

## PHYSICAL ACTIVITY AND PHYSICAL EDUCATION CLASSES FOR STUDENTS DURING THE COVID - 19 PANDEMIC

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### Abstract

In March 2020, regular contact classes in Physical Education at the University of Zagreb were interrupted and transferred to a virtual environment. It was one in a series of restrictive measures adopted to combat the Covid-19 pandemic caused by Coronavirus-2, which has greatly changed not only the usual way of life but also physical activity which is known to have numerous positive effects on individual health and society as a whole. Distance learning was conceived in such a way that students have partial freedom to create activities they need to perform using the information and tasks provided through a variety of online and digital tools. The aim of this study was to determine the existence of differences in physical activity before and during the pandemic and differences in physical activity with according to gender. The aim was also to determine students' attitudes towards the new form of (online) teaching. The research was conducted through an anonymous online questionnaire on 189 students of one of the faculties of the University of Zagreb, with an average age of  $19.98 \pm 0.84$  years. Significantly lower levels of physical activity were found in female students before the pandemic and there were differences in physical activity by gender before the pandemic, but not during. The level of physical activity during the pandemic increased compared to the level of physical activity before the pandemic, especially among female students. Most of the respondents have a positive attitude towards online teaching. This research has shown how teaching conceived in this way and the online and digital tools used can increase the level of physical activity and that in the future they should be incorporated into regular teaching.

**Key words:** Covid-19 pandemic, physical activity, students, Physical Education classes

### Introduction

In December 2019, a new severe acute corona virus (SARS-CoV-2) appeared in China, which quickly spread around the world (Zhou et al., 2020) and caused a global crisis. The virus causes a disease called COVID-19. In March 2020, the World Health Organization (WHO) declared a global pandemic, which, on May 2, 2021, numbered a total of 151 812 556 infected people, of which 3 186 817 died. In order to balance the curve of exponential growth of the spread of the virus and given the lack of adequate cure and vaccine, many countries around the world have introduced some form of blockade, i.e., restrictions on the current way of life. Croatia, similar to a large number of countries in Europe and the world, has taken certain anti-epidemic measures. Between March 19 and May 11, 2020, the Civil Protection Headquarters of the Republic of Croatia adopted a number of measures: social distancing, ban on gatherings in public places, restriction of movement between local and regional self-government units, suspension of public transport, closure of a number of institutions, cafes and restaurants; suspension of almost all service activities. Regular, i.e., contact teaching in schools and universities was suspended and transferred to a virtual environment ("remotely"). The number of people working from home was greatly increased. All organized sports activities were prohibited. Fitness centres, gyms, swimming pools and all sports facilities were closed. All of the above has greatly changed the everyday life of most people; their work, schooling, way of spending free time, and thus physical activity (Hossain, Sultana & Purohit, 2020).

Physical activity is a complex behaviour that occurs in a variety of forms and contexts. Free play, household chores, transportation, various types of recreation, activities within the education system (Physical Education) and organized sports are just some of the types of physical activities (Malina, Bouchard, & Bar-Or, 2004). The World Health Organization has defined physical activity as "all movements or activities in daily life, including activity at work or school, recreation or sports activity" (Pan American Health Organization, 2002). It is known that regular physical activity of the appropriate type, frequency, sufficient duration, and intensity, carried out by one's own choice such as recreation, or necessary and even mandatory physical activity has numerous positive effects on physical and mental health (Schuh et al, 2018, 2019) and that insufficient levels of physical activity are one of the four leading risk factors for mortality in the world. Specifically for Covid-19, physical activity has been shown to provide protective elements in the fight against the disease caused by

the virus (Jacob, Tully, & Barnett 2020; Schuch et al, 2020; Simpson and Katsanis 2020).

The recommendations of the World Health Organization (WHO, 2010) for people over the age of eighteen are a minimum of 150 minutes per week of moderate-intensity aerobic physical activity or a minimum of 75 minutes per week of high-intensity aerobic physical activity with daily minimum intervals of ten minutes. Additional health effects can be achieved by doubling the recommended values.

Physical Education (PE) at the University of Zagreb is mandatory in the first and second year of the undergraduate study and is actually the last step of systematic exercise during schooling. One of the most important goals of PE is to prevent premature reduction of ability levels due to insufficient physical activity and to train students for individual physical exercise and rational, meaningful use of their free time. It is performed during 30 classes per semester in the form of exercises.

Student age is a transitional period from adolescence to adulthood. Adolescence has been shown to be a key period in which previously acquired habits that persist into adulthood change or further reinforce (Hallal et al., 2006). Students who are more physically active and in better physical condition show better health-related quality of life, health parameters, and academic success (Ge et al, 2019; Gordon-Larsen et al, 2004; Hervás et al, 2018; Lipošek et al, 2018).

Much has been written about the possible negative health consequences of the pandemic, particularly due to insufficient physical activity as an indirect consequence of quarantine (Hall et al., 2020; Lippi et al., 2020). Special attention is paid to the fact that staying at home and limited movement and social interaction can lead to the appearance and increase of fear, depression, and anxiety (Hammami et al, 2020). Adapted physical activity programs can enhance the suppression of the negative physiological and psychological consequences of restrictions associated with the mentioned pandemic (Chen et al., 2020; Jiménez-Pavón et al., 2020).

The aim of this paper is to determine whether there is a difference in physical activity among students before and during the measures introduced during the Covid-19 pandemic, whether there are differences with regard to gender and what are the attitudes of students towards the introduced online teaching in which both students and professors have found themselves for the first time (and without any preparation).

## Methods

The research was conducted on 189 students of the Faculty of Chemical Engineering and Technology, University of Zagreb, with an average age of  $19.98 \pm 0.84$  years. During the twelfth week of distance learning, the respondents completed an anonymous questionnaire made for the purposes of this research. The questionnaire consists of questions about age, gender, and year of study on the basis of which grouping and analysis were performed, questions about physical activity before and during the Covid-19 pandemic as well as attitudes towards distance learning of Physical Education.

In accordance with the recommendations of the World Health Organization and the Croatian Institute of Public Health, and the previously mentioned restrictions, students were offered several activities to fulfil their obligations for the Physical Education course. In addition to the recommended walking, running, and cycling, they were also offered rollerblading and hiking, as well as independent exercise in their homes. Detailed exercise instructions as well as examples of exercises were available to all students through platforms on which all classes and mutual communication took place.

The obtained data were processed with the statistical software package Statistica - version 13.3 and Microsoft Excel 2016 licensed for the University of Zagreb. After basic descriptive statistics, nonparametric data analysis methods were used to determine differences (Wilcoxon rank test and Mann-Whitney U test). Response frequencies are shown for all variables. The level of statistical significance was set at  $p < 0.05$ .

## Results

The questionnaire was completed by a total of 189 respondents (153 female students - 81% of the total sample and 36 male students - 19%) with an average age of  $19.98 \pm 0.84$  years. The largest share of respondents (60%) is in the first year, 39% in the second year and 1% in the third year of the undergraduate study.

Table 1. Physical activity before and during a pandemic

		total sample		female students		male students	
		%	N	%	N	%	N
I spent all or most of my free time doing things that involve almost none physical activity	before	25,4	48	28,76	44	11,11	4
	during	7,94	15	6,54	10	13,89	5
Sometimes (1-2 times a week) I had physical activity in my free time	before	29,63	56	30,07	46	27,78	10
	during	22,75	43	26,14	40	8,33	3
Sometimes (3-4 times a week) I had physical activity in my free time	before	28,57	54	26,14	40	38,89	14
	during	38,62	73	37,91	58	41,67	15
I often (5-6 times a week) had physical activity in my free time	before	14,29	27	13,73	21	16,67	6
	during	25,93	49	25,49	39	27,78	10
Very often (7 or more times a week) I had physical activity in my free time	before	2,12	4	1,31	2	5,56	2
	during	4,76	9	3,92	6	8,33	3

Wilcoxon's rank test showed a statistically significant increase in physical activity in the entire sample at the time of the COVID-19 pandemic ( $z = 6.60$ ,  $p < 0.00$ ), as well as in the group of female students ( $z = 6.42$ ,  $p < 0, 00$ ). There was no statistically significant difference in physical activity between male students at the time of the pandemic ( $z = 1.76$ ,  $p < 0.08$ ).

Table 2. Differences in physical activity of respondents before and during the pandemic

	gender	Mann – Whitney U test				
		N	Sumrank	U	Z	p
Physical activity before the pandemic	F	153	13844,0	2063,0	-2,33819	0,02
	M	36	4111,0			
Physical activity during the pandemic	F	153	14264,0	2483,0	-0,92	0,36
	M	36	3691,0			

The Man - Whitney test showed a statistically significant difference between male and female students in physical activity before the pandemic, but not during the pandemic.

Table 3. Students' wishes for physical activity during the pandemic

During the pandemic, I want to be physically active	Gender		
	Female N (%)	Male N (%)	Total N (%)
Yes	149 (97,39)	33 (91,67)	182 (96,3)
No	4 (2,61)	3 (8,33)	7 (3,7)
Total	153 (100)	26 (100)	189 (100)

Table 4. Attitudes of female and male students towards PE distance learning

PE distance learning:	Gender		
	Female N (%)	Male N (%)	Total N (%)
I like it.	140 (91,5)	30 (83,33)	170 (89,95)
I do not like it.	13 (8,5)	6 (16,67)	19 (10,05)

Table 5. Attitudes of male and female students on the impact of PE distance learning on the level of physical activity

PE distance learning helps me to be physically active	Gender		Total N (%)
	Female N (%)	Male N (%)	
Yes	149 (97,39)	31 (86,11)	180 (95,24)
No	4 (2,61)	5 (13,89)	9 (4,76)

Male and female students do not differ statistically significantly in their attitudes in the last three mentioned variables.

## Discussion

The pandemic caused by Covid-19 disease is affecting the entire world population. Research shows that adolescence is a period in which acquired habits (and thus habits of engaging in physical activities) that extend throughout life are strengthened or possibly changed (Hallal et al., 2006; Keating et al., 2005) and that this is the last step on which we can systematically, within the education system, influence a considerable part of the population. Thus, the primary goals of this research were to determine the possible differences in the level of physical activity in students before and during restrictive measures and their attitudes towards PE distance learning.

The obtained results are in contrast to most studies in which a general decrease in physical activity was observed, especially in the male population (Ammar et al, 2020; Sekulić et al., 2020; Tison et al, 2020; Xiang et al., 2020), but they agree with several studies whose results have shown just the opposite. In a study in Belgium, in addition to the undesirable increase in sedentary time, the number of physically active persons also increased (Constandt et al., 2020). In general, the most physically active and active individuals decreased their physical activity, while those inactive, i.e., minimally active, increased their activity levels (Giustino et al, 2020; Lesser et al, 2020). The reason for the significant increase in physical activity levels in the examined sample during restrictive measures during the pandemic compared to the time before the pandemic can be found in the fact that the physically inactive in previous studies most often reported lack of time as the main reason for inactivity. (Rasbash et al, 2019). It is certainly necessary to mention that in this research, students were encouraged to engage in physical activity, in order to perform obligations for the course, or due to almost daily communication which was not present in the mentioned research. During distance learning students did not waste time on transportation to several different faculty locations and were able to choose the time and type of physical activity as part of the performance of obligations for the PE course. Very different examples of activities were available to them on several online platforms as well as the possibility of combining different activities (which is not possible when conducting regular contact classes due to space, time and organizational constraints). This form of teaching gave them a certain freedom to create and organize their own time and activities, which for the most part certainly increased the motivation to carry out physical activities. The views of the largest number of respondents speak in favour of that. Almost 98% of female students and 92% of male students showed a desire for physical activity during restrictive measures. Almost 90% of respondents have a positive attitude towards such conceived and conducted distance learning. Over 95% of them believe that distance learning classes conducted in this way help them to be physically active. Research by Feter et al. (2019) and Gal et al (2018) confirm the positive impact of wearable devices and smartphone applications on physical activity.

Viewed by gender, this study found significantly lower levels of physical activity among female students before the pandemic. Also, a significant increase in the levels of physical activity during restrictive measures was found among female students. This can be explained by the fact that girls are generally less active and that males are more involved in organized sports activities that were prohibited by the measures, while girls are more likely to exercise independently in nature or at home (van Uffelen et al., 2017). In a study by Rodriguez-Larrad et al. (2021) female students stated that during the pandemic they used social networks as a tool to increase levels of physical activity, just as they found new sources of physical activity. In this research, a larger number of female students (although not statistically significant) want to be physically active during the pandemic, they like the conceived and conducted PE distance learning and believe that it helps them in physical activity which also contributes to increased physical activity.

## Conclusion

Engaging in physical activity during a Covid-19 pandemic has been shown to be associated with reduced depression and anxiety as well as raising the body's immune system and resistance to infection (Wolf et al, 2021). Considering the above mentioned, and all the previously known positive effects of appropriate physical activity on physical health and the specifics of this transition period from adolescence to adulthood, special attention should be paid to this population, especially at the time of the pandemic.

In order to maintain or even increase levels of physical activity during the pandemic, specific circumstances are needed, as well as will and motivation. This research has shown how digital and web technologies can be one of the ways to have a positive effect on physical activity levels and how restrictive measures can even have a positive effect on certain segments of life. In the future (after the pandemic), the introduction of digital technologies in regular Physical Education classes or giving more space to them should certainly be considered. Given the established difference in the level of physical activity during restrictive measures by gender, all further actions should be adjusted to the specifics of each gender.

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