

# CROSS-CULTURAL ADAPTATION AND VALIDATION OF THE DISEASE SPECIFIC QUESTIONNAIRE OQLQ IN SERBIAN PATIENTS WITH MALOCCLUSIONS

## MEDKULTURNA PRILAGODITEV IN POTRDITEV VPRAŠALNIKA O KAKOVOSTI ŽIVLJENJA (OQLQ) SRBSKIH PACIENTOV Z MALOKLUZIJO

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### ABSTRACT

**Introduction.** Dentofacial disorders may potentially significantly affect the quality of life. Objectives of this study were to validate translated and culturally adapted Orthognatic Quality of Life Questionnaire (OQLQ) on a cohort of Serbian patients with malocclusions.

### Keywords:

malocclusions,  
quality of life,  
OQLQ, validation

**Methods.** The questionnaire was validated in 111 consecutive patients with malocclusions, seen between December 2014 and February 2015 at the Clinic of Orthodontics, Faculty of Dental Medicine, University of Belgrade. Clinical validity was assessed comparing the mean scores for the four subscales of the OQLQ and mean PAR pre-treatment score. In order to assess whether the allocation of items in the subscales corresponds to their distribution in the original questionnaire, an exploratory factor analysis (principal component analysis with varimax rotation) was conducted.

**Results.** The results of the internal consistency analysis demonstrated good relationships between the items; Cronbach's alpha coefficients for the four subscales were highly significant ( $p < 0.001$ ) (0.88-0.91). All items were significantly correlated between baseline and the retest (6 weeks after). The correlations between the PAR and all four domains of the OQLQ were all significant ( $p < 0.01$ ). The loading weights obtained in the exploratory factor analysis showed that this model revealed four factors with eigenvalue greater than 1, explaining the 64.0% of the cumulative variance. The majority of the items (86.4%) in the Serbian version of the OQLQ presented the highest loading weight in the subscales assigned by the OQLQ developer.

**Conclusions.** The psychometric properties of the OQLQ (Serbian version) have exceptional internal consistency and reproducibility as an instrument for evaluation of dental malocclusions. Additionally, this questionnaire may be useful as a supplementary outcome measure in persons with malocclusions.

### IZVLEČEK

**Uvod.** Dentofacialne nepravilnosti lahko močno vplivajo na kakovost življenja. Cilj te študije je na podlagi kohortne raziskave med srbskimi pacienti z malokluzijo potrditi preveden in kulturno prilagojen vprašalnik o kakovosti življenja po ortognatskem kirurškem posegu (OQLQ).

### Ključne besede:

malokluzije,  
kakovost življenja,  
vprašalnik OQLQ,  
potrditev

**Metode.** Vprašalnik je bil potrjen s 111 zaporednimi pacienti z malokluzijo, ki so med decembrom 2014 in februarjem 2015 obiskali Kliniko za ortodontijo (Fakulteta za dentalno medicino, Univerza v Beogradu). Klinična potrditev je bila dosežena s primerjavo povprečnih rezultatov štirih podlestvic vprašalnika in povprečnega nominalnega rezultata pred posegom. Opravljena je bila raziskovalna analiza dejavnikov (analiza glavnih komponent z rotacijami po metodi Varimax), da bi se ustrezno ovrednotila porazdelitev elementov v podlestvici, ki ustreza njihovi porazdelitvi v izvornemu vprašalniku.

**Rezultati.** Rezultati notranje analize skladnosti so pokazali dobro razmerje med elementi, predvsem so za štiri podlestvice pomembni koeficienti Cronbach alfa ( $p < 0,001$ ) (0,88-0,91). Vsi elementi se se ustrezno ujemali med osnovnim in ponovnim preizkusom (6 tednov pozneje). Povezave med nominalnimi rezultati in vsemi štirimi domenami vprašalnika so bile pomembne ( $p < 0,01$ ). Naležne teže, pridobljene z raziskovalno analizo dejavnikov, so dokazale, da je ta model prikazal štiri dejavnike z lastno vrednostjo višjo od 1, kar obrazloži 64,0% kumulativnega odmika. Večina elementov (86,4%) v srbski različici vprašalnika predstavlja najvišje naležne teže na podlestvicah, ki jih določa razvijalec vprašalnika.

**Zaključki.** Psihometrične lastnosti vprašalnika OQLQ (srbska različica) imajo kot orodje za ovrednotenje dentalnih malokluzij izjemno notranjo doslednost in ponovljivost. Poleg tega je lahko ta vprašalnik zelo uporaben kot dopolnilno merilo izida kirurškega posega pri osebah z malokluzijo.

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## 1 INTRODUCTION

Severe dental malocclusions should be most frequently treated with combined orthodontic and surgical treatment (1-4). Dentofacial disorders may potentially significantly affect the quality of life (1, 5, 6). It has to be emphasized that impaired health-related quality of life (HRQoL), as a consequence of oral diseases and disorders, may affect various aspects of life in a large number of individuals (7). Until now, several definitions of HRQoL have been suggested, and there is no universal agreement regarding the conceptualization of this concept. However, today it is widely accepted that the HRQoL is "the measure in which the assigned value is modified to the duration of the life in function of the perception of physic, psychological and social limitations and the decrease of opportunities due to the disease, its sequels, the treatment and/or the health policies" (8). It has to be emphasized that facial and dental aesthetics have a significant impact on personal and professional relations, especially among child and adolescent subjects (9). Therefore, disturbed HRQoL, along with impaired function and aesthetics, warrants adequate orthodontic or orthognatic treatment. Having in mind all the above-mentioned, it is crucial for the dentist to have a valid and reliable tool for measuring HRQoL that is focused on dentofacial disorders' influences on interpersonal relationships.

Although quality of life may be defined as a person's sense of wellbeing (10), there is no generally accepted definition of HRQoL. There seems to be a consensus that aspects of physical, functional, social and psychological health should be included in HRQoL assessments. However, research in the field of orthodontics and HRQoL is still rather insufficient. Studying the impact of oral diseases on individuals has made major progress during the 1980s (7). The increasing necessity for measures of HRQoL in oral diseases and conditions has led to the development of a number of various instruments, such as the Oral Health Impact Profile (OHIP) (11), Oral Impact on Daily Performance (OIDP) (12) and Orthognatic Quality of Life Questionnaire (OQLQ) (1).

Investigating the outcomes of the treatment of dental malocclusions has concentrated predominantly on measuring traditional indices. These clinical objective indicators are important, but should be necessarily supplemented with HRQoL measures, because HRQoL does not always correlate with objective findings (3). Patients sometimes consider measures of HRQoL, which are the subjective perception of their overall status, as more important than impaired outcome based on clinician's examination. There are two groups of measures for the assessment of HRQoL: generic and specific measures. The medical outcomes study, a 36-item short form health survey (SF-36), is the most widely used patient-based

generic measure of health (13). The main advantage of generic measures is that they allow comparisons among different populations and various illnesses. On the other hand, specific measures focus on specific conditions or diseases. Therefore, they are potentially more responsive to small, but clinically important changes in health.

Patients presenting with dental malocclusions may require a course of fixed orthodontic appliances, in certain cases, followed by a surgery. These patients are usually in the younger age group, and a specific instrument for their problem has been developed in 2000 (1). Originally, this questionnaire, OQLQ, was developed as a condition-specific quality of life measure to be used in studies investigating the outcome of orthognatic treatment.

The objective of this study was to validate translated and culturally adapted OQLQ on a cohort of Serbian patients with dental malocclusions. To the best of our knowledge, in order to assess construct validity, for the first time in the OQLQ validation studies, factor analysis was performed.

## 2 METHODS

The sample was selected by convenience and included all incident consecutive patients getting on a course of therapy related to malocclusions, namely orthodontic treatment and potentially orthognatic surgery at the Clinic for Orthodontics, the Faculty of Dental Medicine, University of Belgrade, Belgrade, Serbia, from December 2014 to April 2015. These subjects were considered for inclusion in the study. Eligible patients satisfied the following criteria: the presence of malocclusions, age 18+ years, and written informed consent. At the time when the questionnaires were distributed, all selected patients were undergoing clinical examinations. Since the complete clinical and radiological findings were not available, subjects were informed of treatment options. Exclusion criteria: 1) patients already included in orthodontic treatment, and 2) the presence of congenital deformities, such as cleft lip and palate, and syndromes involving facial changes.

The study was approved by the Ethical Committee of Faculty of Dental Medicine of the University of Belgrade.

Before enrolment, all the subjects provided signed informed consent.

Out of 148 patients, seen in this period at the Clinic, 117 fulfilled inclusion criteria.

In all patients included in this study, in order to assess the patients' morphological deformities, we used PAR (Peer Assessment Rating) pre-treatment score, measured by dentist (LJV), and trained in the PAR (14). Values for the components of PAR pre-treatment score were recorded and calculated.

In this investigation, HRQOL was measured by OQLQ (1). This instrument was developed for orthognatic patients, and it consists of 22 statements marked on a 4-point scale for each statement, where 1 meant the issue covered in the statement "bothers them a little", 4 meant "it bothered them a lot", and 2 and 3 were in between (1). An option of "not applicable" existed for those not affected by the issue covered in that statement. The 22 items contribute to the following four dimensions: social aspects, facial aspects, oral function and awareness of dentofacial aesthetics (1). The OQLQ dimensions are scored so that lower scores indicate a better quality of life and higher scores represent a poorer quality of life.

According to the internationally accepted methodology for the cultural adaptation of an HRQOL questionnaire, we have used a standard back-translation methodology for the production of the Serbian version of OQLQ. The main objective of this translation was linguistic validation of OQLQ in Serbian. The translation involved the following steps: (a) Translation of the original English OQLQ questionnaire into Serbian, and production of a version that was semantically and conceptually as close as possible to the original questionnaire. A professional translator performed this "forward translation". (b) In the next "backward translation" step, these questions were translated back into English. Two qualified translators, quality of life experts and clinicians have discussed controversial items to generate a version of OQLQ which would be most appropriate for the cultural environment of Serbia and acceptable for testing on patients with malocclusions. (c) In order to check Serbian population's understanding and interpretation of the translated items, the questionnaire was tested on 10 patients with malocclusions of wide range of severity. The results of these tests have been discussed in the same group of experts. Additionally, in this step, patients with malocclusions were also included and their suggestions were considered. This stage led to the final version of the OQLQ. (d) The final version of the questionnaire was tested on 20 persons with malocclusions. Furthermore, the patients were asked additional questions regarding the simplicity, clarity and relevance of the questions.

The OQLQ questionnaire was filled in by the patients in the presence of a physician who assisted if necessary. In order to assess patient's acceptability of OQLQ, the mean time required for completing the questionnaire, the proportion of missing data within each scale and assistance in reading/writing were also noted.

Of the 111 respondents, 78 were asked to complete exactly the same questionnaire in 6 weeks following the first completion, in order to assess test-retest reliability, according to the author's suggestion (1).

## 2.1 Statistical Analysis

Clinical validity of this questionnaire was assessed comparing the mean scores for the four domains of the OQLQ and the mean PAR pre-treatment score. Pearson's (r) correlation coefficient was used to investigate the relationship between the OQLQ scores and the main clinical and demographic variables. Validity of the questionnaire may be determined in various ways. Content validity refers to how accurately an assessment or measurement instrument relates to the various aspects of the specific construct in question (15). Additionally, content validity is an important research methodology term that refers to how well a test measures the behaviour for which it is intended. In clinical studies, content validity refers to the association between instrument items and objective clinical characteristics of a certain syndrome.

It is well known that when items are used to form a scale, they need to have internal consistency. Since it is supposed that all items should measure the same variable, correlation with each other should exist, and a useful coefficient for assessing it is Cronbach's alpha (16). Therefore, internal reliabilities of the Serbian version of OQLQ were assessed for multiple item scales by using Cronbach's alpha coefficient (16), which ranges from 0 to 1, the latter meaning perfect reliability. Values of alpha coefficient above 0.9 denote excellent internal consistency.

Reproducibility of the OQLQ questionnaire was evaluated using the Spearman-Brown reliability coefficient. Reproducibility is one of the main characteristics of the research method, and by definition it relates to the ability of an entire study to be duplicated, either by the same researcher or by other research groups which work independently (17).

In order to assess whether the allocation of items in the domain corresponds to their distribution in the original questionnaire, an exploratory factor analysis (principal component analysis with varimax rotation) was conducted. A factor was considered important if its eigenvalue exceeded 1.0.

## 3 RESULTS

Out of 117 patients who met the inclusion criteria, 111 agreed to participate (response rate=94.9%), 46 of which (41.4%) were male and 65 (58.6%) female, with age ranging from 18 to 34 years old, with an average age of 22.3±4.4 years.

All 111 patients with malocclusion were able to read and comprehend the questionnaire. The mean time to complete the questionnaire was 3.5 minutes (range, 2.0-8.0 minutes). Two (1.8%) patients needed help to complete

the questionnaire; none of the patients required help reading some or all of the items, and 2 patients (1.8%) required assistance in writing the responses. There were no missing items.

The results of the internal consistency analysis are shown in Table 1. A low item-total correlation indicates that the item was not related to the remaining items in the scale.

Only question 1 in the second component and question 5 in the third component gave values below 0.50, while all other items gave values between 0.52 and 0.78. This suggests good relationships between the items. The alpha coefficients for the four components were highly (between 0.88 and 0.91) significant ( $p < 0.001$ ).

**Table 1.** Internal consistency analysis of the Serbian version of the Orthognathic Quality of Life Questionnaire (OQLQ).

Subscale/item	Item-total correlation	Alpha coefficient for each component	Intra-class correlation coefficient
<b>Social aspects of deformity</b>			
15. Cover mouth when meeting people	0.78		
16. Worry about meeting people	0.68		
17. Worry people will make hurtful comments	0.77		
18. Lack confidence socially	0.74	0.91	0.91 ( $p=0.001$ )
19. Do not like smiling	0.66		
20. Get depressed about appearance	0.73		
21. Sometimes think people are staring	0.60		
22. Comments about appearance upset me	0.70		
<b>Facial aesthetics</b>			
1. Self-conscious about appearance of my teeth	0.42		
7. Don't like seeing side view of face (profile)	0.67		
10. Dislike having photograph taken	0.59	0.85	0.90 ( $p=0.001$ )
11. Dislike being seen on video	0.72		
14. Self-conscious about appearance	0.60		
<b>Oral function</b>			
2. Problems biting	0.52		
3. Problems chewing	0.71		
4. Avoid eating some foods	0.53	0.75	0.88 ( $p=0.001$ )
5. Don't like eating in public	0.30		
6. Pains in face/jaw	0.55		
<b>Awareness of facial deformity</b>			
8. Spend time studying face	0.67		
9. Spend time studying teeth	0.69	0.85	0.89 ( $p=0.001$ )
12. Stare at people's teeth	0.73		
13. Stare at people's faces	0.65		

Clinical validity was assessed through comparison with PAR pre-treatment score

All correlations between the PAR and all four domains of the OQLQ were significant (Table 2).

The test-retest analysis was performed by comparing the two sets of scores for each of the components using the intra-class correlation coefficient (results shown in Table 1). Test-retest reliability of the scale is evaluated by Spearman-Brown reliability coefficient (ranged from 0.88 to 0.91, for 4 subscales). All items in baseline and the retest questionnaire significantly correlated. The mean values of both test and retest (6 weeks after baseline) of the four subscales of OQLQ are presented in Table 3.

**Table 2.** Clinical validity of the Serbian version of the Orthognathic Quality of Life Questionnaire (OQLQ).

Subscales of OQLQ	Peer Assessment Rating (PAR) pre-treatment score	
	Correlation coefficient	p
Social aspects of deformity	0.274	0.005
Facial aesthetics	0.275	0.004
Oral function	0.276	0.004
Awareness of facial deformity	0.259	0.007

**Table 3.** Descriptive statistics of the Serbian version of the Orthognathic Quality of Life Questionnaire (OQLQ) at baseline and after 6 weeks.

Subscale/item	Test values		Retest values	
	Mean $\pm$ SD	Range	Mean $\pm$ SD	Range
Subscales of OQLQ	6.7 $\pm$ 7.7	0-30	6.6 $\pm$ 7.7	0-29
Social aspects of deformity	6.8 $\pm$ 5.3	0-19	6.4 $\pm$ 5.5	0-20
Facial aesthetics	5.0 $\pm$ 4.3	0-17	5.2 $\pm$ 4.8	0-16
Oral function	5.9 $\pm$ 4.6	0-16	5.7 $\pm$ 4.9	0-16
Awareness of facial deformity				

SD-standard deviation

The loading weights obtained in the exploratory factor analysis are shown in Table 4. This model revealed four factors with eigenvalue greater than 1, explaining the 64.0% of the cumulative variance. The majority of the items (86.4%) in the Serbian version of the OQLQ presented the highest loading weight in the domains assigned by the OQLQ developers: „Social aspects of deformity“ (8/8), „Facial aesthetics“ (4/5), „Oral function“ (3/5), and „Awareness of facial deformity“ (4/4). None of the scales corresponded fully to the original. The domain „Social aspects of deformity“ replicated original eight items

(no. 15-22) with one additional question (no.1), which originally belongs to „Facial aesthetics“. Thus, the factor „Facial aesthetics“ lost item no.1, in Serbian version of OQLQ, and comprises four items (no. 7, 10, 11 and 14) with the highest loading in that domain. Furthermore, scale „Oral function“ replicated 3 of 5 questions, while two of the items were derived to the „Awareness of facial deformity“. Consequently, in the Serbian version of the OQLQ, the factor „Awareness of facial deformity“ was extended with these two additional questions containing 8 items.

**Table 4.** Exploratory factor analysis of the Serbian version of the Orthognathic Quality of Life Questionnaire (OQLQ).

Original OQLQ items	Factor 1	Factor 2	Factor 3	Factor 4
	Social aspects of deformity	Facial aesthetics	Oral function	Awareness of facial deformity
<b>Social aspects of deformity</b>				
15. Cover mouth when meeting people	<b>.856</b>	.165	.056	.162
16. Worry about meeting people	<b>.821</b>	.162	-.092	.142
17. Worry people will make hurtful comments	<b>.802</b>	.117	.279	.052
18. Lack confidence socially	<b>.729</b>	.163	.295	.136
19. Do not like smiling	<b>.618</b>	.408	.199	.011
20. Get depressed about appearance	<b>.665</b>	.252	.300	.191
21. Sometimes think people are staring	<b>.560</b>	.075	.520	.058
22. Comments about appearance upset me	<b>.624</b>	.298	.288	.147
<b>Facial aesthetics</b>				
1. Self-conscious about appearance of my teeth	<b>.511</b>	.263	.323	.065
7. Don't like seeing side view of face (profile)	.157	<b>.790</b>	.275	.117
10. Dislike having photograph taken	.183	<b>.644</b>	.203	.013
11. Dislike being seen on video	.206	<b>.804</b>	.166	.052
14. Self-conscious about appearance	.338	<b>.495</b>	.437	.307
<b>Oral function</b>				
2. Problems biting	.034	.008	<b>.596</b>	.550
3. Problems chewing	.115	.033	<b>.433</b>	.358
4. Avoid eating some foods	.145	.047	.056	<b>.784</b>
5. Don't like eating in public	.277	.325	<b>.628</b>	.347
6. Pains in face/jaw	.154	.332	.075	<b>.625</b>
<b>Awareness of facial deformity</b>				
8. Spend time studying face	.347	.197	.421	<b>.494</b>
9. Spend time studying teeth	.394	.155	.487	<b>.429</b>
12. Stare at people's teeth	.390	.271	.204	<b>.625</b>
13. Stare at people's faces	.212	.305	.147	<b>.713</b>

Highest factor loadings for each factor are in the bold script; factor loadings corresponding to the factors in the original version are marked with a grey background; factor loadings with a black background indicate highest loadings on other factors than the original ones.

#### 4 DISCUSSION

The patients with malocclusions have been demonstrated to have lower disease specific quality of life (1, 18, 19), although when using the generic instruments, their quality of life was equal to that of the general population (20).

This is the first report of using a disease-specific quality of life measure for adult patients with malocclusions looking

for orthodontic or orthognathic treatment in Serbia. OQLQ was a well-accepted questionnaire and easy to administer in Serbian population. None of the items were found to be embarrassing to the patients. This result is not different from the results obtained from English, Brazilian, Japanese and German patients with malocclusions (1, 18, 20, 21). Only about 2% of patients in our study needed help in completing the questionnaire. In the Serbian

validation study of OQLQ, 100% of the patients found that the questionnaire was understandable. In our study, there were no missing data. Similar findings have been previously consistently shown across several studies (18, 20, 21).

Cunningham et al. (22) demonstrated significant restrictions in the quality of life in their study of 62 patients with dentofacial deformity, performed prior to surgical treatment (23). Our mean values for all four categories of OQLQ are lower than in the previously published studies (18, 23). The data varies extensively, although certain associations exist. Thus, patients in the two above mentioned studies complained of social aspects of deformity (Mean score in Cunningham's study (1)=15.07; Mean score in Bock's study (18)=14.73) as most disturbing, which is partially in line with our study. This demonstrates that our patients ranged facial aesthetics (Mean score = 6.8) as the most significant factor influencing quality of life, followed by social aspects (Mean score=6.7). While German patients significantly complained of functional impairment, our patients, as well as English patients, found it more appropriate to complain of facial aesthetic and social aspects of deformity. These findings might be attributed to social and cultural characteristics of Serbian society. Thus, the influence of cultural tradition cannot be ignored regarding this matter.

Test-retest reliability of the scale, evaluated by Spearman-Brown reliability coefficient (ranged from 0.88 to 0.91, for 4 subscales), was outstanding, suggesting that the subscale scores remained stable over the 6-week period. Clinical validity was assessed through comparison with PAR pre-treatment score. In our investigation, the PAR correlated significantly with all four domains of the OQLQ. It has to be mentioned that content-validity bias might occur when the content of a test is comparatively more difficult for one group of persons than for others. Furthermore, item-selection bias, a subcategory of this bias, refers to the use of individual test items that are more adequate for one group's language and cultural experiences. Finally, construct-validity bias, which refers to whether a questionnaire accurately measures what it was designed to measure, should also be considered in validation studies.

Based on the factor analysis of the OQLQ, 22 items in the scale were divided into four separate subscales, as follows: Factor 1 subgroup comprised "Social aspects of deformity", Factor 2 subgroup consisted of questions related to "Facial aesthetics", Factor 3 subgroup comprised items regarding "Oral function", and Factor 4 subgroup comprised items related to "Awareness of facial deformity". To our best knowledge, none of the previously published OQLQ validation studies included factor analysis. In our validation study, there is a slight difference between the results of the factor analysis in

the Serbian OQLQ patient set and certain patterns in the original OQLQ version1 regarding item classification in the four subgroups. That is, "Self-conscious about appearance of my teeth" was classified in the "Facial aesthetics" subgroup, while in our study the rotated component matrix classified this notion as "Social aspects of deformity". Another minor discrepancy involves "Avoid eating some foods" and "Pains in face/jaw", originally classified in the subgroup "Oral function", which according to our factor analysis, belongs to the subgroup "Awareness of facial deformity". It might be assumed that these mild discrepancies could be related to linguistic and cultural specificities. However, it has to be emphasized that the Serbian version of OQLQ supports original item structure and classification in four subgroups.

We have successfully adapted an internationally validated questionnaire for Serbian population (OQLQ-SR). In this study, we have demonstrated that subjects with malocclusions experience functional, aesthetic, and social impairment. Additionally, in line with this notion, a recent systematic review (24) of quantitative studies for the data related to the impact of malocclusions on oral HRQoL in children and adolescents showed that malocclusions have negative effects on oral HRQoL.

Future directions in clinical practice should be based on the notion that this instrument might be used by dentists concurrently with clinical and radiological findings, to potentially make the optimal treatment decision. Furthermore, longitudinal studies of pre- and post-therapy clinical and psychological characteristics of orthognatic patients should be performed in order to predict the treatment outcome.

There are certain limitations in this study. Our study could have benefitted from a larger sample size. As already mentioned, it will be necessary to examine HRQoL of patients after treatment, and assess the results longitudinally. It would potentially lead to the conclusion whether the difference in the improvement of HRQoL might exist between surgical and conservative orthodontic treatment.

In conclusion, the psychometric properties of the cross-culturally adapted 22-item OQLQ (Serbian version) have exceptional internal consistency and reproducibility as an instrument for the evaluation of dental malocclusions. To the best of our knowledge, in order to assess construct validity, in our survey, for the first time in the OQLQ validation studies, factor analysis was performed. The OQLQ (Serbian version) characteristics are similar to those found in different cultural backgrounds. Based on the above mentioned, this quality of life instrument may potentially contribute to the selection of the best orthodontic treatment options for improving HRQoL of patients with malocclusions.

## CONFLICTS OF INTEREST

The authors declare that no conflicts of interest exist.

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## ETHICAL APPROVAL

Received from the Ethical Committee of the Faculty of Dental Medicine of the University of Belgrade.

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## AUTHOR'S ROLES

Ljiljana Vucic, Branislav Glisic and Uros Vucic contributed to conception and design, acquired data, analyzed and interpreted data and drafted the article. Darija Kisic-Tepavcevic, Jelena Drulovic and Tatjana Pekmezovic contributed to conception and design, performed statistical analysis and provided critical revision of the intellectual content of the manuscript. All authors provided final approval of the version to be published.

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