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Quality of life of young adult patients after orthognathic surgery

M.B. ROMAN[1], A.M. CYBULSKA[2], K. DOWGIERD[1], G. WÓJCIK[2], M. STANISŁAWSKA[2], E. GROCHANS[2]

[1]Department of Clinical Pediatrics, Head and Neck Surgery Clinic for Children and Young Adults, University of Warmia and Mazury, Olsztyn, Poland
[2]Department of Nursing, Faculty of Health Sciences, Pomeranian Medical University in Szczecin, Szczecin, Poland

Abstract. – OBJECTIVE: Craniofacial defects are functional imbalances of their structures. Impaired speech and facial deformities hinder adolescents' ability to fulfill social roles. The optimal age for a patient to be qualified for orthognathic surgery is between 16 and 30 years.

PATIENTS AND METHODS: The study sample consisted of 65 patients after bimaxillary orthognathic surgery performed in the Head and Neck Surgery Department with Craniofacial Surgery Subdivision in Provincial Specialist Children's Hospital in Olsztyn. The research tools used in the study were: the author's questionnaire concerning sociodemographic data, and the following standardized questionnaires: the 'How Do You Cope?' questionnaire, the Emotional Intelligence Questionnaire (INTE), the List of Personal Values (LOPV), the Short Form Health Survey (SF-36), the Satisfaction With Life Scale (SWLS).

RESULTS: The study demonstrated a positive correlation between the levels of QoL and general life satisfaction according to the SWLS. A negative relationship was observed between QoL and dispositional coping according to the 'How do you cope?' questionnaire. The emotion-focused coping strategy in the category of dispositional coping negatively correlated with eight of the SF-36 domains.

CONCLUSIONS: Young adults after bimaxillary orthognathic procedures show a high level of QoL. The level of QoL depends, among others, on the level of emotional intelligence. Better ability to recognize emotions is associated with higher QoL in the domain of general health.

Key Words:
Quality of life, Orthognathic surgery, Young adult.

Abbreviations

QoL, Quality of Life; HRQOL, Heath Related Quality of Life; CoE, Concentration on emotions; SSS, Seeking social support; AC, Active coping; INTE, Emotional Intelligence Questionnaire; LOPV, List of Personal Values; SWLS, The Satisfaction with Life Scale; SF 36, Short –Form; PF, physical functioning; RP, role physical; BP, bodily pain; GH, general health, VT, vitality; RE, role emotional; SF, social functioning; MH, mental health, HT, health transition; PCS, physical component summary, MCS, mental component summary, OQLQ, Orthognathic Quality of Life.

Introduction

Quality of life (QoL) is an interdisciplinary concept, linking many areas of life, and depending on one's previous experiences, personality traits, and ability to cope with stressful situations. Apart from medical goals, achieving non-medical goals – such as improvement of the patient's well-being that enables efficient physical and social functioning – also play an important role in the treatment process[1].

The face is the part of the body on which we focus most attention. It is one of the subjective determinants of attractiveness. This uncovered part of the human body is the primary channel of interpersonal communication[2]. Abnormal speech and facial deformities make it difficult to fulfill social roles due to a distorted self-image. This leads to withdrawal from social life and a sense of isolation and loneliness, while cultural differences are of less importance here[3,4].

The development of the maxillomandibular system is a gradual, slow process. Both the mandible and the maxilla can grow in a disharmonious way, causing problems with biting and chewing food. The disturbed chewing process causes digestive disorders. Dentofacial deformities affect speech regardless of the adaptive abilities. An open mouth alters the breathing pattern, eliminating the physiological process of breathing through

Corresponding Author: Anna Maria Cybulska, MD; e-mail: anna.cybulska@pum.edu.pl

the nose. Pathological positioning of the teeth affects oral hygiene. Such a process results in dental and periodontal diseases. Moreover, dentofacial deformities may impede the functioning of the temporomandibular joints[5].

The development of maxillofacial defects is associated with stimuli that interfere with the formation of the masticatory apparatus. Then, congenital defects develop. Interfering stimuli may be genetic factors or teratogenic influences of the external or internal environment. Acquired deformities arising after birth are caused by endogenous generators. Systemic diseases disturb the development of the skeleton along with tooth buds, resulting in morphological defects. Another cause of acquired defects is dysfunction of the oral and facial musculature. Such disorders include hyper- or hypotonia, parafunctions such as biting the lips, tongue, and cheeks, sucking fingers, and biting nails. Acquired skeletal defects are also caused by swallowing dysfunctions—visceral swallowing, lateral swallowing, persistent infantile swallowing, and chronic mouth breathing. Skeletal deformities most often appear in the period of an intensive growth spurt, i.e., during puberty[6].

Orthognathic procedure may be defined as a surgical repositioning of mandible and/or maxilla and/or their segments, with or without orthognathic repositioning of teeth in order to improve function, aesthetics, and health-related quality of life[7]. Most of the orthognathic surgeries are performed not only to improve functionality, but also to restore the correct morphology of the face. Regaining the correct proportions improves aesthetics – an important factor that determines one's behaviour toward another person in social relationships. It is associated with an increase in self-esteem, attractiveness and self-confidence, as well as restoration of the ability to fulfill social roles. The optimal age for patients to be qualified for orthognathic surgery is between 16 and 30 years[8].

There are few studies in the literature regarding the QoL of young adult patients after orthognathic procedures. Therefore, the aim of our study was to assess the QoL based on emotional intelligence, life satisfaction, coping with stressful situations, and personal values among young adult patients after bimaxillary orthognathic procedures.

Patients and Methods

This study was conducted among 95 patients after orthognathic procedures carried out in the Head and Neck Surgery Department with Craniofacial Surgery Subdivision in Provincial Specialist Children's Hospital in Olsztyn (Poland). The following inclusion criteria were established: age between 16 and 25 years, having undergone bimaxillary orthognathic surgery less than six months before the survey, consent for participation in the study, and full completion of the provided set of questionnaires. The exclusion criteria were failure to meet the inclusion criteria, no consent to participate in the study, and an incompletely filled set of questionnaires.

Patients were invited to the study by mail, and after verification of the returned questionnaire sets, 65 respondents who met all inclusion criteria were qualified for the study. The study was conducted in accordance with the Declaration of Helsinki and was approved by the Bioethics Committee of the Pomeranian Medical University in Szczecin (KB-0012/255/06/18).

The study was conducted using standardized questionnaires: the Short Form Health Survey (SF-36), the 'How do you cope?' questionnaire, the Emotional Intelligence Questionnaire (INTE), the List of Personal Values (LOPV), the Satisfaction With Life Scale (SWLS), and the author's questionnaire concerning sociodemographic variables (age, sex, marital status, place of residence, education) and medical data (psychological support, provision of equipment to improve the patient's functioning, comorbidities, care in specialist clinics, number of hospital stays, time of treatment undertaken).

The SF-36 is a 36-item scale, which measures eight domains of health status: physical functioning (PF), role physical (RP), bodily pain (BP), general health (GH), role emotional (RE), social functioning (SF), vitality (VT), mental health (MH). Each section is rated on a scale from 0 to 100—the higher the score, the better the QoL. There are no official thresholds for the SF-36 thus the subscales are compared with one another in order to identify the best and the worst aspects of QoL[9].

The 'How do you cope?' questionnaire is a measure of stress and the ability to cope with stressful situations by Juczyński and Ogińska-Bulik[10]. The questionnaire consists of two parts—the first one is meant to assess dispositional ways of coping with stress, and the second one examines situational strategies of coping with stressful situations. In the first part, respondents assess the frequency of each of the ways of acting on a 5-point scale (from 'never' to 'almost always'). In the second part, respondents rate the intensity of

particular ways of acting on a 5-point scale (from 'definitely not' to 'definitely yes'). The scale measures active coping, concentrating on emotions as well as seeking social support.

The Emotional Intelligence Questionnaire (INTE), developed by N. S. Schutte, M.J. Malouff, L.E. Hall, D.J. Haggerty, J.T. Cooper, Ch.J. Golden, L. Dornheim, is used to measure respondents' emotional intelligence understood as the ability to recognize, understand, and control both their own and other people's emotions, and also as the ability to effectively use both their own and other's emotions in order to control actions. The questionnaire consists of 33 first-person statements. Respondents rate on a 5-point scale to what extent they agree with a given statement, where 1 stands for 'I definitely disagree' and 5 stands for 'I definitely agree'. The interpretation of the results was based on the standard ten scale: low scores (1-3), average scores (4-7), and high scores (8-10)[11].

The List of Personal Values (LOPV) is a standardized tool by Z. Juczyński. It measures the importance of health in the context of other important human values and personal goods[12]. The questionnaire consists of two parts—the first one describes nine symbols of happiness, and the second one describes 10 categories of personal values. Respondents rate the importance of each item on a 5-point scale, where 5 stands for the greatest value and 1 denotes the lack of importance.

The Satisfaction with Life Scale (SWLS) is a subjective measure of people's satisfaction with life, based on comparing their own situation to the standards set by them. Respondents rate to what extent the statement describes their life so far on a 7-point Likert scale, where 1 stands for 'I completely disagree' and 7 for 'I absolutely agree'. The points are summed up, and the final score may range from 5 to 35. The higher the score, the greater the life satisfaction. The interpretation was based on the standard ten scale: low scores (1-3), average scores (4-7), and high scores (8-10)[13].

Statistical Analysis

Statistical analysis was performed using STATISTICA version 13.3 (TIBCO Software Inc., Palo Alto, CA, USA). Methods of descriptive statistics were used to describe the variables. Depending on the type of measurement scale, different measures were used: measures of central tendency (mean) and dispersion (standard deviation) were determined for metric (quantitative) variables, and a measure of structure (frequency) was determined for non-metric (qualitative) variables. To assess the relationship between two quantitative variables, correlation analysis with the Pearson correlation coefficient was carried out. The direction and strength of the observed correlations were assessed. The effects for which the value of probability *(p)* was lower than the accepted level of significance of 0.05 ($p < 0.05$) were considered significant.

Results

The study involved 65 patients, 73.8% of whom were women, 50.8% were aged between 19 and 20 years, 81.5% had brothers and/or sisters, and 38.5% lived in cities with a population of 10,000 to 100,000 people. Most respondents (72.3%) did not receive social support from psychologists, while they were under the care of an orthodontic clinic (84.6%) and used braces (64.6%).

QoL and Psychosocial Functioning of Patients After Orthognathic Procedures

In our study, the QoL of patients after orthognathic surgery on the basis of the SF-36 results was assessed. The highest mean QoL was reported by the respondents in the following domains: physical functioning (PF) (97.15 ± 5.45), role physical (RP) (86.73 ± 20.71), and the physical component summary (PCS) (86.95 ± 10.88). In the remaining domains, the respondents' scores were as follows: social functioning (SF) (76.15 ± 25.07), role emotional (RE) (79.49 ± 27.25), bodily pain (BP) (78.31 ± 24.08), vitality (VT) (55.00 ± 15.10), general health (GH) (54.52 ± 13.79), and health transition (HT) (69.23 ± 24.91). The patients after orthognathic surgery assessed their functioning better in the physical dimension (PCS) (86.95 ± 10.88) than in the mental dimension (MCS) (64.90 ± 15.09).

Stress and coping with stressful situations were assessed using the "How do you cope?" questionnaire. It was observed that in both categories (i.e. *dispositional* ways of coping with stressful situations, and *situational* ways of coping with stressful situations), the patients after orthognathic procedures usually chose the Active Coping Strategy (ACS)–they obtained the scores of 1.96 ± 1 and 2.85 ± 0.8, respectively.

Emotional intelligence was assessed using the Emotional Intelligence Questionnaire. The results obtained by the respondents ranged from 5 to 6 on the standard ten scale, which means that their emotional intelligence was at an average level.

The position of health among other personal goods and life values of the respondents, as well

as the perception of other important life values were assessed with the List of Personal Values questionnaire. Based on the collected data, it was shown that the highest rated symbol of happiness was Good Health (4.0 ± 1.27), while the category of personal values was Love, Friendship (3.8 ± 1.55).

Satisfaction with life expressed as a sense of contentment with one's own achievements and conditions was assessed using the Satisfaction with Life Scale. The respondents' results were within 6 on the standard ten scale, reflecting average satisfaction with life.

The relationships between the patients' QoL according to the SF-36 and the results of the 'How do you cope?' questionnaire, the Emotional Intelligence Questionnaire, the Satisfaction with Life Scale, and the List of Personal Values.

In our study, the relationship between the level of stress and the ways of coping with stressful situations according to the 'How do you cope?' questionnaire and QoL as measured by the SF-36 was analyzed. It was established that the strategy of concentrating on emotions in the category of dispositional ways of coping with stressful situations correlated negatively with domains: role physical (RP) (r = -0.249), general health (GH) (r = -0.330), vitality (VT) (r = -0.474), social functioning (SF) (r = -0.391), role emotional (RE) (r = -0.327), mental health (MH) (r = -0.410), physical component summary (PCS) (r = -0.266), mental component summary (MCS) (r = -0.487). A statistically negative correlation was observed between the strategy of concentrating on emotions in the category of situational ways of coping with stressful situations and QoL according to the SF-36 in the following domains: role physical (RP) (r = -0.307), vitality (VT) (r = -0.315), role emotional (RE) (r = -0.394), mental component summary (MCS) (r = -0.365) (Table I).

We also analyzed the relationships between emotional intelligence according to the Emotional Intelligence Questionnaire, satisfaction with life according to the Satisfaction with Life Scale, and QoL according to the SF-36.

Analysis of the data demonstrated a statistically significant positive correlation between the level of emotional intelligence and the level of QoL in six of the SF-36 domains: general health (GH) (r = 0.518), vitality (VT) (r = 0.461), mental health (MH) (r = 0.334), health transition (HT) (r = 0.279), physical component summary (PCS) (r = 0.299), mental component summary (MCS) (r = 0.357). A positive correlation was also observed

Table I. Correlations between the results of the SF-36 and the 'How do you cope?' questionnaires among young adult patients after orthognathic procedures.

SF-36	'How do you cope?' questionnaire											
	Dispositional ways of coping with stressful situations						Situational ways of coping with stressful situations					
	AC		CoE		SSS		AC		CoE		SSS	
	r	p	r	p	r	p	r	p	r	p	r	p
PF	0.160	0.207	-0.026	0.836	0.141	0.268	0.028	0.827	0.093	0.463	0.003	0.981
RP	-0.072	0.570	-0.249	0.047	-0.047	0.714	-0.018	0.889	-0.307	0.014	-0.011	0.933
BP	-0.078	0.540	-0.079	0.534	-0.044	0.728	-0.232	0.066	-0.030	0.813	-0.055	0.667
GH	**0.066**	**0.606**	-0.330	0.008	0.030	0.811	0.198	0.116	-0.054	0.672	0.067	0.600
VT	-0.118	0.353	-0.474	0.000	-0.111	0.383	0.009	0.946	-0.315	0.011	-0..041	0.746
SF	-0.018	0.890	-0.391	0.001	-0.102	0.421	-.0.063	0.624	-0.241	0.055	-0.031	0.806
RE	-0.128	0.313	-0.327	0.008	-0.126	0.322	-0.045	0.725	-0.394	0.001	-0.101	0.428
MH	-0.057	0.654	-0.410	0.001	-0.119	0.351	-0.028	0.826	-0.238	0.058	-0.066	0.605
HT	-0.017	0.892	-0.058	0.648	-0.047	0.712	0.031	0.806	-0.007	0.956	-0.013	0.917
PCS	-0.027	0.830	-0.266	0.033	-0.011	0.931	-0.011	0.929	-0.166	0.189	-0.013	0.919
MCS	-0.104	0.415	-0.487	0.000	-0.141	0.268	-0.035	0.782	-0.365	0.003	-0.077	0.546

Physical functioning (PF), role physical (RP), bodily pain (BP), general health (GH), vitality (VT), social functioning (SF), role emotional (RE), mental health (MH), health transition (HT), physical component summary (PCS), mental component summary (MCS), Active Coping (AC), Concentration on Emotions (CoE), Seeking Social Support (SSS).

Table II. Relationships between the results of the SF-36, the INTE, and the SWLS obtained by young adult patients after orthognathic procedures.

SF-36	Emotional Intelligence Questionnaire INTE						SWLS (sum)	
	Factor I		Factor II		Sum			
	r	p	r	p	r	p	r	p
PF	0.247	0.049	0.121	0.340	0.207	0.100	0.141	0.266
RP	0.060	0.636	-0.020	0.874	0.050	0.698	0.472	0.000
BP	0.128	0.315	0.187	0.138	0.192	0.128	0.006	0.963
GH	0.532	0.000	0.273	0.029	0.518	0.000	0.441	0.000
VT	0.502	0.000	0.204	0.106	0.461	0.000	0.402	0.001
SF	0.219	0.082	0.064	0.617	0.197	0.119	0.226	0.073
RE	0.115	0.365	0.111	0.383	0.153	0.228	0.295	0.018
MH	0.366	0.003	0.156	0.220	0.334	0.007	0.185	0.142
HT	0.267	0.033	0.210	0.095	0.279	0.026	0.062	0.624
PCS	0.290	0.020	0.167	0.187	0.299	0.016	0.400	0.001
MCS	0.373	0.002	0.170	0.179	0.357	0.004	0.337	0.007

Physical functioning (PF), role physical (RP), bodily pain (BP), general health (GH), vitality (VT), social functioning (SF), role emotional (RE), mental health (MH), health transition (HT), physical component summary (PCS), mental component summary (MCS), Active Coping (AC), Concentration on Emotions (CoE), Seeking Social Support (SSS).

in factorial results—the higher the ability to use emotions to support thinking and acting, the higher the QoL in the domains of physical functioning (PF) (r = 0.247), general health (GH) (r = 0.532), vitality (VT) (r = 0.502), mental health (MH) (r = 0.366), health transition (HT) (r = 0.267), physical component summary (PCS) (r = 0.29), mental component summary (MCS) (r = 0.373). A higher ability to recognise emotions was accompanied by higher QoL in the domain of general health (GH) (r = 0.273) (Table II).

Furthermore, a statistically significant positive correlation was observed between general satisfaction with life according to the Satisfaction With Life Scale and the QoL in six of the SF-36 domains: role physical (RP) (r = 0.472), general health (GH) (r = 0.441), vitality (VT) (r = 0.402), role emotional (RE) (r = 0.295), physical component summary (PCS) (r = 0.4), mental component summary (MCS) (r = 0.337) (Table II).

Another aspect analyzed in this study was the relationship between the results of the List of Personal Values and the level of QoL according to the SF-36. Based on the data obtained, negative correlations were noticed between the level of QoL and symbols of personal happiness according to the List of Personal Values, namely: 'success in studying, working' and vitality (VT) (r = -0.255), 'good financial standing' and health transition (HT) (r = -0.310). There were negative correlations between the following categories of personal values and the SF-36 domains: 'good health, physical and mental wellbeing' and the domains of mental health (MH) (r = -0.267), mental component summary (MCS) (r = -0.261), and social functioning (SF) (r = -0.250); 'happiness, contentment' and the domains of physical functioning (PF) (r = -0.271), and bodily pain (BP) (r = -0.259); 'good appearance, presentation' and the domain of physical functioning (PF) (r = -0.303). Decreased significance of the 'success at studying, working' personal happiness symbol was associated with higher QoL in the domain of vitality (VT) (r = -0.25), and decreased significance of 'good financial standing' entailed better QoL in the health transition (HT) domain (-0.310). Furthermore, increased significance of the 'knowledge, wisdom' category of personal values was related to higher QoL in the domains of bodily pain (BP) (r = 0.259), general health (GH) (r = 0.338), social functioning (SF) (r = 0.351), and physical component summary (PCS) (r = 0.273) (Table III).

Discussion

Patients with mandibular and maxillary deformities not only suffer from headaches, dental deformities, functional disorders, as well as

speech and mandibular joint problems, but also are concerned about the appearance of their faces. The above can have a real impact on patients' psychological reactions, so it seems important to assess the QoL of young adults after orthognathic surgery. In their article, Pica et al[14] noted that nowadays, QoL measurement is a mandatory part of the evaluation of surgical intervention. In order to obtain a holistic view of QoL, the Short Form Health Survey (SF-36) was used in our study. This tool was recommended by Lee et al[15] for assessing QoL of patients with and without facial deformities. However, the authors noticed that the tool narrows the perception of patients' QoL to aspects related to their oral cavity. Our study was conducted among respondents being a minimum of six months after orthognathic surgery. A suggestion of a 6-month postoperative phase was due to the fact that oedema reduces during that time, which allows better visualization of facial aesthetics. During this time, a change in the functioning of the oral cavity is achieved, and the patient returns to full social functioning.

In our study, we observed that patients after orthognathic surgery had better QoL in the domains of physical functioning (PF), health transition (HT), and physical component summary (PCS). Similar results were obtained by Al-Asfour et al[16], who conducted a study among 66 patients after orthognathic surgery at Kuwait University Dental Clinic. Furthermore, the study demonstrated an improvement in QoL when the procedure was as successful as the respondents expected.

Social functioning (SF) in our study was highly rated by the respondents after orthognathic procedures. In their study of 50 patients before and after orthognathic surgery, Rustemeyer et al[17] obtained similar results. However, the researchers used a different diagnostic tool than ours, namely the Oral Health Impact Profile-14 (OHIP-14), which is an orthognathic quality of life questionnaire. They noted that subjective assessment of facial aesthetics may result in a more favorable social situation, as skeletal deformity has a negative impact on the patient's social life. Despite cultural differences, also in the study of Saudi Arabian patients, the greatest improvements were seen in the social components, followed by facial aesthetics and oral function[18]. Analogous results were obtained by Brucoli et al[19] who analyzed the QoL of 33 patients treated in Italy. These authors observed an improvement in the patients' QoL after orthognathic surgery, as well as progression related to psychosocial factors. Comparison of the SF-36 results obtained by patients before and after orthognathic surgery indicated improvement in the domains of bodily pain (BP) and social functioning (SF).

The results obtained in our study for the domains of vitality (VT) and mental health (MH) were contradictory to those reported by other authors. The study by Brucoli et al[18] from the University of Eastern Piedmont, Italy, showed improved QoL in both these domains (VT and MH) after a 6-month postoperative phase. Similar results were achieved among 57 orthognathic patients at Christchurch Hospital (New Zealand[20]), where permanent changes in appearance were found to contribute to a marked and sustained improvement in psychological well-being. Also, a study conducted by Eslamipour et al[21] among 43 Iranian patients, who were referred to private practices in Isfahan after orthognathic procedures, demonstrated a significant improvement in the patients' QoL in the aspect of emotional, psychological, and social health. Presumably, this may be related to the different cultural background and the implications associated with it.

In our study, we observed a significant effect of psychosocial functioning on the level of QoL among young adults after orthognathic surgery. An important variable affecting the assessment of QoL was the type of coping strategies adopted in stressful situations. The prevalence of an active strategy may be due to a positive attitude towards the treatment process and the associated hope not only for a better appearance and more efficient functioning, but also a change in personal life. Furthermore, our study revealed the relationship between QoL, emotional intelligence, and the results of the List of Personal Values (LOPV). Based on the collected data, it was shown that improved oral function and face appearance were associated with a stronger relationship between the 'doing your favorite work/job' personal happiness symbol and the domain of physical functioning (PF), and between the 'successful family life' personal happiness symbol and the domain of general health (GH). Also, in a study by Szemik et al[22], it was noted that doing one's favorite job is particularly important for the health status and QoL of young adults. During this time, significant changes take place in a young person's life, from the end of adolescence to entry into new social roles. A positive correlation was also observed between QoL and the 'Knowledge, wisdom' category of personal values. Appreciation of a given value causes an improvement of QoL in

Table III. Relationship between the results of the SF-36 and the List of Personal Values (symbols of personal happiness) obtained by young adult patients after orthognathic procedures.

SF-36	The List of Personal Values (LOPV) - symbols of personal happiness															
	Large circle of friends		Successful family life		Doing favourite work, job		Success in studying, working		Good health		Being needed by other people		Good financial standing		Adventurous life, travelling	
	r	p	r	p	r	p	r	p	r	p	r	p	r	p	r	p
PF	-0.081	0.525	-0.049	0.701	0.262	0.036	-0.092	0.470	0.152	0.230	-0.075	0.555	-0.167	0.188	0.068	0.593
RP	-0.025	0.845	0.030	0.812	-0.035	0.781	-0.097	0.445	-0.004	0.973	-0.022	0.864	0.116	0.360	0.026	0.836
BP	-0.053	0.680	0.077	0.546	-0.168	0.184	-0.062	0.629	0.091	0.474	0.042	0.739	0.023	0.855	0.053	0.678
GH	-0.079	0.534	0.255	0.042	0.126	0.321	-0.096	0.450	0.013	0.920	-0.217	0.086	-0.043	0.738	0.047	0.711
VT	0.206	0.102	0.151	0.235	-0.036	0.780	-0.255	0.042	0.196	0.121	0.066	0.607	-0.159	0.208	-0.211	0.095
SF	0.004	0.977	0.002	0.985	-0.065	0.612	0.004	0.974	0.180	0.155	-0.050	0.697	0.016	0.898	-0.059	0.642
RE	-0.018	0.889	0.036	0.780	-0.193	0.127	-0.175	0.168	0.055	0.667	0.140	0.269	0.080	0.528	0.040	0.752
MH	0.236	0.061	0.124	0.329	-0.164	0.195	-0.090	0.478	0.101	0.428	0.057	0.657	-0.194	0.124	-0.061	0.630
HT	-0.006	0.963	0.157	0.215	0.095	0.458	-0.134	0.293	-0.116	0.362	0.087	0.492	-0.310	0.013	0.187	0.139
PCS	-0.068	0.596	0.138	0.277	-0.005	0.971	-0.124	0.330	0.052	0.683	-0.085	0.502	0.030	0.814	0.062	0.625
MCS	0.146	0.251	0.105	0.411	-0.149	0.240	-0.169	0.181	0.153	0.229	0.078	0.542	-0.091	0.475	-0.086	0.497

Physical functioning (PF), role physical (RP), bodily pain (BP), general health (GH), vitality (VT), social functioning (SF), role emotional (RE), mental health (MH), health transition (HT), physical component summary (PCS), mental component summary (MCS), * the table lacks category ‘Fame, popularity’.

Table IV. Relationship between the results of the SF-36 and the List of Personal Values (categories of personal values) obtained by young adult patients after orthognathic procedures.

SF-36	The List of Personal Values (LOPV) - categories of personal values																			
	Love, friendship		Good health, physical and mental wellbeing		Sense of humor, wit		Intelligence, cleverness		Knowledge, wisdom		Happiness, contentment		Courage, decisiveness		Kindness, delicacy		Attractiveness		Wealth, fortune	
	r	*p*	r	*p*	r	*p*	r	*p*	r	*p*	r	*p*	r	*p*	r	*p*	r	*p*	r	*p*
PF	0.042	0.744	0.156	0.220	0.107	0.402	0.122	0.336	0.092	0.470	-0.271	0.030	0.069	0.590	-0.141	0.266	-0.303	0.015	0.070	0.583
RP	-0.167	0.188	-0.122	0.339	0.180	0.156	-0.114	0.371	0.117	0.359	0.055	0.668	-0.067	0.597	-0.006	0.960	0.097	0.444	0.187	0.140
BP	0.066	0.607	-0.096	0.451	0.115	0.365	-0.129	0.310	0.259	0.039	-0.259	0.039	0.084	0.510	-0.135	0.287	0.084	0.507	0.160	0.207
GH	-0.037	0.772	-0.223	0.077	0.201	0.111	-0.238	0.059	0.338	0.006	-0.043	0.737	0.188	0.137	-0.115	0.366	-0.070	0.584	0.138	0.276
VT	0.082	0.519	-0.106	0.406	-0.082	0.520	-0.108	0.396	0.205	0.104	0.039	0.762	0.111	0.384	-0.030	0.813	-0.044	0.731	-0.121	0.341
SF	-0.012	0.923	-0.250	0.046	0.133	0.296	-0.235	0.061	0.351	0.004	0.044	0.733	-0.008	0.953	-0.117	0.357	0.236	0.060	0.030	0.816
RE	0.006	0.960	-0.238	0.059	0.030	0.815	-0.094	0.459	0.106	0.404	0.043	0.735	-0.081	0.526	0.182	0.151	0.058	0.647	0.062	0.625
MH	0.144	0.256	-0.267	0.033	-0.003	0.984	-0.170	0.180	0.161	0.203	-0.001	0.991	0.526	0.053	-0.026	0.839	0.067	0.597	-0.082	0.521
HT	0.142	0.264	-0.118	0.353	-0.014	0.916	0.044	0.731	0.071	0.579	-0.126	0.322	0.000	1.00	0.139	0.275	-0.164	0.196	-0.021	0.872
PCS	-0.070	0.581	-0.147	0.247	0.208	0.100	-0.196	0.121	0.273	0.029	-0.082	0.518	0.060	0.639	-0.098	0.442	0.013	0.917	0.208	0.098
MCS	0.078	0.540	-0.261	0.037	0.011	0.933	-0.175	0.166	0.230	0.068	0.035	0.786	0.095	0.095	0.018	0.889	0.079	0.536	-0.041	0.749

Physical functioning (PF), role physical (RP), bodily pain (BP), general health (GH), vitality (VT), social functioning (SF), role emotional (RE), mental health (MH), health transition (HT), physical component summary (PCS), mental component summary (MCS).

the domains of bodily pain (BP), general health (GH), social functioning (SF), and physical component summary (PCS). Felce and Perry[23] noticed that QoL consists of three interdependent levels: personal values (i.e. a satisfactory physical, emotional, material, social status, as well as activity and development), personal satisfaction with life, and objective living conditions. The sum of these objective and subjective elements constitutes the holistic picture of QoL.

Our results confirm that the gnathic defect hinders intellectual, social and physical development of a young person. When QoL is increased, good health provides a means to achieve happiness in personal life, giving opportunities for both intellectual and social development.

Limitations

While summing up the implications of the study, a few factors complicating the analysis of the results should be taken into account. The most significant limitation of our study was the size of the study sample. However, it was due to the fact that bimaxillary orthognathic surgery is still a niche and new field of surgery. Another problem was the small number of studies conducted in other centres. Moreover, the available studies usually do not show QoL holistically, but narrow the issue to oral-related QoL. Differences in methodology, related to the selection of tools, complicate the interpretation of the results.

Conclusions

Young adults after bimaxillary orthognathic procedures show a high level of QoL. The level of QoL depends on the level of emotional intelligence. Better ability to recognize emotions is associated with higher QoL in the domain of general health. Among patients after orthognathic surgery, along with the growing importance of personal values related to family, wisdom, and work, the QoL related to physical, mental and social functioning increases. The choice of a coping strategy for stressful situations affects QoL. It has been observed that when the use of emotion-focused strategies is limited, QoL increases in the spheres of physical, mental, and social functioning. This fact is an important prognostic factor. Young people who prefer active forms of coping with stress feel responsible for their health and do not transfer this competence to other subjects.

Ethics Approval and Consent to Participate

The study was carried out in accordance with the Declaration of Helsinki, and the protocol was approved by the Bioethical Commission of Pomeranian Medical University in Szczecin (approval numberKB-0012/255/06/18). All subjects were informed about the study, and all provided informed consent.

Authors' Contributions

Material preparation, data collection and analysis were performed by. Study concept and design analysis and interpretation of data M.B.R., A.M.C., K.D., G.W., M.S., E.G., obtained funding M.B.R., K.D., E.G., study supervision E.G. The first draft of the manuscript was written by A.M.C. and G.W. and all authors commented on previous versions of the manuscript. All authors read and approved the final manuscript.

Conflicts of interest

The authors declare no conflicts of interest.

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