Original Article

Influence of personality traits on a patient's decision to accept orthognathic surgery for correction of dentofacial deformity

Renata Vidakovic[a]; Martina Zigante[b]; Vjera Perkovic[b]; Stjepan Spalj[c]

ABSTRACT

Objectives: To investigate the influence of personality traits in addition to quality of life (QoL) on the decision to accept orthognathic surgery.

Materials and Methods: A total of 108 patients (68% female) aged 14–53 years (median, 18 years; interquartile range, 17–25.75 years), with skeletal malocclusions of Index of Orthognathic Functional Treatment Need grades 3–5 (moderate to very great need for surgery) were included in this cross-sectional study. Personality traits of extraversion, neuroticism, agreeableness, openness, consciousness, perfectionism, and self-esteem and dimensions of Orthognathic Quality of Life Questionnaire were compared between patients who accepted orthodontic preparation for orthognathic surgery and those who refused ($n = 55$ vs 53).

Results: Patients who accepted the suggested surgical procedure had higher age, perfectionism, facial esthetic (FE) concern, social aspect, and impairment of oral function (OF) as well as lower self-esteem with small to medium effect sizes ($P \leq .040$; $r = 0.198$–0.399). Other personality traits and awareness of dentofacial deformity did not differ between the groups. In multiple logistic regression analysis, while controlling for sex, perfectionism, and self-esteem, the following predictors of acceptance of orthognathic surgery were higher: FE concern (odds ratio [OR], 3.4; 95% confidence interval [CI], 1.3–9.1), OF (OR, 3.0; 95% CI, 1.0–8.6), and age $\geq$18 years (OR, 2.7; 95% CI, 1.0–7.1; $P < .001$).

Conclusions: Extraversion, neuroticism, agreeableness, conscientiousness, and openness do not significantly affect a patient's decision to accept orthognathic surgery. The influence of self-esteem and perfectionism is primarily on perception of alteration of QoL induced by dentofacial deformity. (*Angle Orthod.* 2022;92:521–528.)

KEY WORDS: Dentofacial deformity; Orthognathic surgery; Perfectionism; Personality traits; Self-esteem

INTRODUCTION

Dentofacial deformities can compromise oral function (OF), but they have a more pronounced negative effect on psychosocial well-being.[1] The online meeting platforms, social media, and self-presentation with facial pictures can raise awareness of facial features and flaws and negatively influence self-perception.[2] Research showed increasing demand for correction of dentofacial irregularities.[3] The golden standard for treating patients with skeletal malocclusions is the conventional orthodontic–surgical procedure, a combination of orthodontic therapy with fixed appliances and orthognathic surgery for harmonizing intermaxillary relations and facial appearance.[4] The treatment can last more than 3 years and is demanding for the patient and the healthcare system.[5]

Normative need for orthognathic surgery can be established with the use of the Index of Orthognathic Functional Treatment Need (IOFTN).[6] However, the IOFTN, similar to other measures of objective clinical parameters, does not take into consideration the impact of the skeletal anomaly on the persons' life. Oral health-related quality of life (QoL) as a multidi-

[a] Doctoral Student, Department of Orthodontics, Faculty of Dental Medicine, University of Rijeka, Rijeka, Croatia.

[b] Research Assistant, Department of Orthodontics, Faculty of Dental Medicine, University of Rijeka, Rijeka, Croatia.

[c] Professor, Department of Orthodontics, Faculty of Dental Medicine, University of Rijeka, Rijeka, Croatia; and Professor, Department of Dental Medicine, Faculty of Dental Medicine and Health, J. J. Strossmayer University of Osijek, Osijek, Croatia.

Corresponding author: Dr Renata Vidakovic, Department of Orthodontics, Faculty of Dental Medicine, University of Rijeka, Kresimirova 40, Rijeka 51000, Croatia
(e-mail: drvidakovic@gmail.com)

Accepted: December 2021. Submitted: October 2021.
Published Online: February 14, 2022

mensional concept offers broader insight into the effects of malocclusions on satisfaction with life beyond the scope of clinical parameters.[7] Patients with altered facial appearance showed poorer QoL in comparison with the general population, were more aware of their deformity, and had more functional limitations and problems with social contacts.[8,9] Nevertheless, some patients tolerated their severely pronounced malocclusions well and did not deem correction necessary, whereas others with minor irregularities sought orthodontic correction, indicating that the normative need for treatment often does not correlate with the decrease of QoL.[10]

Research highlighted personality traits as intrinsic factors that may shape a patient's perception of dentofacial deformity and influence the demand for and compliance during orthodontic treatment.[11,12] The Big Five model has been widely used for the evaluation of individual differences among people and includes the following five main personality traits shared by cultures worldwide: neuroticism (vs emotional stability), extraversion (vs introversion), openness to experience (vs closedness), agreeableness (vs antagonism), and conscientiousness (vs lack of direction).[13] Conscientiousness is a strong predictor of positive life outcomes with an established correlation with preventive health activities such as exercising and healthy diet.[14] Patients with higher levels of neuroticism seem to experience distorted and emphasized symptoms and seek more therapeutic procedures.[15] Negative correlation of neuroticism with overall satisfaction with life has been established.[16] Perfectionism is a personality trait that can affect perception and actions, best conceptualized as a multilayered characteristic that includes a person's concern with striving for flawlessness, critical self-evaluation, and concern regarding evaluation by others.[17] Self-esteem is an innate capacity to deal with less favorable circumstances in life such as dentofacial deformity.[18] Previous research points to self-esteem as the strongest predictor of QoL.[19]

The purpose of this study was to investigate the possible effect of personality traits in addition to QoL on a patient's decision to accept suggested orthognathic surgery. It was hypothesized that perfectionism and neuroticism would be the most prominent predictors of acceptance of orthognathic surgery and agreeableness and openness to a lesser extent.

MATERIALS AND METHODS

In this cross-sectional study, a convenience sample of 108 White patients (68% females) aged 14–53 years (median, 18 years; interquartile range [IQR], 17–25.75 years) with an objective need for orthognathic surgery were recruited from a pool of patients referred for an orthodontic consultation or/and therapy of a skeletal malocclusion to University Dental Clinic Rijeka, Croatia. Standard orthodontic diagnostic procedures, including clinical examination, photogrammetric, cephalometric, and study casts analysis, were performed by four examiners, an orthodontist or orthodontic postgraduates, during 2020. Collected data were evaluated, and IOFTN scores were determined by an experienced orthodontist (Dr Spalj). Patients with IOFTN grades 3–5 (need for surgery–very great need for surgery) who signed informed consent were included in the study. The study was approved by Ethics Committees of the University of Rijeka Faculty of Dental Medicine (no. 2170-57-006-20-01) and Clinical Hospital Centre Rijeka (no. 2170-29-02/1-20-2). The minimum sample size required to explore the effect of seven personality traits on the acceptance of orthognathic surgery was calculated to be 103 patients considering a moderate effect size $f^2 = 0.15$, level of significance $\alpha = 0.05$, and power of 80%. Of 108 patients with an objective need for orthognathic treatment, 55 patients (51%) agreed to an orthodontic–surgical treatment plan; 57% were male patients.

The impairment of QoL was measured with the Orthognathic Quality of Life Questionnaire (OQLQ), a condition-specific instrument for the evaluation of QoL of patients with dentofacial deformities with an indication for orthognathic surgery.[20] The questionnaire showed cross-cultural applicability.[21,22] OQLQ measures the following four dimensions: OF, facial esthetic (FE) concern, social aspect (SA), and awareness of dentofacial deformity (AW). The sum of individual dimensional scores indicated the level of QoL impairment, concern, or awareness of deformity: the higher the score, the higher the impairment/concern/awareness.

Personality traits in both groups were assessed with the Big Five Inventory (BFI) that included extraversion, neuroticism, agreeableness, openness, and consciousness. For each trait, two specific facets were also analyzed: assertiveness and activity (extraversion), anxiety and depression (neuroticism), altruism and compliance (agreeableness), esthetics and ideas (openness), and order and self-discipline (conscientiousness).[23] Perfectionism was measured with the Frost Multidimensional Perfectionism Scale in six dimensions (doubt in performance, concern over mistakes, organization, parental expectations, parental criticism, personal standards) and as a global measure.[24] Global self-esteem was assessed with the Rosenberg Self-Esteem Scale, a broadly accepted one-dimensional instrument consisting of 10 items.[25]

Table 1. Comparison of Age and Dimensions of Perfectionism Between Patients Who Accepted and Patients Who Refused Orthognathic Surgery[a]

Variable	AM ± SD	Minimum Value	Maximum Value	Median	IQR	*P* Value[b]	*r*
Age							
Accepted	22.5 ± 6.6	14	39	20	17–27		
Refused	20.3 ± 7.4	14	53	17	16.5–21.5	**.010**	−0.246
Concern over mistakes							
Accepted	20.6 ± 7.1	9	37	21	15–25		
Refused	15.9 ± 5.7	9	32	14	12–18.5	**<.001**	−0.337
Organization							
Accepted	23.2 ± 4.7	10	30	24	20–26		
Refused	23.4 ± 5.1	10	30	24	21–27	.641	−0.045
Parental expectations							
Accepted	10.6 ± 4.1	5	20	10	7–14		
Refused	10.1 ± 4.3	5	24	9	7–13	.419	−0.078
Personal standards							
Accepted	22.3 ± 5.9	11	34	22	18–27		
Refused	19.9 ± 4.9	12	32	20	16–23	**.029**	−0.211
Doubt in performance							
Accepted	10.4 ± 3.6	4	18	10	7–13		
Refused	9.4 ± 3.5	4	17	9	7–12	.118	−0.150
Parental criticism							
Accepted	7.6 ± 3.1	4	16	7	5–10		
Refused	7.1 ± 2.4	4	13	7	5–8.5	.678	−0.040
Global perfectionism							
Accepted	71.4 ± 17.8	40	109	72	55–86		
Refused	64.0 ± 14.9	40	108	63	53.5–74	**.026**	−0.214

[a] AM indicates arithmetic mean; *r*, effect size; and SD, standard deviation.
[b] *P* level of significance assessed with Mann-Whitney *U*-test. *P* values marked with bold indicate statistically significant differences between the groups.

Statistical Analysis

Normality of distribution was tested with Kolmogorov-Smirnov test. As the variables did not show normal distribution for analyzing the differences between patients who accepted and those who refused orthognathic surgery, the Mann-Whitney *U*-test was used. To assess the effect size, the formula $r = Z/\sqrt{N}$ was used. Multiple logistic regression analysis was used to determine the predictors for accepting surgery, and variables were dichotomized for that purpose: age, 0 = adolescent ≤17 years and 1 = adult ≥18 years; OF and FE concern, 0 = low ≤9 and 1 = high ≥10; AW, 0 = low ≤7 and 1 = high ≥8; SA, 0 = low ≤15 and 1 = high ≥16; global self-esteem, 0 = low ≤29 and 1 = high ≥30; and global perfectionism, 0 = low ≤87 and 1 = high ≥88. Variables with cutoff median of scalar point values were also modeled. Odds ratio (OR) with 95% confidence interval (CI) were calculated to assess the odds for accepting the suggested surgery. Pearson correlations were used to test the relationship between final predictors and variables that demonstrated significant intergroup differences in univariate analysis but appeared not to be significant predictors in multiple regression. Commercial statistical software IBM SPSS 22 was used for data analysis (IBM Corp, Armonk, N.Y.).

RESULTS

Patients with skeletal malocclusions with established normative need for orthognathic surgery who accepted the proposed treatment were older and had higher levels of global perfectionism (dominantly in the concern over mistakes and high personal standards domains) and had lower levels of global self-esteem than those who refused surgery, with a small to medium effect size ($P \leq .040$; $r = -0.198$ to -0.337; Tables 1 and 2, Figure 1). Also, patients who decided to undergo the suggested orthodontic–surgical procedure had higher FE concern, OF, and SA, with a small to medium effect size ($P \leq .029$; $r = -0.210$ to -0.399; Table 2, Figure 2).

Perfectionism and self-esteem had the smallest effect size. The Big Five personality traits and their facets and AW did not differ between the group that accepted and the group that refused surgery (Figures 2 and 3).

Multiple regression with control of sex, global perfectionism, and self-esteem pointed to age, FE concern, and OF as predictors for acceptance of orthognathic surgery ($P < .001$; Table 3). The odds for accepting surgery were 3.4 times higher in patients with high FE concern, three times higher in patients with significantly impaired OF, and 2.7 times higher in patients older than age 18 years. The model correctly classified 66% of

Table 2. Comparison of OQLQ, the Big Five Traits, and Self-Esteem Between the Group Who Accepted and the Group Who Refused Orthognathic Surgery

Variable	AM ± SD	Minimum Value	Maximum Value	Median	IQR	*P* Value[a]	*r*
Self-esteem							
Accepted	40.4 ± 5.9	20	49	41	37–45		
Refused	42.6 ± 5.6	25	50	43	40–46.5	**.040**	−0.198
Extraversion							
Accepted	27.6 ± 5.3	17	38	28	23–31		
Refused	28.4 ± 6.6	12	39	29	23.5–33.5	.279	−0.104
Agreeableness							
Accepted	34.6 ± 4.5	25	45	35	31–38		
Refused	34.9 ± 4.2	26	42	35	33–38	.680	−0.040
Consciousness							
Accepted	32.8 ± 5.7	17	44	34	29–37		
Refused	33.0 ± 5.3	19	45	34	29.5–37	.875	−0.015
Neuroticism							
Accepted	20.0 ± 5.1	9	33	20	16–24		
Refused	19.5 ± 5.1	12	35	19	16–21.6	.377	−0.085
Openness							
Accepted	36.5 ± 6.2	24	49	37	31–41		
Refused	37.0 ± 5.1	25	46	37	33–42	.747	−0.031
SA							
Accepted	10.8 ± 7.1	0	27	10	7–16		
Refused	7.9 ± 7.0	0	27	7	1.5–11.5	**.029**	−0.210
FE concern							
Accepted	12.7 ± 4.9	0	19	14	11–16		
Refused	9.4 ± 5.6	0	20	11	4.5–13.5	**.001**	−0.321
OF							
Accepted	9.0 ± 4.8	0	18	9	5–13		
Refused	5.2 ± 4.4	0	20	4	2–7.5	<**.001**	−0.399
AW							
Accepted	7.2 ± 3.8	0	15	7	4–10		
Refused	6.7 ± 4.6	0	16	7	2.5–10	.550	−0.058

[a] *P* level of significance assessed with Mann-Whitney *U*-test. *P* values marked with bold indicate statistically significant differences between the groups.

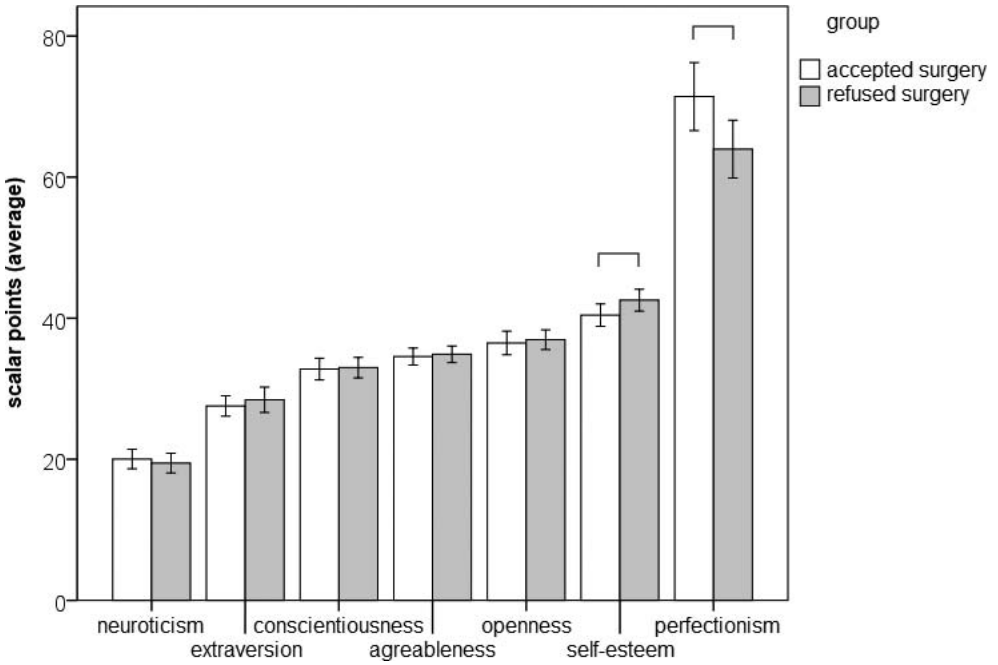

Figure 1. Comparison of the Big Five personality traits, perfectionism, and self-esteem between the group who accepted and the group who refused surgery. Columns represent averages, and whiskers display 95% CIs. Horizontal lines mark variables that are significantly different between the groups.

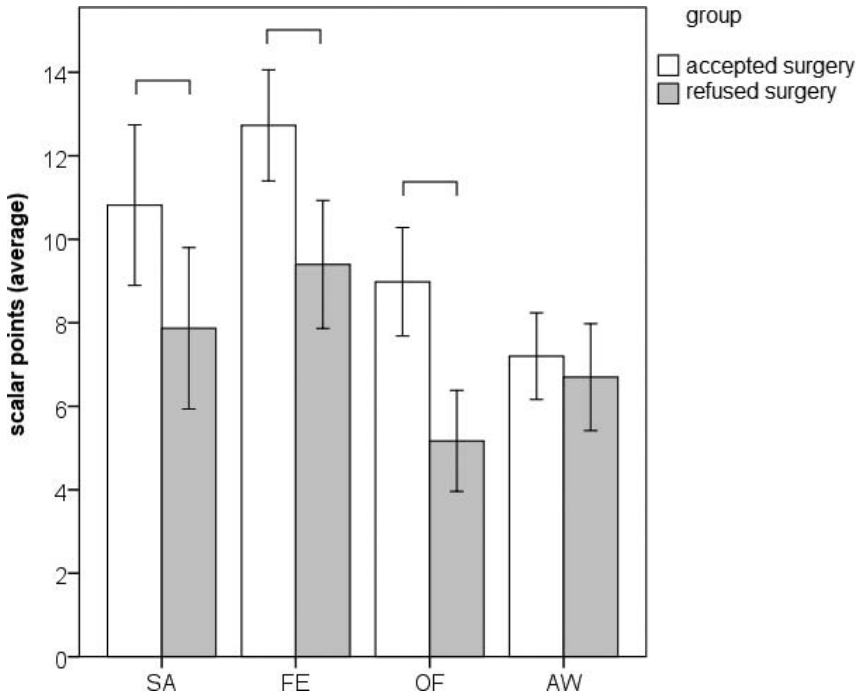

Figure 2. Comparison of OQLQ dimensions between the group who accepted and the group who refused surgery. Columns represent averages, and whiskers show 95% CIs. Horizontal lines mark variables that are significantly different between the groups.

patients, 62% of those who accepted and 70% of those who refused surgery. Self-esteem, perfectionism, and SA were not significant predictors in multiple regression because the Pearson correlation coefficients implied that they correlated with significant predictors: self-esteem with FE concern ($r = -0.502$; $P < .001$), perfectionism with OF ($r = 0.257$; $P = .007$), and SA with FE concern and OF ($r = 0.708$ and 0.366; $P < .001$).

DISCUSSION

This study showed that personality traits had less influence on the decision to accept orthognathic

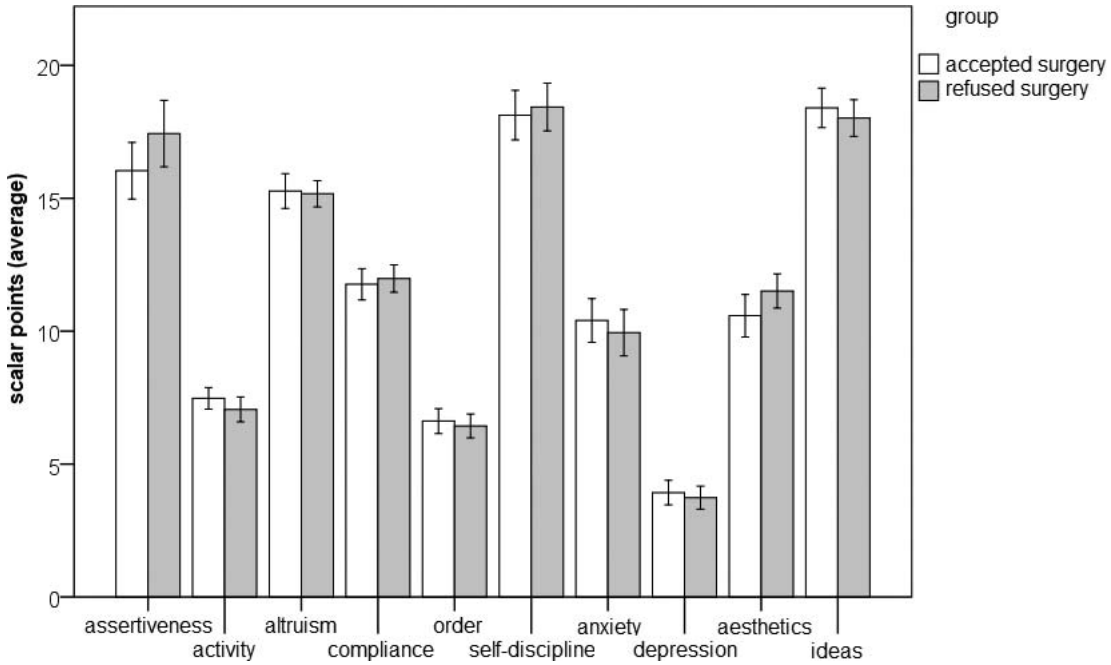

Figure 3. Comparison of facet traits within the broad Big Five personality domains between the group who accepted and the group who refused surgery. Columns represent averages, and whiskers show 95% CIs.

Table 3. Predictors of Acceptance of Proposed Orthognathic Surgery[a]

Variable	B	SE	*P* Value	OR (95% CI)
Sex (1 = female)	−0.8	0.5	.128	0.5 (0.2–1.3)
Age (1 = adults ≥18 years)	1.0	0.5	**.043**	2.7 (1.0–7.1)
Impairment of social contacts (1 = high ≥16)	0.8	0.7	.223	2.2 (0.6–7.8)
FE concern (1 = high ≥10)	1.2	0.5	**.017**	3.4 (1.3–9.1)
Impairment of OF (1 = high ≥10)	1.1	0.5	**.045**	3.0 (1.0–8.6)
Global self-esteem (1 = high ≥30)	0.3	1.0	.768	1.3 (0.2–8.9)
Global perfectionism (1 = high ≥88)	0.5	0.7	.492	1.6 (0.4–6.4)
Constant	−1.6	1.2		

[a] B indicates logistic coefficient; SE, standard error. Nagelkerke pseudo $R^2 = 0.300$; $P < .001$. *P* values marked with bold indicate statistically significant differences between the groups.

surgery for correction of dentofacial deformity than altered QoL. Previous research indicated that personality, a multidimensional and multilayered pattern of behavior, emotions, and thoughts, could influence patient acceptance of therapy for dentofacial anomalies.[26,27] Of the Big Five personality traits, emphasized agreeableness can lead to better compliance during different stages of orthodontic treatment.[27] It is presumably so because agreeable people tend to maintain harmonious social relationships, are trustworthy, seek approval from others, and as such, are more inclined to accept orthodontic treatment. In contrast, people who show antagonistic traits do not care much about the opinions of others, have little or no tendency to please, and are likely to be less affected by dentofacial deformity.[28]

It was also hypothesized that agreeable people cooperate during various phases of orthodontic treatment because of the trust they place in the person of authority, the orthodontist.[27] Although accepting suggested orthognathic surgery may be regarded as complying with the treatment plan, present research showed no correlation. Openness (willingness to accept new things, intellectual curiosity) was thought to be a possible predictor of acceptance of orthognathic surgery, but the current study showed no correlation, similar to the other Big Five traits. The results indicated that patients with lower self-esteem were more likely to accept surgery, but perfectionism seemed to influence the decision more. Self-esteem appears to function as an anxiety buffer in less favorable circumstances[29] and does not seem to be strongly related to dentofacial features.[30] People with higher self-esteem have better social skills[31] and they seem to cope better with altered dentofacial appearance, being less motivated to undergo surgery. Perfectionists with higher personal standards tend to be more dissatisfied with their appearance and are more prone to seek surgical correction of displeasing dentofacial features because they cannot influence and change them themselves (eg, with diet or exercise).[32] The emphasized high concern over mistakes dimension of perfectionism in patients who accepted surgery may suggest that they regard the dentofacial deformity as their own failure, a mistake that results in the loss of respect and rejection from others.[33]

Patients with skeletal anomalies have poorer QoL when compared with the general population, primarily in the SA, FE concern, and OF dimensions.[8,9,19] The present research demonstrated that patients who accepted orthodontic–surgical treatment for correcting skeletal malocclusion had more functional difficulties, were more worried about their FE concerns, and reported more difficulties in socialization than patients who refused surgery. Although the patients were most bothered by esthetic aspects of the skeletal anomaly, functional impairment was the primary motive for surgery in the Croatian population and obviously deemed it a justified reason for undergoing surgery and missing school or work.[19]

Multiple regression analysis pointed to age as a predictor of acceptance of orthognathic surgery. It is presumably so because dentofacial deformities do not present themselves in full scale until the end of growth that coincides with entering adulthood. In addition, coming of age, finishing school, entering the professional world, and engaging in social networks makes people search for ways to enhance their opportunities by also improving their appearance.

Although a stronger impact of facial deformity was reported in female patients,[34] sex did not seem to be a strong factor in accepting orthognathic surgery. Personality traits do not appear to directly influence the decision to accept orthognathic surgery but, rather, to affect the perception of QoL impairment induced by dentofacial deformity, probably because of the broad influence of heritability on personality traits (40%–55%).[35] Because the same genes operate on all traits in both sexes, sex differences in heritability are not large.

The present study indicated that, when it came to agreeing to surgery that profoundly changes facial appearance, factors other than personality may play a

part, such as fear. Patients form their goals and expectations of orthodontic treatment based on general knowledge about the procedure. Transitory and intermittent discomfort and pain during orthodontic treatment are not uncommon and can even be expected.[36] Extensive surgery under general anesthesia, trauma, and uncertainty about the outcome present far greater risk and may be the cause of fear and subsequently deter the patient from the procedure.

In addition, socioeconomic factors may play a part in accepting orthognathic surgery for correction of a skeletal anomaly. Orthognathic surgery is performed in public hospitals in Croatia, and costs are fully covered by the Croatian Health Insurance Fund. However, although orthodontic treatment alone does not require special alterations to everyday routines, orthognathic surgery with a postoperative recovery period of at least 1 month prevents the patient from fulfilling professional and academic duties, which some cannot afford.

The current study had some limitations. The cross-sectional design provided broad insight into the problem but did not establish cause-and-effect associations. Namely, personality traits, although generally stable over time, may show some developmental changes not addressed in this study. In younger patients, the facial deformity may not have had a great influence on the personality traits, whereas in older patients, it may have already modified some personality traits. The influence of other personality characteristics such as body image was also not addressed in this study. Further interdisciplinary research is needed to identify the patients who would benefit most from the procedure.

CONCLUSIONS

- Personality traits of extraversion, neuroticism, agreeableness, conscientiousness, and openness do not significantly affect a patient's decision to accept orthognathic surgery.
- The influence of self-esteem and perfectionism is primarily on perception of alteration of QoL induced by a dentofacial deformity.

ACKNOWLEDGMENTS

This research was supported by the University of Rijeka Grant "Determinants of Effectiveness of Treatment of Altered Orofacial Functions and Appearance" (uniri-biomed-18-22). Special thanks to Assistant Professor Karin Kuljanic, PhD, for advice and help with psychometric instruments.

REFERENCES

1. Soh CL, Narayanan V. Quality of life assessment in patients with dentofacial deformity undergoing orthognathic surgery—a systematic review. *Int J Oral Maxillofac Surg*. 2013;42:974–980.
2. Fardouly J, Diedrichs PC, Vartanian LR, Halliwell E. Social comparisons on social media: the impact of Facebook on young women's body image concerns and mood. *Body Image*. 2015;13:38–45.
3. Sanghoo Y, Kim YA. Cosmetic surgery and self-esteem in South Korea: a systematic review and meta-analysis. *Aesthetic Plast Surg*. 2020;44:229–238.
4. Patel PK, Novia MV. The surgical tools: the LeFort I, bilateral sagittal split osteotomy of the mandible, and the osseous genioplasty. *Clin Plast Surg*. 2007;45:741–747.
5. Paunonen J, Helminen M, Peltomaki T. Duration of orthognathic-surgical treatment. *Acta Odontol Scand*. 2017; 75(5):372–375.
6. Ireland AJ, Cunningham SJ, Petrie A, Cobourne MT, Acharya P, Sandy JR, et al. An index of orthognathic functional treatment need (IOFTN). *J Orthod*. 2014;41:77–83.
7. Clijmans M, Lemiere J, Fieuws S, Willems G. Impact of self-esteem and personality traits on the association between orthodontic treatment need and oral health-related quality of life in adults seeking orthodontic treatments. *Eur J Orthod*. 2015;37:643–650.
8. Belusic Gobic M, Kralj M, Harmicar D, Cerovic R, Mady Maricic B, Spalj S. Dentofacial deformity and orthognatic surgery: influence on self-esteem and aspects of quality of life. *J Craniomaxillofac Surg*. 2021;49:277–281.
9. Sun H, Shang HT, He LS, Ding MC, Su ZP, Shi YL. Assessing the quality of life in patients with dentofacial deformities before and after orthognathic surgery. *J Oral Maxillofac Surg*. 2018;76:2192–2201.
10. Agou S, Locker D, Muirhead V, Tompson B, Streiner DL. Does psychological well-being influence oral-health-related quality of life reports in children receiving orthodontic treatment? *Am J Orthod Dentofacial Orthop*. 2011;139: 369–377.
11. Spalj S, Novsak A, Bilobrk P, Katic V, Trinajstic Zrinski M, Pavlic A. Mediation and moderation effect of the Big Five personality traits on the relationship between self-perceived malocclusion and psychosocial impact of dental esthetics. *Angle Orthod*. 2016;86:413–420.
12. Aydogan C. Extraversion and openness to experience moderate the relationship between orthodontic treatment need and oral health-related quality of life in adolescents: a cross-sectional study. *Angle Orthod*. 2018;88:617–623.
13. Schmitt DP, Allik J, McCrae RR, Benet-Martinez V. The geographic distribution of Big Five personality traits: patterns and profiles of human self-description across 56 nations. *J Cross-Cult Psychol*. 2007;38:173–212.
14. Roberts BW, Kuncel NR, Shiner R, Caspi A, Golbert LR. The power of personality: the comparative validity of personality traits, socioeconomic status and cognitive ability for predicting important life outcomes. *Perspect Pscyhol Sci*. 2007;2: 313–345.
15. Goubert L, Crombez G, Van Damme S. The role of neuroticism, pain catastrophing, and pain related fear in vigilance to pain: a structural equations approach. *Pain*. 2004;107;234–241.
16. Arrindel WA, Heesnik J, Feij JA. The satisfaction with life scale (SWLS): appraisal with 1700 healthy young adults in the Netherlands. *Pers Individ Differ*. 1999;88:815–826.

17. Stober J. The Frost Multidimensional perfectionism scale revisited: more perfect with four (instead of six) dimensions. *Pers Individ Diff*. 1998;24:481–491.
18. Robins RW, Hendin HM, Trzesniewski KH. Measuring global self-esteem: construct validation of a single-item measure and the Rosenberg self-esteem scale. *Pers Soc Psychol Bull*. 2001;27:151–161.
19. Vidakovic R, Zigante M, Perkovic V, Zibar Belasic T, Uhac M, Spalj S. Orthognathic quality of life: what are we measuring? *J Craniofac Surg*. 2021;32:173–178.
20. Cunningham SJ, Garratt AM, Hunt NP. Development of a condition-specific quality of life measure for patients with dentofacial deformity: I. Reliability of the instrument. *Community Dent Oral Epidemiol*. 2000;28:195–201.
21. Sanchez-Burgos R, Martinez-Gimeno C, Arribas-Garcia I, Gomez-Oliveira G, Alvarez-Flores M, Garcia-Hernandez A, et al. Transcultural adaptation and validation of the Spanish language version of the questionnaire OQLQ for the assessment of quality of life in orthognathic patients. *J Clin Exp Dent*. 2018;10:e1184–e1191.
22. Tajima M, Kohzuki M, Azuma S, Saeki S, Meguro M, Sugawara J. Difference in quality of life according to severity of malocclusion in Japanese orthodontic patients. *Tohoku J Exp Med*. 2007;212:71–80.
23. Soto CJ, John OP. Ten facet scales for the Big Five Inventory: convergence with NEO PI-R facets, self-peer agreement, and discriminant validity. *J Res Pers*. 2009;43: 84–90.
24. Frost RO, Marten P, Lahart C, Rosenblate R. The dimensions of perfectionism. *Cognit Ther Res*. 1990;14: 449–468.
25. Franck E, De Raedt R, Barbez C, Rosseel Y. Psychometric properties of the Dutch Rosenberg Self-Esteem Scale. *Psychol Belg*. 2008;48:25–35.
26. Johnston C, Hunt O, Burden D, Stevenson M, Hepper P. Self-perception of dentofacial attractiveness among patients requiring orthognathic surgery. *Angle Orthod*. 2010;80:361–366.
27. Hansen V, Liu SSY, Schrader SM, Dean JA, Stewart KT. Personality traits as potential predictor of willingness to undergo various orthodontic treatments. *Angle Orthod*. 2013;83:899–905.
28. Spalj S, Lajnert V, Ivankovic L. The psychosocial impact of dental aesthetics questionnaire—translation and cultural validation in Croatia. *Qual Life Res*. 2014;23:1267–1271.
29. Greenberg J, Solomon S, Pyszcynski T, Rosenblatt A, Burling J, Lyon D, et al. Why do people need self-esteem? Converging evidence that self-esteem serves and anxiety-buffering function. *J Pers Soc Pscychol*. 1992;63:913–922.
30. Avontrood S, Lemiere J, Cadenas de Llano-Perula M, Verdonck A, Laenen A, Willems G. The evolution in self-esteem before, during and after orthodontic treatment in adolescents with dental malocclusions, a prospective cohort study. *Eur J Orthod*. 2020;42:257–262.
31. Riggio RE, Throckmorton B, DePaula S. Social skills and self-esteem. *Pers Individ Dif*. 1990;11:799–804.
32. Sherry S, Hewitt O, Lee-Baggley D, Flett G, Besser A. Perfectionism and interest in cosmetic surgery. *Plast Reconstruc Surg*. 2005;115:1806–1807.
33. Hewitt P, Flett G, Sherry S, Habke M, Parkin M, Lam RW, et al. The interpersonal expression of perfectionism: perfectionistic self-presentation and psychological distress. *J Pers Soc Psychol*. 2003;84:1303.
34. Mendes de Paula Gomes A, Adas Saliba Garbin C, da Silva Ferraz FW, Adas Saliba T, Isper Garbin AJ. Dentofacial deformities and implications on quality of life: a presurgical multifactorial analysis in patients seeking orthognathic surgical treatment. *J Oral Maxillofac Surg*. 2019;77:409.
35. Diener E, Oishi S, Lucas RE. Personality, culture, and subjective well-being: emotional and cognitive evaluations of life. *Annu Rev Psychol*. 2003;54:403–425.
36. Banerjee S, Banerjee R, Shenoy U, Agarkar S, Bhattacharya S. Effects of orthodontic pain on quality of life of patients undergoing orthodontic treatment. *Indian J Dent Res*. 2018; 29:4–9.