopnea Index/h (AHI/hr) of 24/h. 9 (50%) had mild OSA (AHI 5–15/H), 5 (28%) had moderate OSA (AHI 15–30/h) and 4 (22%) had severe OSA (AHI >30/h). The average Periodic Limb Movement Index (PLMI) was 24.5/h.

In our cohort, there was a significant relationship between ESUS and OSA and an elevated PLMI. The presence of elevated PLMs is associated with overnight autonomic hyperactivity, which results in fluctuating blood pressure that may contribute to the development of atherosclerotic plaque formation. This suggests that ESUS has a multifactorial underlying aetiology.

Disclosure: No

21: MEDICAL DISORDERS AND SLEEP

P276 | Novel oxygen desaturation parameters are compared to the AHI to better predict cognitive function: novel insights from the akershus sleep apnea project

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Background: Oxygen desaturation indices have become dominant in the field of sleep apnea research and have been compared with the currently used apnea-hypopnea index (AHI) for diagnosing obstructive sleep apnea (OSA) severity. They have been shown to act as better indicators of OSA severity and better predict cognitive function compared to the AHI. Two novel parameters were introduced by Kulkas et al (2013). They consider the duration and morphology of the oxygen desaturation events. This study is a secondary analysis of the Akershus Sleep Apnea project by Hrubos-Strøm et. al (2012). The aim is to analyse if novel oxygen desaturation parameters are more strongly related to cognitive function scores than the AHI.

Methods: A total of 290 community-dwelling adults were included from the Akershus Sleep Apnea Project (56,5% males, mean age 48.2 years) all of which were at high risk for OSA according to the Berlin Questionnaire. Participants underwent a one-night polysomnography and completed two cognitive tests: the Ray Auditory Verbal Learning test and the Stroop test. OSA parameters included in the analysis were AHI, oxygen desaturation index, average oxygen desaturation, arousal index, desaturation duration and desaturation severity.

Results: Participants included in the analysis were 216. Multiple linear regression analysis showed that the two novel oxygen parameters were not associated with cognitive function. Average oxygen desaturation was significantly associated with all the cognitive domains included in the analysis: immediate recall, delayed recall, and learning measured with the Ray Auditory Verbal Learning Test, and inhibition measured with the Stroop test.

Conclusion: The results confirm the insufficiency of the AHI as a predictor for any cognitive domain. However, despite being more precise than average oxygen desaturation, the novel desaturation indices did not predict cognitive function. To understand the relationship between obstructive sleep apnea and cognitive function improved analysis is needed among individuals diagnosed with OSA along with additional cognitive tests.

Disclosure: No

P277 | Meta-analysis of obstruction site observed with drug-induced sleep endoscopy in patients with obstructive sleep apnea

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Objective: To perform a meta-analysis on the distribution and characteristics of the obstructive site in patients with obstructive sleep apnea (OSA) using data from a variety of published studies that evaluated the obstruction with drug-induced sleep endoscopy (DISE).

Methods: A literature search was performed to identify studies in which DISE was used to identify the obstruction site in adult patients with OSA, and the obstruction site was described in sufficient detail. Four items were evaluated in the meta-analysis: the obstruction site, closing direction of the soft palate, degree of closure, and percentage of single-level obstructions.

Results: A total of 2,950 patients from 19 studies were included. In the two-level classification system, the rate of obstruction was 91.6% for the soft palate and 58.0% for the tongue base. In the four-level classification system, the rate of

obstruction was 84.1% for soft palate, 32.8% for the tonsil, 51.6% for the tongue base, and 34.3% for the epiglottis. The soft palate closed in the anteroposterior direction at a rate of 44.4% and in the concentric direction at a rate of 46.5%. The rate of a closure of 75% or more was 69.3% for the soft palate and 56.8% for the hypopharynx. The percentage of single-level obstructions was 42.5%.

Conclusion: The soft palate is obstructed in most patients with OSA, and the tongue base is obstructed in half of the patients. In addition, multilevel obstructions including the tonsil, lateral pharyngeal wall, or epiglottis are common; thus, these areas must be checked carefully.

Disclosure: No

P576 | Prevalence study of sleep disorders and its association with psychosocial variables in Honduras: a populational based study

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There is a lack of knowledge about the Prevalence of the main sleep disorders and the patterns of sleep in Central America. This is the first study that assess the main sleep disorders and its association in the Population of Honduras. Using a Probabilistic based sample study of 1729 dwellers, from all 18 Honduran states, Sleep Apnea risk (based in BERLIN questionnaire), Insomnia (IGI), Fatigue (FAS), Chronotype (HO Score and MESSI), Quality of life (WHOQOL), Depression (PHQ-9), Anxiety (GAD-7), Sleepness (PSQ), Snoring and Cognition Complains were collected together with Sociodemographic, Antropometric (BMI, Neck Circumference), Comorbidities (Diabetes, Hypertension, medication and substance/drug abuse risk (AUDIT)) and some Biomarkers from Blood Samples.

The data shows the prevalence's of Overweight and Obesity (55%), Snoring (40%), High risk for Sleep Apnea (18%), Fatigue (34.5%), Depression (22.1%), Insomnia Complains (19%), Risk for Depression (17%) and Cognitive complains (3%). These prevalence of sleep disorders are compatible with other studies made in Mexico and Latin America based in questionnaires. The prevalence for Sleep Apnea is lower than a populational based study made in Brazil, using Polysomnographic measures in a lab setting.

Performing a logistic regression using Berlin Apnea risk as a Dependent Variable, we found that being Male (OR = 1.5[1.1–2.1]), BMI (OR = 1.2[1.1–1.2]), Chest Circumference (OR = 1.03[1.02–1.04]), Blood Pressure (OR = 1.04[1.01–1.06]), Fatigue (OR = 1.07[1.04–1.10]), Insomnia (OR = 1.08[1.03–1.13]), Depression (OR = 1.09 [1.02–1.21]) and Sleepness (OR = 1.1[1.03–1.31]) are statistically significant risk factors for Sleep Apnea.

These results found in this populational based study are compatible with US, Europe, and Latin America studies. A similar profile is found using Insomnia Severity Index as a Dependent Variable. All variables remain significant, except for Gender. Some discussion about the pattern of life and urban city in the health and sleep behavior of Honduran Dwellers is presented and this prevalence study is important for establishing and evaluating some public health projects to improve the quality of life from Central America population

Disclosure: No

P855 | Association of brain natriuretic peptide levels with cardiovascular diseases in patients with obstructive sleep apnea

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Introduction: Obstructive sleep apnea (OSA) is a common condition being increasingly recognized and is associated with long-term morbidity and mortality. Very few data are available for Indian population and public health hazard of the condition continues to be seriously underestimated in this country. OSA is accompanied by episodic increases in left ventricle afterload due to large negative swings in intra-thoracic pressure and repetitive surges in arterial pressure. Brain natriuretic peptide (BNP) is released by ventricular myocytes in response to pressure and volume overload. The objective of this study was to evaluate dose-response relationship between severity of OSA and plasma BNP concentration with the risk of cardiovascular diseases.

Methods: The study involved 225 OSA patients and 75 healthy controls. A standard full-night diagnostic PSG was performed in study population. OSA defined as having an Apnea- hypopnea index (AHI) of ≥5 per h of sleep and depending on AHI, OSA patients were divided into 3 categories. Participants with an AHI < 5 constituted the comparison group. In this study, the change in BNP levels from morning to evening was recorded (between 8 a.m. and 10 a.m., and 8 p.m.-10 p.m.). Plasma BNP was measured by fluorescence immunoassay quantification.

Results: The results of the assay showed that average concentration of BNP (evening and morning) increased significantly with severity of OSA, the BNP levels in morning samples significantly increased than evening. Log transformed overnight BNP values showed that maximum change in nocturnal to diurnal BNP occurred for severe OSA patients however least concentration of BNP was found in healthy individuals (control group).

Conclusions: The findings of the study established a dose-response relationship between increasing severity of sleep apnea and elevated plasma BNP concentration.

Disclosure: No

22: PSYCHIATRIC AND BEHAVIOURAL DISORDERS AND SLEEP

P278 | Sleep and activity differences across symptom-derived mood disorder clusters in UK Biobank

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Introduction: Mood disorders such as major depression and bipolar disorder are associated with adverse sleep and activity outcomes, including poor sleep efficiency and abnormally short or long sleep duration. The heterogeneity between these disorders often makes diagnosis difficult and time consuming and so recent research has focused on whether sleep and activity measures can help differentiate between mood disorders. Results are mixed but suggest that there may be differences in sleep and activity patterns across mood disorder groups. The lack of consensus across these studies could be caused by high levels of symptom overlap and arbitrary boundaries between groups. This study aims to address this by firstly identifying data-driven clusters in a large sample based on their answers to a wide range of mental health questions; and secondly to compare sleep and activity measures across these clusters.

Methods: 12,473 participants from UK Biobank completed both a detailed mental health questionnaire and wore an accelerometer for a 7-day period, from which measures of sleep and activity were derived. Hierarchical clustering was performed on answers to 42 mental health questions covering depression, mania, anxiety, self-harm and psychotic symptoms. Sleep efficiency and abnormally low/high sleep duration were compared across resulting clusters, as well as other measures of daily activity.

Results: Four meaningful clusters were identified; cluster 1 exhibited low levels of anxiety and a lower severity of all other symptoms; cluster 2 reported the highest levels of all symptom categories and high severity; cluster 3 primarily reported depression and anxiety symptoms with low levels of mania and self-harm; cluster 4 exhibit mostly mania and anxiety symptoms with low levels of depression and self-harm. Preliminary results show sleep efficiency is worse in the groups that report higher levels of mania symptoms (cluster 2 and 4). These clusters were also more likely to report short sleep duration, though this was not significant.

Discussion: Here we show that symptom derived clusters in a large sample broadly align to clinical categories of mood disorders. Analysis of sleep and activity measures suggest mania symptoms are associated with lower sleep efficiency which may be useful for clinical assessment.

Disclosure: No

P279 | Sleep quality in methadone maintenance treatment patients

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Objectives/Introduction: There is a bidirectional link between sleep disturbances and substance use disorders. Sleep problems can be a precipitating factor in starting sedative drugs to face insomnia and other related problems. However, substance use disorder can also

cause many sleep disturbances, inducing relapses and increasing drug intake. Withdrawal syndrome, an irregular lifestyle, infectious diseases, and comorbid psychiatric illnesses can contribute to sleep disorders, insomnia being one of the most commonly reported problems. We aim to investigate sleep quality among heroin-dependent patients receiving methadone maintenance treatment (MMT).

Methods: Our study evaluated sleep quality in 68 patients undergoing MMT, that completed surveys assessing socio-demographic factors and the Pittsburgh Sleep Quality Index (PSQI).

Results: In 68 patients, the median methadone dose was 39.8 mg, 86.8% were males, and 13.2% were females with an average age of 51.6 years old. The prevalence of sleep disturbance (PSQI > 5) was very high (91.2%). Around one-third of the sample relates bad/very bad sleep quality, with half of the patients having difficulty initiating sleep. Only 16% of the sample sleeps more than 7 h a day. We found that complaints of daytime sleepiness/dysfunction were also frequent in this population. More than 90% use sleep-inducing medication.

Conclusions: Sleep problems among heroin-dependent patients receiving methadone maintenance treatment are frequent. Poor sleep quality and excessive daytime sleepiness are common. Sleeping pills can be a solution used in this population to face insomnia complaints. People undergoing methadone maintenance treatment should be routinely and promptly evaluated and treated for sleep disorders.

Disclosure: No

P280 | Sleep problems as a risk factor for suicide

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Objectives/Introduction: This study was conducted in order to explore whether poor sleep was associated with suicidal ideation above and beyond depression and whether specific domains of sleep were related to suicidal ideation. We also determined whether the association between sleep problems and suicidal ideation was mediated by depression.

Methods: Patients aged 18 to 65 years from an outpatient clinic at Seoul St. Mary's Hospital were recruited for this study. The Beck Depression Inventory (BDI) and Pittsburgh Sleep Quality Index (PSQI) were used to assess psychiatric symptoms. Independent samples *t*-test, Chi-square test, Pearson correlation analyses, hierarchical multiple regression analyses, and mediation analyses were performed using SPSS PROCESS macro.

Results: Among 909 participants, the majority of participants with suicidal ideation also had sleep problems (94.9%). After controlling for age, marital status, and depressive symptoms, total sleep problems estimated by the PSQI global score were also significant associated with suicidal ideation. Among seven sleep components derived from the PSQI, several components including cough or snore loudly, have bad dreams, and use sleep medication were associated with increased suicide risk. Also, the relationship between sleep problems and suicidal ideation was mediated by depressive symptoms indirectly. There was no convincing direct relationship between sleep problems and suicidal ideation.

Conclusions: Investigating the pathways which connect sleep problems and suicidality is fundamental to the development of suicide prevention. While it might be premature to suggest specific interventions, it would be important for clinicians to consider evaluating and managing sleep problems in the context of suicidality.

Disclosure: No

P281 | Involvement of BDNF signaling pathway in the development of insomnia and depression symptoms in OSA patients

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Introduction: Obstructive sleep apnea (OSA) is characterized by recurrent pauses in breathing during sleep leading to sleep fragmentation and further excessive daytime sleepiness. Therefore, OSA patients are at high risk of suffering from complications from psychiatric disorders. Brain-derived neurotrophic factor (BDNF) signaling pathway is involved in the development of depression and insomnia. The study aimed to evaluate mature BDNF and proBDNF levels among OSA and healthy individuals, circadian changes, and their association with insomnia and depression symptoms.

Methods: Sixty individuals following polysomnography (PSG), based on the apnea-hypopnea index (AHI), were divided into 2 groups: OSA patients (AHI 30; $n = 30$) and healthy controls (AHI < 5; $n = 30$). Participants filled out questionnaires: Beck Depression Inventory (BDI), Athens Insomnia Scale (AIS), and Pittsburgh Sleep Quality Index (PSQI). Peripheral blood was collected in the evening before and in the morning after PSG. Protein concentrations were measured using ELISA. Further OSA group was divided into subgroups based on the standard cut-off points: control/high AIS (AIS>5), control/high PSQI (PSQI>5), and control/high BDI (BDI>19). The study was funded by the Ministry of Education and Science (Poland) grant no. SKN/SP/496681/2021

Results: No differences between morning and evening BDNF and proBDNF levels were observed. BDNF protein concentration positively correlated with total sleep time both in the evening ($r = 0.386$, $p = 0.035$) and in the morning ($r = 0.412$, $p = 0.024$).

BDNF and proBDNF levels were higher in the high AIS group in the evening (both $p < 0.001$) but not in the morning. Similar outcomes were achieved in the comparison of the high and the control PSQI groups (both $p < 0.001$). However, the high BDI group had lower morning BDNF and proBDNF concentrations ($p = 0.047$ and $p = 0.003$, respectively) than the control BDI.

An increased level of the morning compared to the evening BDNF and proBDNF protein concentrations were achieved in the control

AIS group (p = 0.033 and $p = 0.035$, respectively) and the control PSQI group (p = 0.043 and $p = 0.046$, respectively).

Conclusions: The results suggest that the BDNF signaling pathway is involved in developing insomnia and depression symptoms among OSA patients. Furthermore, diurnal changes in BDNF and proBDNF protein levels in OSA patients with exacerbated insomnia symptoms indicate the involvement of this pathway in psychiatric complications in OSA patients.

Disclosure: No

P282 | A systematic review and meta-analysis: the effects of melatonin on sleep parameters in individuals with mental or sleep disorders

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Introduction: Exogenous melatonin has been shown to induce somnolence. Many randomized control trials (RCT) have investigated the efficacy of exogenous melatonin in individuals with mental and/or sleep disorders and the general consensus is that this supplement is effective when improving sleep parameters. However, previous meta-analyses on this topic tend to either focus on one disorder or group disorders together. Grouping disorders can be problematic as these results may not provide the best effect sizes to explain the effect of melatonin on each disorder. In cases like this, one disorder may dominate in the analyses. Therefore, a high-level overview of this topic is needed to investigate the efficacy of exogenous melatonin in each mental and sleep disorder. This research intends to provide a comprehensive synthesis of RCTs that focus on the use of melatonin in individuals with mental and/or sleep disorders.

Methods: We searched electronic databases for RCTs of melatonin based on a pre-registered protocol (PROSPERO: CRD42021289827). To assess the quality of the studies, we used the Risk of Bias tool, version 2. Thirty-four RCTs were included (21 in children/adolescents: $N = 984$; 13 in adults: $N = 1014$).

Results: The results of our study indicate that melatonin improves sleep onset latency and total sleep time in children and adolescents with a variety of neurodevelopmental disorders, but not nocturnal awakenings. Similarly, sleep onset latency (measured by diary) and total sleep time (measured with polysomnography) improved in adults with delayed sleep phase disorder. Tolerability was not significantly different between melatonin and placebo.

Conclusion: In conclusion, melatonin is a relatively tolerable supplement in comparison to a placebo for individuals with mental and/or sleep disorders. Furthermore, the strength of the effect of melatonin on sleep parameters may vary between disorders. In some cases, melatonin was no different than placebo. This infers that not every disorder receives the same effects. These results are important to consider if exogenous melatonin is to be implemented within the framework of a stepwise treatment, including good sleep hygiene practices.

Disclosure: No

P577 | Sleep Health And Wellness Questionnaire (SHAWQ) scores associate with sleep problems, depression symptoms, and academic performance in adolescents and university students

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Introduction: We aimed to develop a brief sleep health questionnaire for identifying adolescents and university students with sleep problems who may be at risk of depression and lower academic achievement.

Methods: Sleep survey data in adolescents ($n = 1733$) were analyzed by best-subsets regression to identify the strongest predictors of self-reported depression symptoms (Kutcher Adolescent Depression Scale; KADS): sleep quality, daytime sleepiness, self-rated health, staying up past 3:00 a.m., school day sleep latency, and gender. A 6-item Sleep Health And Wellness Questionnaire (SHAWQ) was developed using these items. Students were categorized into low, moderate, and high-risk groups for depression symptoms based on their SHAWQ scores. The SHAWQ was tested prospectively in adolescents ($n = 1777$) for associations with depression symptoms (KADS), and in university students ($n = 2046$) for associations with sleep quality (Pittsburgh Sleep Quality Index; PSQI), insomnia symptoms (Insomnia Severity Index; ISI), and depression symptoms (Center for Epidemiological Studies Depression Scale-Revised; CESDR). We also tested whether SHAWQ scores in incoming first-year university students ($n = 1423$) predicted grade point average (GPA) over their first year.

Results: SHAWQ scores in adolescents correlated with depression scores (Pearson's $r = 0.55$, $p < 0.001$), with the high-risk group showing more than 8-fold increased odds of experiencing depression symptoms most or all of the time, compared with the low-risk group. SHAWQ scores in university students correlated with PSQI, ISI, and CESDR scores ($r = 0.66$, $r = 0.68$, and $r = 0.55$; $p < 0.001$). Among students in the high-risk group, 82.0% had poor sleep quality (PSQI>5), 92.6% had subthreshold to severe insomnia on the ISI, and 77.9% had subthreshold to Major Depressive Disorder on the CESDR. The average GPA percentile rank was about 10 points lower in the high-risk group compared with the low-risk group ($p < 0.001$).

Conclusions: The SHAWQ is a short instrument for assessing sleep health in adolescents and university students that is associated with depression symptoms and academic achievement. It can potentially

be used to screen for students who would benefit from counselling for sleep and mental health problems.

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Disclosure: No

P578 | Association of sleep timing and obesity in the nationwide sample of 169,313 people

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Objectives/Introduction: Little is known about the association of bedtime and obesity in the real-world population. Therefore, we examined the association between bedtime and obesity among Korean nationwide sample.

Methods: We obtained the cross-sectional data from participants aged 19 years or more of the 2018 Korean Community Health Survey. The demographic characteristics, the presence of hypertension and diabetes mellitus were collected by well-trained interviewers. Body mass index was calculated from the measured value of height and body weight. The Pittsburgh Sleep Quality Index and Patient Health Questionnaire-9 were provided to the sample. Logistic regression models tested associations between sleep timing and obesity. The analysis was stratified by demographic variables, hypertension, diabetes mellitus, and depression in case of observing significant interactions.

Results: Among the nationwide sample, 169,313 subjects (55.5 ± 17.40 years; 43.8 % of males) were included for analysis. Participants with bedtime earlier than 11:00 p.m. were older ($p < 0.001$), less yearly income ($p < 0.001$) and shorter duration of education ($p < 0.001$) compared to later bedtime (later than 11:00 PM) group. The prevalence of hypertension ($p < 0.001$), diabetes ($p < 0.001$), depression ($p < 0.001$) and obesity ($p < 0.001$) were significantly higher in the early bedtime group. Logistic regression models with stratified by significant variables showed an association between sleep timing and obesity (odds ratio, 1.059; 95% confidence interval, 1.034 to 1.081).

Conclusions: Later bedtime was associated with a higher prevalence of obesity in a community-based large sample. Further studies would be needed to delineate the pathogenesis of obesity among the late-sleeping population.

Disclosure: No

P579 | Inpatient sleep quality & wellbeing in a secure psychiatric hospital: inpatient experiences & stakeholder perspectives

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Introduction: Sleep problems such as insomnia, a disorder involving prolonged difficulties initiating and maintaining sleep, are related to sedentary behaviour and poorer mental health. Sleep problems are highly prevalent in psychiatric inpatients, with 49% experiencing insomnia symptoms. Whilst co-production in healthcare is key to developing interventions, psychiatric inpatients are often underrepresented in healthcare research. The current study aims to explore inpatient and staff perspectives regarding inpatient sleep quality, to aid the development of a sleep intervention.

Methods: We recruited 14 inpatients for individual interviews (36% female, average age 23–73 years) and 10 staff members for focus groups (three conducted), from a secure psychiatric hospital in the U.K. A semi-structured interview schedule guided discussion regarding; prevalence and type of sleep problems, patient understanding of sleep, daytime impact of poor sleep and napping, support for sleep problems and physical activity.

Results: Using reflexive thematic analysis, four themes were identified: (1) Patient's Bedrooms as Their Only Private Spaces, (2) Irregular Sleep Schedules, (3) Noise & Disruption to Night-Time Sleep and (4) Keeping a Routine & Staying Physically Active. Agreement between patients and staff, a crucial element of intervention design, was strongest when discussing irregular sleep schedules, disruptions at night, staff support and the importance of routine for sleep quality.

Conclusions: The current work highlights the importance of qualitative exploration of inpatient sleep and co-production in secure mental healthcare. Study results can be utilised in developing future sleep interventions in similar patient populations.

Disclosure: No

P580 | Mediation effect of the coping strategies on the relation between stress and sleep quality

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Objectives/Introduction: Recently data has been accumulated regarding the role of coping strategies in the relationship between stress and sleep quality. Therefore, we set out to identify the mediating effects of coping strategies between stress and sleep quality.

Methods: A online-based cross-sectional study was performed using the Perceived Stress Scale-10, the Pittsburgh Sleep Quality Index, and the Brief COPE inventory in an 811the community-based nonclinical adult sample. The 24 items of Brief COPE were categorized into four factors (social support, problem solving, avoidance, positive thinking) as validated by Baumstarck et al. Then, we used the PROCESS macro to conduct simple and the multiple mediation analysis analyses of for the four coping styles as potential mediators in the relationship

between stress and sleep quality, and an additional subgroup analysis was examined to identify a gender difference for the mediation effect.

Results: Our results yielded that an avoidant coping strategy indirectly mediated the association between perceived stress and sleep quality. The other three coping styles showed no mediating effects. And the multiple mediation analysis showed a set of four coping skills as a significant mediator between stress and sleep. As a group, four coping styles mediated significantly the association between perceived stress and poor sleep quality. And avoidance has maintained its significance thought all regression analyses. Finally, this results remained as same in the females.

Conclusions: These findings demonstrate that the effect of perceived stress on poor sleep quality was mediated by coping strategies, especially avoidant coping by avoidance. Thus, further research should consider the coping styles of individuals to reduce the influence of stress on sleep quality.

Disclosure: No

P856 | Altered fractal patterns of motor activity during sleep in depressed individuals

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Objectives/Introduction: Outputs from healthy physiological systems, including motor activity, often display fractal temporal fluctuations with a complex pattern balanced between randomness and excessive regularity, which reflects system integrity and adaptability. Alterations in fractal motor activity fluctuations are associated with various psychopathological disorders, such as (bipolar) depression and dementia. The current study examines how fractal patterns are altered across the sleep-wake cycle and whether the daily rhythm differs in individuals with depression.

Methods: Participants (n = 329) from the Netherlands Study of Depression and Anxiety were included: 90 currently depressed (i.e., a diagnosis in the past 6 months), 152 remitted depressed, and 87 healthy controls. Actigraphy was assessed continuously for 14 days. Habitual sleep-wake periods were obtained from the Munich Chronotype Questionnaire. To evaluate fractal patterns across the sleep-wake cycle, the detrended fluctuation analysis (DFA) was performed in each non-overlapping 4-h window to assess temporal correlations in motor activity fluctuations across different time scales. A scaling exponent, α, from the DFA quantifies temporal correlations as follows: if $\alpha = 0.5$, there is no correlation in the fluctuations (white noise); if α>0.5, there are positive correlations; $\alpha = 1$ indicates the most complex fluctuation patterns, a characteristic of healthy physiological systems; α>1 and close to 1.5 indicates excessive regularity in a system becoming more rigid. Multilevel linear regression analyses were used to determine the sleep-wake status and group differences on the scaling exponent.

Results: All individuals showed a significant daily rhythm in α, with larger values during wakeful periods ($\alpha = 1.035 \pm 0.003$; indicating stronger temporal correlations) and smaller values during sleep periods ($\alpha = 0.784 \pm 0.004$, $p < 0.001$; indicating more random activity fluctuations). Compared to controls ($\alpha = 0.772 \pm 0.008$), α during sleep was significantly larger in currently depressed individuals ($\alpha = 0.802 \pm 0.007$, $p < 0.001$) and was similar in remitted individuals ($\alpha = 0.778 \pm 0.005$, $p = 0.25$). There were no significant group differences in α during wakeful periods.

Conclusions: Fractal activity patterns varied across the sleep-wake cycle, with more random fluctuations during the sleep periods. The rhythm was suppressed in depressed individuals due to stronger temporal correlations in their activity fluctuations during sleep that more resembled the fractal activity patterns during the wakeful periods.

Disclosure: Yes

Conflict of Interest statement: F.A.J.L.S. served on the Board of Directors for the Sleep Research Society and has received consulting fees from the University of Alabama at Birmingham; F.A.J.L.S. interests were reviewed and managed by Brigham and Women's Hospital and Partners HealthCare in accordance with their conflict of interest policies and are not related to the current work. The other authors report no conflicts.

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P857 | Objective and subjective sleep characteristics among patients diagnosed with trauma and stress-related disorders: a systematic review and meta-analysis

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Introduction: People who have been through traumatic events are more likely to have trouble sleeping than the general population. The prevalence of sleep disturbances in traumatic patients is that 87% of the population faced traumatic events (Werner., Arditte Hall., Griffin& Galovski, 2019). Various objective subjective sleep measurements to

assess sleep characteristics needs to be assessed. Trauma and Stress-Related Disorders patients report inconsistent sleep patterns with objective and objective measurements more than the control group.

Aims: To investigate the impact of traumatic events on sleep in patients diagnosed with Trauma and stress-related disorders patients. Identify the sleep characteristics in these patients using both objectives including Polysomnography (PSG)and Actigraph, and subjective measurements including Pittsburgh Sleep Quality Index (PSQI), Insomnia Severity Index (ISI), and sleep diaries.

Methods: Case-control studies that compare participants with current Trauma and stress-related disorders to Healthy control. Sleep parameters of interest were: (1) total sleep time (TST); (2) sleep onset latency (SOL); (3) wake after sleep onset (WASO); (4) sleep efficiency; (5) Rapid Eye Movement (REM); (6) Rapid Eye Movement Latency (REML); and Sleep Efficiency (SE). Data were Meta-analysed as mean differences (MDs) using RevMan 5.4. The final total number was 2733 participants.

Results: There was evidence of a statistically significant difference between Trauma and stress-related disorders to Healthy control in both objective and subjective sleep parameters, with a significant reduction in the patient group other than healthy control in TST (MD = -17.55 min, 95% CI: [−31.03, −4.06], $p = 0.01$); WASO (MD = 14.44, 95% CI: [7.20, 2169], $p < 0.0001$); SOL (MD = 1.25 min, 95% CI: [−4.48, 6.99], $p = 0.67$).

Conclusion: We found differences in sleep characteristics between patients diagnosed with trauma and stress disorders and healthy control. Remarkable decrease in three sleep characteristics TST, and increase in SOL, WASO whither subjective and objective in patients group compared to healthy control. Furthermore, the results revealed a significant decrease in objective TST, SOL, and WASO. The study results recommend that Subjective sleep complaints should be considered even in without objective measurements.

Disclosure: No

P858 | The effects of auditory stimulation and sensitivity on sleep spindles in 8-11 month-old infants

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Objectives/Introduction: It is well established that sleep disturbances are common in autism spectrum disorder (ASD) with a demonstrated early onset in infants with a family history for ASD (EL-ASD). One theory describes sleep problems in ASD to originate from atypical sensory processing, one of the core symptoms of ASD. Indeed, a link between hypersensitivity and sleep problems has been described in previous literature, both in ASD and in typical populations. However, it is less clear how exactly sensory stimulation changes sleep macro- and micro-architecture in infancy in the first place and what the role of atypical sensory processing is. Based on previous studies in adults, we focus on sleep spindle density, a feature of sleep linked to inhibition of sensory stimulation. We expect to find that sleep spindle density will be higher in the nap with auditory stimulation compared to an undisturbed nap. Additionally, we expect that individual differences in sensory sensitivity will influence changes in the nap architecture from disturbed to undisturbed sleep.

Methods: EEG recordings are collected from infants age 8–11 months at two visits, one with and one without auditory stimulation (Stimulation vs Baseline). Sleep spindles are automatically detected with the YASA spindle algorithm. Sensory sensitivity is measured with a subset of questions from the Sensory Profile 2, a parent report measure. Using Linear Mixed effects Models we will look at the effect of condition on sleep macro-architecture and sleep spindle density.

Results: So far, data of 29 infants has been collected, of which 19 completed both visits. Data collection is still ongoing and we aim to reach 40 participants. Our sample has diverse sensory profiles, as we also recruit infants who are at elevated likelihood of developing ASD, because they have an older sibling with ASD ($n = 5$).

Disclosure: No

P859 | Disturbed sleep: "neglected" symptom of borderline personality disorder. REM sleep fragmentation effect on the overnight downregulation of emotional distress and its impact on DBT treatment

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Previous research has shown that rapid-eye-movement (REM) sleep plays an essential role in the processing of emotions (Wassing et al., 2016), suggesting that restless REM sleep reflects a process that impedes overnight resolution of emotional distress (Wassing et al., 2019). These are interesting results for Borderline personality disorder (BPD) due to: 1) emotional dysregulation being the core feature of the disorder, 2) up to 95.5% of BPD patients reporting subjective sleep problems, and 3)subjective sleep disturbance being associated with recovery status among BPD patients (Asaad et al., 2002); Plante et al., 2013b).

This longitudinal study investigates cross-sectionally at baseline 65 BPD female patients compared to 65 age-matched healthy controls the effect of macro-and microstructural REM and NREM sleep abnormalities on overnight emotional downregulation and memory consolidation. It further investigates whether any associations correlate with any specific BPD phenotypic traits. Finally, baseline sleep assessments are examined as predictors of early (5–8 weeks; T1) or late (20-24 weeks; T2) Dialectical Behavioral Therapy (DBT) treatment response.

Sleep is measured subjectively and objectively. Polysomnography (PSG) is conducted over 2 consecutive nights. On the second PSG evaluation, participants are exposed to a shame induction emotional challenge (EC) task prior to and after sleeping. Overnight dampening

of emotional distress is assessed using physiological and self-reported measures of emotional reactivity. Memory and motor skill learning tasks are implemented pre and post-sleeping as a contrast to the EC. Blood samples are collected prior to bed and at the wake-up time to evaluate levels of cortisol and of circulating inflammatory cytokines as biological markers of stress reactivity and trauma. Outcome measures of treatment response will be defined as % change in the BPD symptomatology, % change in specific symptom domains, and treatment drop-out rates collected at an early or late in treatment follow-up.

Preliminary results will be presented at the conference. Currently 53/130 participants have been tested.

Disclosure: No

24: PAEDIATRICS

P283 | Effectiveness of school-based sleep education in primary school children: a cluster randomized trial

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Introduction: Sleep deprivation, a prevalent problem among children, contributes negatively to their developmental process and neurocognitive abilities. Previous sleep education programmes with a small sample size focused mainly on adolescents and cannot be applied to primary school children. In this study, we evaluated the effectiveness of a multimodal and multilevel school-based sleep education model on improving sleep, daytime functioning and behaviour among primary school children using a cluster randomized controlled design.

Methods: Twelve schools were randomly assigned to either the sleep education group or the non-active control group (baseline data collection: 2011-2012). Schools in the intervention group received the following activities including a town hall seminar, small class teachings, sleep education leaflets, and a painting competition with additional educational brochures and workshops for parents and teachers. Parental-reported questionnaires were collected at baseline and 1-month follow-up. The primary outcomes were sleep-wake patterns. Outcomes were examined by linear mixed-effects model analysis and generalized estimating equations adjusting for clustering effect and baseline characteristics. This trial was registered with the Chinese Clinical Trial Registry (ChiCTR-TRC-12002798).

Results: A total of 3,785 children were included in the final analysis (intervention: 2,092 vs control: 1,693; 49.2% girls; mean age ± SD: 8.8 ± 1.5 years). Children who received sleep education did not report improvements in sleep-wake patterns and insomnia symptoms compared with controls, whereas their parents had significantly improved sleep knowledge than the control groups (paternal: adjusted mean difference: 0.93 [95% confidence interval (CI): 0.15 to 1.71], $p = 0.02$; maternal: adjusted mean difference: 0.86 [95% CI: 0.15 to 1.57], $p = 0.02$). In addition, Children in the intervention group had a lower persistence rate of excessive beverage intake (adjusted odds ratio: 0.48 [95% CI: 0.33 to 0.69]) and greater reduction of conduct problems (adjusted mean difference: 0.13 [95% CI: 0.02 to 0.25], $p = 0.02$) at 1-month follow-up.

Conclusions: The findings demonstrated that school-based sleep education was effective in enhancing parental sleep knowledge and improving behavioural outcomes in children, but it did not improve their sleep-wake patterns and sleep difficulties. Further sleep intervention programmes for primary school children should consider incorporating behavioural change intervention and active parental involvement.

Disclosure: No

P284 | The effect of a 2022 heat wave on infant sleep: Evidence of the impact of global warming on children s health

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Introduction: Children born in 2020 will likely experience seven times more heat waves than those born in 1960. There is growing concern about the impact of these extreme, acute weather events. Despite multiple international organizations raising alarms about the impact of global warming on children's health, few pediatric studies have investigated the impact of extreme weather events on sleep. The goal of this study was to examine the sleep of infants and toddlers in the United Kingdom (UK) using autovideosomnography data collected before, during, and after an acute heat wave in July 2022.

Methods: Infant sleep metrics (total sleep time (TST), sleep efficiency (SE) and number of night wakings (NW)) were collected via autovideosomnography for 120 infants in and around London, England (age 6–24 months, mean = 14.2 ± 5.0 months) using the Nanit baby monitor from July 14–23. In the middle of this time period (July 18–19) there was an extreme heat wave, with maximum daytime temperatures above 38°C.

Results: Pearson's correlations revealed strong negative correlations between maximum daytime temperature and TST ($r(8) = -0.94$, $p < 0.0001$) and SE ($r(8) = -0.87$, $p = 0.001$). Maximum daytime temperature and NW were positively correlated ($r(8) = 0.87$, $p = 0.001$). Average TST for the two nights of the heatwave was more than 20 min less per night than the average of the four nights before and the four nights after the heatwave. Tukey tests revealed this difference to be significant (p's < 0.005).

Conclusion: The UK heat wave of July 2022 significantly impacted children's sleep health. Findings from this study highlight the importance of including sleep health, a pillar of children's overall health and wellbeing, in studies that aim to understand the impact of global warming on children's health. This presentation will discuss implications of these findings as well as considerations for future research to test direct and indirect pathways by which extreme weather conditions affect sleep. Such research is urgently needed to inform ongoing global discussions to meet the goals of the 2015 Paris Agreement and identify sources of resiliency to combat global warming before 2035.

Disclosure: Yes

Conflict of Interest statement: Drs. Ordway, Anders, Berger, and Natale are members of the Scientific and Medical Advisory Board of Nanit.

Drs. Barnett and Lucchini and Ms. Shambhavi Thakur are employed by Nanit.

P581 | Origin, synchronization, and propagation of sleep slow waves in young adolescents

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Study Objectives: Slow waves, the hallmark of Non-Rapid Eye Movement (NREM) sleep, undergo significant changes throughout childhood and adolescence, mirroring changes in brain function and anatomy. However, most current knowledge on maturation-dependent slow-wave changes relates to variations in so-called slow-wave activity (i.e., delta power; 0.5–4 Hz), whereas changes in slow-wave origin, synchronization, and cortical propagation remain under-investigated. Therefore, here we studied and characterized changes in slow-wave characteristics from adolescence to adulthood.

Methods: We analyzed overnight high-density (256 electrodes) EEG recordings of 21 healthy adolescents (10.3 ± 1.5 years old, 9 females) and 18 healthy adults (31.1 ± 4.4, 11 females). All recordings were preprocessed to reduce artifactual activity, and NREM slow waves were detected and characterized in terms of origin, topographic distribution (involvement), and propagation using validated algorithms. A principal component analysis (PCA) was applied to determine and compare typical slow-wave involvement patterns across adolescents and adults. The threshold for statistical significance was set at $p = 0.05$.

Results: Three main, highly consistent PCs explained more than 95% of the variance for slow-wave involvement in both young adolescents and adults. The PCs showed maxima in centro-frontal areas (PC1), anterior (PC2a) or posterior areas (PC2b), and left (PC3a) or right (PC3b) hemispheres. The variance explained by PC1 was significantly smaller in young adolescents relative to adults (~52% vs. ~72%), while the opposite was observed for PC2 (~38% vs. ~21%) and PC3 (~9% vs. ~7%). Overall, slow waves originated more posteriorly and had a stronger posterior involvement in young adolescents compared to young adults (cluster-mass correction). Interestingly, while slow waves of adolescents were larger in amplitude, they also involved a smaller proportion of electrodes relative to adults (~32% vs. ~37%). Finally, in young adolescents, slow waves displayed a stronger inter-hemispheric asymmetry, as they both originated and tended to spread more over the right compared to the left hemisphere.

Conclusions: Slow-wave origin, synchronization, and propagation undergo specific changes during adolescence that likely reflect modifications in cortico-cortical connections. These slow-waves parameters could provide an accurate yardstick to assess, track, and interpret pathological developmental changes such as those associated with neuropsychiatric disorders.

Disclosure: No

P860 | Interplay among colic symptomatology, sleep behavior and the gut microbiome in infants

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Introduction: Colic symptomatology, manifesting in excessive crying, bloating and stomach cramps, is prevalent in infants and burdensome for families. Colic symptomatology was linked to gut microbiota, that is, increased abundance of Clostridium and Klebsiella and decreased Bifidobacterium and Lactobacillus. Further, the intertwinement

between colic symptomatology and disturbances in sleep-wake regulation was postulated, including episodic crying as a hallmark of immature synchronization among homeostatic and circadian sleep regulators. However, whether immature sleep regulation, colic symptomatology and the candidate microbiota are closely intertwined remains entirely unknown.

Methods: We assessed colic symptomatology (parent-report), sleep behavior (7–11 days: actimetry, 24-h diary) and gut microbiota (stool) in 34 infants age 10.5 ± 3.2 weeks. We evaluated colic symptomatology as Crying (h), Bloating and Stomach Cramps (none/light/medium/strong). Reflecting individual maturational status of sleep regulation, we captured number of daytime naps (Nap Counter) and nighttime awakenings (Longest Nocturnal Wake). With 16S rRNA amplicon sequencing we identified abundance of Bifidobacterium, Lactobacillus, Klebsiella, and Clostridium from stool.

Results: The association between sleep regulation and colic symptomatology was tested through linear mixed models (random factor subject ID) which showed a trend indicating a positive association between outcome variable Longest Nocturnal Wake and Stomach Cramps ($b = 7.69$, $p = 0.063$). This association between Longest Nocturnal Wake and Stomach Cramps was strengthened when adding Clostridium ($b = 6.91$, $p = 0.037$) or Bifidobacterium as a fixed factor to the model ($b = 7.31$, $p = 0.026$). There were no significant associations between colic symptomatology, Nap Counter and gut microbiota. Further analyses of colic symptomatology and the candidate gut microbiota showed that severe Stomach Cramps were correlated to higher Clostridium abundance ($r = 0.33$, $p = 0.064$).

Conclusion: We link increased colic symptomatology with immature sleep-wake regulation reflected by Stomach Cramps and nighttime awakenings in infants, in relation to gut microbiota. Specifically, more abundant Clostridium may contribute to colic symptomatology manifestation. Our results suggest that targeting the intestinal flora with synbiotics could be a rapid measure to not only alleviate colic symptoms but also to support infants' sleep regulation. Tailoring intake to individual development of homeostatic and circadian sleep regulators may be a promising health anchor.

Disclosure: No

25: SLEEP AND AGING

P582 | Memory performance mediates subjective sleep quality effect on alzheimer's disease biomarker levels at the preclinical stages of the disease

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Introduction: Sleep disturbances are prevalent in Alzheimer's disease (AD), with sleep quality already impaired in individuals with mild cognitive impairment (MCI). While previous studies have characterized sleep in MCI, few have analyzed associations between subjective sleep quality, AD (CSF) biomarkers and cognitive performance. Here, this relationship is evaluated in individuals with MCI from the European Prevention of Alzheimer's Dementia Longitudinal Cohort Study (EPAD-LCS).

Methods: 442 adults with MCI (Global clinical dementia rating = 0.5) underwent CSF sampling and completed the Pittsburgh sleep quality index (PSQI) questionnaire. Analyses employed separated multivariate linear regression models, with each CSF biomarker (Aβ42, p-tau and t-tau) as dependent variables and PSQI total score as a predictor, adjusted by age, sex, *APOE-ε4* status, research site, body mass index and sleep medication (dichotomized PSQI component 6). CSF t-tau or p-tau models were additionally adjusted by $\log_{10}$(CSF Aβ42), and CSF Aβ42 by $\log_{10}$(CSF p-tau). Models evaluating associations between sleep and cognition (measured by the Repeatable Battery for Assessment of Neuropsychological Status (RBANS)) were adjusted by education level. Post-hoc analyses adjusted these models by RBANS delayed memory score (RBANS-DMS). Finally, a mediation analysis investigated whether this factor mediated associations between sleep quality and CSF AD biomarkers.

Results: Poorer sleep quality (higher total PSQI) was associated with lower CSF t-tau(std. $\beta = -0.01$, $p = 0.044$) and p-tau (std. $\beta = -0.01$, $p = 0.038$). Furthermore, poorer sleep quality was associated with higher RBANS-DMS (better cognitive performance) (std. $\beta = 0.87$, $p = 0.006$). Following adjustment by RBANS-DMS, significant associations between PSQI score and CSF t-tau and p-tau were negated (t-tau: std. $\beta = -0.01$, $p = 0.193$, p-tau: std. $\beta = -0.01$, $p = 0.182$). Finally, mediation analyses showed that RBANS-DMS significantly mediated the sleep effect on CSF p-tau [$b = -0.0055$, $SE = 0.0022$ ([CI] −0.0101, −0.0017)] and t-tau [$b = -0.0044$,$SE = 0.0018$ ([CI] −0.0082, −0.0013)].

Conclusion: Poorer sleep quality in MCI patients is associated with lower CSF tau levels (p-tau and t-tau) and better episodic memory performance. These paradoxical results may stem from systematic recall bias in MCI patients with more prominent episodic memory deficits, who may overestimate their sleep quality. These findings suggest that subjective measures of sleep in adults with MCI should be interpreted with caution and complemented with objective methods.

Disclosure: No

P861 | Inflammation and neurodegeneration plasmatic biomarkers in patients with obstructive sleep apnea syndrome and mild cognitive impairment

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The aim of this study is to investigate clinical, polygraphic and plasmatic biomarkers differences in OSAS patients with or without Mild Cognitive Impairment (MCI).

We so far recruited 23 moderate-severe OSAS patients in this monocentric, prospective, case-control study. Inclusion criteria were: age greater than 60 years, absence of OSAS treatment, complaints about subjective cognitive impairment, exclusion of major comorbidities.

We performed a thorough neuropsychological evaluation and took a blood sample to assess plasma levels of neurodegeneration markers (Amyloid β 42, total tau and phosphorylated tau protein levels), markers of overall plasma oxidative state such as Hypoxia-Inducible Factor 1-α (HIF1-α) protein level, and state of inflammation (interleukin 8 protein level).

We analyzed differences between OSAS patients without MCI (OSAS-MCI) and those with MCI (OSAS+MCI).Results: Our patients had a mean age of 69,6 ± 4,3 years, seven (30,4%) were female. These patients suffered from moderate-severe OSAS: the mean Apnea-Hypopnea Index was of 39,4 ± 13,8 per h, Oxygen Desaturation Index was 38,5 ± 17,3 per h, mean oxygen saturation was 92,1 ± 3,0 percent, percentage of time spent with an oxygen saturation below 90% (T90) was 21,8 ± 22,6. Sixteen patients (16/23, 69,6%) were diagnosed as OSAS+MCI patients, with verbal memory (n = 12/16, 75%) and visuo-spatial abilities (n = 5/16, 31,3%) being the two most affected domains.

Comparing the OSAS+MCI versus OSAS-MCI group we found a significantly increased T90 (26,5 ± 25,2 vs 11,1 ± 9,5, p = 0,046) and significantly higher levels of HIF1-α (59,4 ± 52,7 pg/ml vs 24,7 ± 15,8 pg/ml, p = 0,03) in the first ones. Demographic, polygraphic and laboratory data did not show other significant differences.

These data suggest that in OSAS patients, chronic intermittent hypoxia (IH) can induce the expression of HIF 1-α, which is involved in inflammation pathways. Higher T90 in OSAS+MCI combined with higher levels of HIF 1-α in OSAS+MCI patients further corroborate the role of IH as a possible mediating mechanism of neurodegeneration in sleep disordered breathing. Longitudinal data after OSAS treatment are needed to further understand the possible causative role of OSAS in neurodegeneration and the impact of Continuous Positive Airway Pressure therapy on cognitive symptoms as well as on inflammation and degeneration biomarkers.

Disclosure: No

26: SLEEP AND GENDER

P286 | Gender differences and the association of sleep outcomes with physical activity in Indian young adults

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Introduction: Young adults require adequate sleep and physical fitness for optimal health and growth, as both insufficient sleep and low physical activity have been associated with poor health outcomes. This study examined the prevalence of sleep outcomes (sleep quality, sleep health, and daytime sleepiness) and their relationship with physical activity among young Indian adults. The study also examined if there existed any gender-based differences in these variables.

Methods: A cross-sectional study was conducted in New Delhi, India on a sample of 96 healthy young adults (34 males and 62 females; age: 23.88 ± 2.79 years; BMI: 1.19 ± 0.68 kg/m^2). The Pittsburgh Sleep Quality Index (PSQI) was used to assess sleep quality, PROMIS Short Form v1.0 - Sleep Disturbance 8b was used to evaluate sleep health, the Epworth sleepiness scale (ESS) was used to measure daytime sleepiness, and International Physical Activity Questionnaire (IPAQ) was used to report physical activity. A Spearman's correlation analysis was performed to analyze the correlation between sleep quality, sleep health, daytime sleepiness, and physical activity. To examine gender differences, the Mann–Whitney U test was applied.

Results: Sleep quality was poor for most participants (89.6%). When measured for sleep health, 14.6% had mild sleep disturbances. Excessive daytime sleepiness was reported by 6% of the participants. 43.8% of participants reported being sedentary or low in physical activity, 39.6% reported being moderately active, and 16.7% reported having high physical activity. A significant correlation was found between sleep quality and sleep health (r = 0.48, p < 0.001). For the variables examined, there were no significant differences based on gender.

Conclusion: It can be concluded that poor sleep quality is a prevalent problem among young adults, as well as a lack of physical activity or sedentary behavior. Sleep quality and sleep health had a significant association, suggesting that both parameters should be considered in

managing sleep-related symptoms in youngsters. The degree of association and direction of causality must be further determined by future studies.

Disclosure: No

P583 | Relationship between subjective sleep parameters and fatigue in Indian working women

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Objective: Working women in India come across various challenges than their counterparts as they face the challenge of playing the dual role to excel at home as well as at their workplace. This often leads to overwork, fatigue, and less time for sleep. Women have a higher incidence of poor sleep-related insomnia and depression than men. An irregular bedtime schedule is a prevalent problem among this population, detrimentally affecting sleep which is a cardinal function contributing to general well-being. A sufficient amount of sleep is mandatory to preserve normal physiological and psychological health. Disruption of sleep causes adverse health outcomes and poor quality of life. Therefore, the goal of the present study was to determine fatigue, daytime sleepiness, and sleep hygiene levels and also to explore the association between sleep hygiene, daytime sleepiness, and fatigue among Indian working women.

Methods: A cross-sectional study was done on 105 working women with a mean age of 35.24 ± 8.94 years. The Fatigue Assessment Scale was used to assess fatigue levels, Epworth Sleepiness Scale and Sleep Hygiene Index were used to evaluate daytime sleepiness and sleep hygiene, respectively. Shapiro Wilk test was used to test the normality of distribution and Spearman's correlation coefficient was used to analyze the data.

Results: The results indicated that 87.4% of working women experienced mild to severe fatigue, 56.5% experienced possible excessive to excessive sleepiness, and 96% had moderate to poor sleep hygiene. It was also observed that there existed significant association between fatigue and daytime sleepiness ($r = 0.56$, $p = 0.00$), daytime sleepiness and sleep hygiene ($r = 0.33$, $p = 0.001$) fatigue and sleep hygiene ($r = 0.71$, $p = 0.00$).

Conclusion: Working women tend to be fatigued, suffer from poor sleep hygiene, and suffer excessive daytime sleepiness. These factors are significantly correlated. There is a need for further research exploring the relationships between these variables and planning intervention strategies for improving these health parameters.

Disclosure: No

27: INSTRUMENTATION AND METHODOLOGY (CLINICAL SLEEP SCIENCE)

P287 | A new multi-level encryption and decryption software for clinical data exchanges in sleep medicine (ASCLEPIOS)

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Introduction: Clinical data exchange between physicians and other medical experts has become more common in recent years, especially since the shift to home office has increased due to the Covid-19 pandemic. This can be problematic for sleep specialists since sleep recordings cannot be easily transferred in a safe and secure manner - a typical recording contains a large volume of sensitive data with multiple parameters (e.g., brain activity, heart rate, pulse oximetry, respiratory flow, cardiac current flow).Therefore, in sleep medicine, a platform that allows safe uploading, downloading, and sharing of patient data is necessary for quality control.

Methods: A new multi-level encryption and decryption software called XNAT was developed by the ASCLEPIOS project to ensure the safety of clinical data exchanges. The clinical and technical partners together trialed this platform and assessed the functionality for sensitive data transfer. The sensitive data used in this assessment were 19 original home sleep recordings (6-channel polysomnographic data).

Results: The clinical and technical partners successfully uploaded 19 raw European Data Format (+) files (sleep recordings) to the XNAT platform, which were immediately pseudonymized. The XNAT platform provided all necessary and important functions in the context of data security: Firstly, all uploaded data followed data privacy regulations and were encrypted with symmetric searchable encryption, attribute-based access control services, attribute-based encryption, and functional encryption. Secondly, all uploaded data could be successfully decrypted, downloaded, annotated, and re-uploaded by both clinical and technical partners. This meant that events in the recordings could be marked and labeled with the suspected relevant medical terms. These annotations were subsequently visible to all other collaborating partners and could be amended if the annotations were incorrect. As a result, sleep scoring with quality control was conducted remotely by both partners.

Conclusion: Overall, the multi-level encryption platform developed by the ASCLEPIOS project allowed both clinical and technical partners to keep sensitive patient data secure whilst being able to collaborate with one another on the same patient data. This opens new opportunities for sleep specialists to gain a second opinion and quality control.

Disclosure: Yes

Conflict of Interest statement: Research is supported by European Union Horizon 2020 grant no. 826093 (ASCLEPIOS) and a research grant by Löwenstein Foundation, Bad Ems, Germany. The authors have no other conflict of interest.

P288 | Incorporating movement-related sensor data to automatic sleep scoring

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In sleep medicine and research, sleep scoring is the foundation for developing diagnoses and analyzing sleep data. Sleep scoring relies on trained experts to visually recognize sleep stages based on fragmented electrophysiological signals from the brain, eyes, and face muscles. Sleep scoring is a tedious and error-prone process, making it inappropriate for the treatment of large datasets and hampering progress in the field. Automation using deep neural networks has produced promising results, but has yet to be adopted widely. An issue with current algorithms is that their accuracy is significantly reduced for sleep-stage transitions. Another problem faced when developing these techniques is the over-representation of some sleep stages over others in human sleep. Wake (W) and light non-rapid eye movement (NREM) sleep are less frequent than deeper NREM stages leading to an imbalance in classification targets. Furthermore, the accuracy of these methods is often decreased when presented with data recorded with at home devices which usually have fewer channels.

Our aim is to improve the performance of a deep learning architecture by adding distinct information about underrepresented sleep stages and stage transitions to the network input. Given that movement is likely to aid differentiating W and light NREM sleep from other sleep stages, we have added an inertial measurement unit (IMU) to an electroencephalography (EEG) headband used to record sleep. We evaluate the performance of a simple deep learning model based on a one-dimensional convolutional neural network (1D-CNN) before and after adding IMU data to assess the value of this attribute. The model was trained on approximately 200 h (30 nights; N= 15) recorded with a 5-channel EEG headband equipped with an IMU. Using various leave one out cross validation (LOOCV) trials, we assess the effect of adding diverse types of movement derived features on the baseline accuracy (70.29%–71.91%) of our algorithm. We discuss the benefits and pitfalls of adding non-traditional features as inputs to machine learning-based sleep scoring algorithms.

Disclosure: Yes

Conflict of Interest statement: All authors are employed by Bitbrain, Zaragoza, Spain.

P584 | Preferential consolidation of emotional reactivity during sleep: systematic review and meta-analysis

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Introduction: Investigations of whether sleep affects cognitively unmodulated reactivity to emotional stimuli have generated inconsistent findings: some show that sleep attenuates emotional reactivity, whereas others report enhanced or maintained reactivity. Methodological differences between studies may account for these discrepancies. To resolve the questions of whether sleep leads to attenuation, enhancement, or maintenance of emotional reactivity, and under which experimental conditions particular effects are observed, we undertook a synthesized narrative and meta-analytic approach.

Methods: We searched PubMed, PsycINFO, PsycARTICLES, Web of Science, and Cochrane Library databases for relevant articles, using search terms determined *a priori* and search limits of English language, human participants and dates January 2006–June 2021. Our final sample included 24 studies that investigated changes in emotional reactivity in response to negatively and/or positively valenced material compared to neutral material over a period of sleep compared to a matched period of waking. Primary analyses used random effects modelling to investigate whether sleep preferentially modulates reactivity in response to emotional stimuli; secondary analyses examined potential moderators of the effect.

Results: Sleep (or equivalent periods of wakefulness) did not significantly affect physiological measures of reactivity to negative or neutral stimuli: however, self-reported arousal ratings of negative stimuli were significantly increased post-sleep but not post-waking. Subgroup analyses indicated that (a) sleep-deprived participants, compared to those who slept or who experienced daytime waking, reacted more strongly and negatively in response to positive stimuli; (b) nap-exposed participants, compared to those who remained awake or who slept a full night, rated negative pictures less negatively; and (c) participants who did not obtain substantial REM sleep, compared to those who did and those exposed to waking conditions, had attenuated reactivity to neutral stimuli.

Discussion: We conclude that sleep may have a larger effect on subjective emotional experience than on objectively measured physiological measures of emotion. Greater consistency in methodology, reporting REM sleep parameters and collecting both psychophysiological and self-report subjective measures will be vital to further explore this relationship.

Disclosure: No

P862 | Multinight in-home in healthy males with objectively measured sleep patterns: stability over time and implications for reliability of assessments during clinical trials

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Introduction: One or two night in-laboratory polysomnography (PSG) remains the gold standard for objective sleep measurements during clinical trials. Our hypothesis was that the variability of sleep patterns occurring at-home in ecological conditions is not reflected by such restricted data. The study objectives were: (i) to analyse variability of sleep parameters using a real-world multinight longitudinal dataset and (ii) to estimate minimal samples required for balancing these inter- and intra-variability in clinical studies.

Methods: Participants were males who self-reported the absence of sleep disorders. They used a sleep-monitoring device (Dreem, France) equivalent to PSG that records, stores, and automatically analyses sleep data. The night-to-night variability of sleep parameters was assessed over five consecutive weeknights using coefficients of variation (CV). Models and simulations were conducted to estimate the minimal number of individuals required to overcome such a variability.

Results: 94 males without sleep disorders were included, accounting for 470 nights. The variability was high for N3 latency, wake after sleep onset (WASO), sleep onset latency, latency to persistent sleep, and N2 latency (CV: 0.44, 0.51, 0.53, 0.55, 0.58, respectively); medium for N3 percentage, awakenings and REM latency (CV: 0.22, 0.24, 0.28, respectively); and low for sleep efficiency, N2 percentage, total sleep time (TST), REM percentage, micro-arousal index and N1 percentage (CV: 0.04, 0.1, 0.1, 0.14, 0.18, 0.19, respectively). Models suggested that minimal sample sizes and numbers of nights varied in function of the considered sleep parameter. When looking at the most common sleep parameters, it goes from 1 night in 10 patients for TST to 4 nights in 30 patients for WASO.

Conclusion: The variability of sleep parameters over time is hugely underestimated and under recognized when designing clinical studies. Our data will help better estimate sample sizes and number of nights required depending on the considered sleep parameter.

Disclosure: Yes

Conflict of Interest statement::

A.C., J.T. and P.J.A. are employees of Dreem SAS. Dr. Bailly has consulted for Dreem. None of the other authors have a financial arrangement or connection to disclose.

28: HEALTHCARE SERVICES, RESEARCH AND EDUCATION

P289 | Sleep contribution to immunity response after vaccination against SARS-CoV-2

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Objectives/Introduction: Vaccination remains the only effective tool on protection against severe disease and death from COVID-19 infection. Growing evidence suggests that sleep could affect immune response after vaccination. The aim of this prospective study was to investigate possible associations between regular sleep disruption and immunity response after vaccination for COVID-19 infection.

Methods: Five hundred ninety-two healthcare workers, with no previous history of COVID-19 infection, from 8 major Greek hospitals were enrolled in this study. All subjects underwent two COVID-19 mRNA vaccine inoculations (Pfizer/BioNTech) with an interval between the doses 21 days. A questionnaire was completed two days after each vaccination, and clinical characteristics, demographics, sleep duration and habits were recorded. Blood samples were collected, and pike IgG antibodies were measured, 20 ± 1 days after the first dose and 21 ± 2 days after the second dose.

Results: A total of 544 subjects (30% males), with median age 46 (38–54) years, and BMI 24.84 (22.6–28.51) kg/m^2 were eligible for the study. Data were analysed using the Statistical Package for the Social Sciences (SPSS), version 10.1 (SPSS Inc., Chicago, IL, USA). The median habitual duration of sleep was 6 (6–7) h of sleep per night. Two hundred eighty-three participants (52%) were used to have short daytime nap. Antibody levels were associated with age ($r = -0.178$, $p < 0.001$), poor sleep quality ($r = -0.094$, $p < 0.05$),

insomnia ($r = -0.098$, $p < 0.05$), and nap frequency per week ($r = -0.098$, $p < 0.05$), but after adjusting for confounders, only insomnia, gender, and age were independent determinants of antibody levels.

Conclusions: It is important to emphasize that insomnia is associated with lower antibody levels against COVID-19 after vaccination.

Disclosure: No

P585 | Sleep management and sports performance at TOKYO2020: field hockey selection

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Introduction: Scientific evidence shows that one of the main factors that influence sports performance is the quantity and quality of sleep and circadian rhythms of athletes. For this reason, one of the basic factors in planning training and competitions is the control of sleep h, quality and knowledge of circadian rhythms, to optimize sports performance.

In the present study, the h of sleep, quality, dysfunctions and emotional state of a group of athletes will be evaluated to optimize their performance prior to the Tokyo 2020 Olympics.

Method: The study includes 30 female field hockey players (mean age = 25 ± 3) (Spanish team, Tokyo 2020). The clinical history is collected, and they answered the Sleepiness questionnaire (Epworth), the Morning-Evening questionnaire (MEQ) and the Profile of Mood State (POMS).

Sleep and circadian rhythms were evaluated using the Kronowise multichannel device (Chronolab, University of Murcia), which, worn like a clock, acquires actimetric data, wrist temperature, body position and light, to predict sleep.

Results: 40% of the players do not have any sleep dysfunction, and they sleep 8:07 ± 0:47 h on average. 28% of circadian studies record indicators of insomnia and 32% are compatible with delayed sleep phase (DSPS). The two pathological groups sleep 7:22 ± 0:36 and 7:18 ± 0:31 on average, respectively, which are significantly less than the healthy group ($p < 0.05$). Both, Insomnia group and DSPS group are associated with more evening chronotypes than the healthy group (mean MEQ(healthy; insomnia; RF) = 56,2–49,6–43,8; $p < 0,05$). However, only insomnia group registers a significantly higher degree of sleepiness (mean Epworth(healthy, insomnia) = 8,8–11.9; $p < 0.05$), and also significantly higher degrees in depression (mean(healthy; insomnia) = 2,7–4,5; $p < 0,05$) and anger (mean(healthy; insomnia) = 3,0–4,4; $p < 0,05$) POMS test domains. Somnolence (mean Epworth(healthy, deprivation) = 8,8–10,7; $p < 0.05$) and anger (mean(healthy; insomnia) = 3,0–4,1; $p < 0,05$) are also a significantly higher factor in those with sleep deprivation.

Conclusions: A high percentage of the players suffer from sleep dysfunctions in different degrees, which all are associated to more evening chronotypes. A correlation is observed between a more depressed and anger mood and suffering from insomnia and sleep deprivation.

Disclosure: No

P863 | Clinical decision support system for sleep staging with explanations from artificial intelligence

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Objectives/Introduction: The aim of this study was to develop an AI-based clinical decision support system (CDSS) for assisting polysomnographic technicians during the review of AI-generated sleep staging results. Our objective is to correctly understand the information required from the CDSS and to develop the system in a user-centered fashion. In particular, with extensive user study, we determine desired features for the sleep staging AI system that could successfully support sleep technicians.

Methods: User needs for the CDSS were identified during interviews with polysomnographic technicians. User observation sessions and iterative design processes were conducted to develop user-friendly CDSS. Then, we evaluated the system with polysomnographic technicians. We compared the performance of the technicians in sleep staging when using the proposed system with their performance when using baseline AI system, which only provides predicted labels without an explanation. Wilcoxon signed-rank test was used to calculate the significance of improvements by adopting the proposed test. All statistics and significance tests were calculated with Python 3.6.

Results: The user study revealed that technicians desire explanations relevant to key electroencephalogram (EEG) patterns for sleep staging when assessing the correctness of the AI predictions. Here, technicians could evaluate whether AI models properly locate and use those patterns during prediction. Based on this, information in AI models that is closely related to sleep EEG patterns was formulated and visualized during the iterative design process. Furthermore, we developed a different visualization strategy for each pattern based on the way the technicians interpreted the EEG recordings with these patterns during their workflows. Generally, the tool evaluation results from the nine polysomnographic technicians were positive. Quantitatively, technicians achieved better classification performances after reviewing the AI-generated predictions with the proposed system; classification accuracies measured with Macro-F1 scores improved from 60.20 to 62.71. Qualitatively, participants reported that the provided information from the tool effectively supported them, and they were able to develop notable adoption strategies for the tool.

Conclusions: Our findings indicate that formulating clinical explanations for automated predictions using the information in the AI with a user-centered design process is an effective strategy for developing a CDSS for sleep staging.

Disclosure: No