

Darko Pop Acev<sup>1</sup>, Martina Brumini<sup>2</sup>, Martina Šlaj<sup>3</sup>, Višnja Katić<sup>1</sup>, Stjepan Špalj<sup>1,4</sup>

## Child Perceptions Questionnaire in Croatia: Two Domains for Measuring Oral Health

### Upitnik za procjenu percepcije djece u Hrvatskoj: dvije domene za mjerenje oralnoga zdravlja

<sup>1</sup> Department of Orthodontics, University of Rijeka, Faculty of Medicine  
*Katedra za ortodonciju, Sveučilište u Rijeci, Medicinski fakultet, Rijeka, Croatia*

<sup>2</sup> Community Health Centre of Primorsko-goranska County  
*Dom zdravlja Primorsko-goranske županije, Kresimirova, Rijeka, Croatia*

<sup>3</sup> Department of Orthodontics, University of Zagreb, School of Dental Medicine  
*Zavod za ortodonciju, Sveučilište u Zagrebu, Stomatološki fakultet, Zagreb, Croatia*

<sup>5</sup> Department of Dentistry, J. J. Strossmayer University of Osijek, Faculty of Dental Medicine and Health  
*Katedra za dentalnu medicinu, Sveučilište J. J. Strossmayera u Osijeku, Fakultet za dentalnu medicinu i zdravstvo, Osijek, Croatia*

#### Abstract

**Objective:** To perform cross-cultural adaptation and to test psychometric properties of the 8-item CPQ in 11-14 year-olds: stepwise-regression (RSF:8) and item-impact (ISF:8) short-forms. **Materials and Methods:** The sample included 237 orthodontic patients aged 11-14 at two University Dental Clinics in Croatia. Structural and construct validity, reliability and responsiveness were assessed. Intraoral examination included an assessment of dental caries and malocclusion severity. **Results:** Two domains instead of originally suggested four are more appropriate for the assessment of oral health-related quality of life (OHRQoL) in both ISF:8 and RSF:8 (60.05% and 52.24% variance;  $\alpha=0.56-0.85$ ). Oral symptoms and functional limitations from the original instrument were grouped in one dimension that defines oral function, while emotional and social well-being were grouped in a dimension of psychosocial well-being. Instruments are able to detect differences between subjects with low and high caries and malocclusion severity. They were stable when there were no changes in oral conditions, while it was possible to detect differences induced by correction of malocclusion following orthodontic treatment ( $p<0.05$ ). **Conclusion:** Both 8-item CPQ demonstrated good psychometric properties but pointed to the fact that two domains instead of four are more appropriate for the assessment of OHRQoL in 11-14 year-olds.

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#### Address for correspondence

Martina Brumini  
Community Health Centre of  
Primorsko-goranska County  
Kresimirova 52A  
51000 Rijeka, Croatia  
tel.: +38551 666 000, fax: +38551  
337 405  
martina.brumini@gmail.com

#### Key words

Adolescent; Oral Health; Quality of Life; Dental Health Surveys; Reproducibility of Results

#### Introduction

Specific health-related questionnaires are being made in dentistry to evaluate patients' perception of their appearance, emotions and daily functioning in order to determine adequate treatment procedures and provide more information about patients' needs and demands. Recently, a new definition of oral health has been introduced by the World Dental Federation: "Oral health is multi-faceted and includes the ability to speak, smile, smell, taste, touch, chew, swallow and convey a range of emotions through facial expressions with confidence and without pain, discomfort and disease of the craniofacial complex" (1). The Child Perceptions Questionnaire (CPQ) is in line with this definition, providing a simple method of evaluating children's well-being related to orofacial condition through dimensions of oral symptoms (OS), functional limitations (FL), emotional (EW) and social well-being (SW) (2). The length of the questionnaire and time

#### Uvod

U stomatologiji se izrađuju specifični upitnici vezani za zdravlje kako bi se procijenila percepcija pacijenata o njihovu izgledu, emocijama i svakodnevnom funkcioniranju, čime bi se utvrdili adekvatni postupci liječenja i dobilo više informacija o njihovim potrebama i zahtjevima. Nedavno je Svjetska stomatološka federacija uvela novu definiciju oralnoga zdravlja: *Oralno zdravlje višeslojno je i uključuje mogućnost govora, osmijeha, mirisa, okusa, dodira, žvakanja, gutanja te prenosi pouzdano raspon emocija izrazima lica bez boli, nelagode i bolesti u kraniofacijalnom području.* (1). Upitnik o dječjoj percepciji (engl. Child Perceptions Questionnaire – CPQ) u skladu je s tom definicijom te omogućuje jednostavnu metodu procjene blagostanja djece u vezi s orofacijalnim stanjem na temelju dimenzija oralnih simptoma (engl. Oral Symptoms – OS), funkcionalnih ograničenja (engl. Functional Limitations – FL) te emocionalnog (engl. Emotional Well-being –

needed for answering it limits its usage in clinical practice. Therefore, short-forms consisting of eight and 16 items were developed, by using item-impact (ISF:8, ISF:16) and stepwise-regression (RSF:8, RSF:16) methods (3).

Our aim was to evaluate psychometric properties and to compare the cross-cultural validity and reliability of the RSF: 8 and ISF:8. The hypotheses were that translated questionnaires are equivalent to originals in groupings of items, and that capture concepts similar to previously defined dimensions of validated oral health-related quality of life (OHRQoL) instruments. It was expected that the instruments are able to distinguish the children with higher and lower oro-facial problems, as well as to detect changes induced by dental treatment. It was assumed that the instruments are stable and will not detect changes in well-being and function unless there are changes in oral conditions.

## Materials and Methods

### Cross-cultural adaptation

Two experts (a dentist and an English language teacher) independently performed forward translation of the English CPQ. Both translations were then independently back-translated in English by other two experts (a dentist and an English language teacher). Expert committee (three dentists and developmental psychologist with a good knowledge of both languages) compared the original, translations and back-translations and designed first versions of questionnaires. Content validity was evaluated using a probe technique (n=20). Based on their comments, a few linguistic modifications were made. The Committee agreed on the final versions of the questionnaires.

### Participants

The sample included 237 subjects (45% males) aged 11-14 years, consecutive patients referred for consultation or treatment at two University Dental Clinics in Croatia (Rijeka and Zagreb) during 2015-2017. A calculated minimum sample size was 220 participants considering type I error rate of 0.05, desired power of 0.80, anticipated model fit with root mean square error of approximation from 0.05-0.08 and with determined degrees of freedom 48 (4). The local Ethics Committee approved the study (No. 2170-24-01-15-2) with written informed consent provided by each participant's parent. The study was performed according to Declaration of Helsinki 1964 and its later amendments.

### Methods

Self-administrated questionnaires included CPQ items, self-assessed oral health and well-being on a 5-point scale (0-4; excellent-bad), satisfaction with esthetic appearance, self-perceived orthodontic treatment need and demand for treatment (0-4; not at all-a lot), Oral Impacts on Daily Performances (OIDP), Oral Health Impact Profile (OHIP) and Psychosocial Impact of Dental Aesthetics Questionnaire (PIDAQ) (5-7). The intraoral examination included detec-

EW) i društvenog blagostanja (engl. Social Well-being – SW) (2). Dužina upitnika i vrijeme potrebno za odgovaranje ograničavaju njegovu upotrebu u kliničkoj praksi. Zato su oblikovane kratke inačice koje se sastoje od osam i 16 čestica korištenjem čestične (engl. Item-impact Short Form – ISF:8, ISF:16) i regresijske metode (engl. stepwise-Regression Short Form – RSF:8 i RSF:16) (3).

Cilj istraživanja bio je procijeniti psihometrijska svojstva i usporediti međukulturnu valjanost i pouzdanost inačica RSF:8 i ISF:8. Hipoteze su bile da su prevedeni upitnici ekvivalentni izvornima u grupiranju čestica te da obuhvaćaju koncepte slične definiranim dimenzijama validiranih OHRQoL (kvaliteta života povezana s oralnim zdravljem) instrumenata. Očekivalo se da će instrumenti moći razlikovati djecu s većim orofacijalnim problemima u odnosu prema onima s manjim poteškoćama te detektirati promjene uzrokovane stomatološkom terapijom. Pretpostavljalo se da su instrumenti stabilni i da neće detektirati promjene blagostanja i funkcije, osim ako se ne promijene uvjeti u ustima.

## Materijali i metode

### Međukulturna prilagodba

Dva stručnjaka (stomatolog i nastavnik engleskog jezika) neovisno su preveli CPQ s engleskoga na hrvatski jezik. Oba prijevoda zatim su neovisno prevedena ponovno na engleski, a to su učinila druga sva stručnjaka (također stomatolog i nastavnik engleskoga jezika). Tim stručnjaka (tri stomatologa i razvojni psiholog s dobrim poznavanjem obaju jezika) usporidili su izvornik, prijevode na hrvatski i povratne prijevode na engleski, te su uskladili prve verzije upitnika. Sadržajna valjanost evaluirana je tehnikom sondiranja na stomatološkim pacijentima dobi od 11 do 14 godina (n = 20). Na temelju njihovih komentara učinjeno je nekoliko jezičnih prilagodbi te je tim dogovorio konačnu verziju upitnika.

### Ispitanici

Uzorak je činilo 237 djece (45 % dječaka) u dobi od 11 do 14 godina, susljednih pacijenata koji su došli na pregled ili terapiju na dvije sveučilišne stomatološke klinike u Hrvatskoj (Rijeka i Zagreb) od 2015. do 2017. Izračunata je minimalna veličina uzorka do 220 ispitanika, uzimajući u obzir pogrešku tipa I od 0,05, snagu od 0,80, očekivani prilagođeni model uz standardiziranu prosječnu kvadratnu kovarijancu reziduala od 0,05 do 0,08 i 48 stupnjeva slobode (4). Lokalno etičko povjerenstvo odobrilo je istraživanje (No. 2170-24-01-15-2), a za svakog ispitanika informirani pristanak potpisali su roditelji. Istraživanje je provedeno u skladu s Helsinškom deklaracijom iz 1964. i njezinim kasnijim nadopunama.

### Metode

Ispitanici su sami ispunjavali upitnike koji su sadržavali čestice CPQ-a, samoprocjenu oralnoga zdravlja i blagostanja na petostupanjskoj ljestvici (0 – 4; izvrsno – loše), zadovoljstvo izgledom i položajem zuba, samoprocijenjenu potrebu za ortodontskom terapijom i zahtjev za terapiju (0 – 4; uopće ne – jako mnogo), Oralni utjecaji na dnevne aktivnosti (engl. Oral Impacts on Daily Performances – OIDP), Profil utjecaja oralnoga zdravlja (engl. Oral Health Impact Profile – OHIP)

tion of dental caries according to WHO criteria by three calibrated experts, with weighted Kappa for intra-rater reliability 0.892-0.923 and for inter-rater 0.812-0.840 (95% CI 0.710-0.990;  $p < 0.001$ ). Malocclusion severity was assessed by using the Index of Orthodontic Treatment Need - Dental Health Component (IOTN DHC), by two orthodontists with weighted Kappa for intra-rater reliability 0.838-0.958 and for inter-rater 0.671 (95% CI 0.469-0.873;  $p < 0.005$ ). Stability over time was assessed on 50 children from two public schools in Rijeka in one-week interval without any dental intervention. The ability of the instrument to detect changes in oral conditions was evaluated on 33 subjects presenting class II/1 malocclusion subjected to orthodontic treatment by functional appliance during the period of approximately one year.

### Statistical analysis

In statistical analysis, the explanatory and confirmatory factor analyses were used to test structural validity. Internal consistency was checked by calculating the Cronbach's alpha and inter-item correlations. Stability over time was assessed by paired t-test and correlations. The Mann-Whitney test was performed to test discriminant validity. CPQ domains were compared between two clinical groups based on caries severity and malocclusion severity. Cut-off points were determined by calculating the highest specificity and sensitivity values using Receiver Operating Characteristic curves. Convergent validity was assessed by the Spearman correlation coefficient  $r$ . Responsiveness was assessed using a Wilcoxon test. Changes in the domains were compared with the amount of reduction of OJ, and collated between groups based on global transition judgements collected post-treatment (Kruskal-Wallis Test). Commercial software SPSS v.22.0 (IBM Corp., Armonk, NY, USA) was used.

## Results

### Structural validity

Explanatory factor analysis with principal component analysis, Varimax rotation and extraction method based on eigenvalues greater than 1 revealed two-factor structure for both ISF:8 and RSF:8, which explained 60.05% and 52.24% of the variance, respectively. The items under OS and FL and under EW and SW were grouped together (Table 1). Confirmatory factor analysis revealed a good model fit (standardized root mean square residual = 0.05 for ISF: 8, 0.06 for RSF:8), and moderate correlations between OS+FL and EW+SW domains (in ISF:8  $r = 0.60$ , in RSF:8  $r = 0.70$ ).

i Upitnik o psihosocijalnom utjecaju dentalne estetike (engl. Psychosocial Impact of Dental Aesthetics Questionnaire – PIDAQ) (5 – 7). Intraoralni pregled uključivao je detekciju dentalnog karijesa prema kriterijima Svjetske zdravstvene organizacije. Obavljala su ga tri kalibrirana ispitivača s vrijednošću težinskoga kapa koeficijenta za ispitivačku pouzdanost od 0,892 do 0,923 te međuispitivačku pouzdanost od 0,812 do 0,840 (95 % CI 0,710 – 0,990;  $p < 0,001$ ). Intenzitet malokluzije procjenjivala su dva ortodonta Komponentom dentalnoga zdravlja Indeksa potrebe za ortodontskom terapijom (engl. Index of Orthodontic Treatment Need - Dental Health Component – IOTN DHC). Vrijednost težinskoga kapa koeficijenta za ispitivačku pouzdanost iznosila je od 0,838 do 0,958, a između ispitivača 0,671 (95 % CI 0,469 – 0,873;  $p < 0,005$ ). Stabilnost upitnika tijekom vremena procijenjena je u dvjema javnim školama u Rijeci gdje je 50 djece dva puta ispunjavalo upitnik u razdoblju od jednog tjedna u kojemu nisu bile izloženi nikakvim stomatološkim intervencijama. Prikladnost, odnosno mogućnost instrumenta da detektira promjene u oralnom stanju inducirane terapijom evaluirana je na 33 pacijenta s malokluzijom klase II/1 koji su tretirani ortodontskom funkcionalnom napravom tijekom razdoblja od oko godinu dana.

### Statistička analiza

Za ispitivanje strukturne valjanosti korištene su eksplanatorna i konfirmatorna faktorska analiza. Unutarnja konzistentnost provjerena je računanjem Cronbachove alfe i korelacijama između čestica. Vremenska stabilnost instrumenta procijenjena je t-testom za zavisne uzorke i korelacijama. Mann-Whitneyjevim testom ispitana je diskriminacijska valjanost. CPQ dimenzije uspoređene su između dviju kliničkih skupina ispitanika baziranih na intenzitetu karijesa i malokluzije. Graničnici su određeni izračunom najviše osjetljivosti i specifičnosti korištenjem krivulja osjetljivosti i specifičnosti. Konvergentna valjanost procijenjena je Spearmanovim korelacijskim koeficijentom  $r$ . Wilcoxonovim testom procijenjena je prikladnost za korištenje u detekciji promjena induciranih terapijom. Promjene u dimenzijama CPQ-a uspoređene su sa stupnjem redukcije pregriza te između skupina s obzirom na samoprocijenjeno poboljšanje oralnoga zdravlja nakon završetka ortodontske terapije (Kruskal-Wallisov test). Korišten je komercijalni softver SPSS v.22.0 (IBM Corp., Armonk, NY, SAD).

## Rezultati

### Strukturna valjanost

Eksplanatornom faktorskom analizom s varimaks rotacijom, primjenom analize glavnih komponenti i njihovim odabirom prema kriteriju svojstvenih vrijednosti većih od 1, dobivena je dvofaktorska struktura za ISF:8 i RSF:8, s objašnjenjem varijance 60,05 % i 52,24 %. Originalne čestice OS i FL, te EW i SW bile su grupirane pod zajednički faktor (tablica 1.). Konfirmatorna faktorska analiza pokazala je dobru prikladnost modela (standardizirani korijen srednjeg kvadrata reziduala = 0,05 za ISF:8 i 0,06 za RSF:8) te umjerenu povezanost između dimenzija OS + FL i EW + SW (za ISF:8  $r = 0,60$ ; za RSF:8  $r = 0,70$ ).

**Table 1.** Factor loadings and items' grouping  
**Tablica 1.** Faktorska opterećenja i grupiranje čestica

	F1	F2
ISF:8		
Hrana je zapadala za zube • Food caught between teeth (OS)*	0.742	
Neugodan zadah • Bad breath (OS)	0.825	
Zubi bole pri konzumaciji hladnih pića/hrane • Difficulty eating/drinking hot/cold foods (FL)	0.598	
Problemi pri žvakanju hrane poput jabuke ili žilavoga mesa • Difficulty chewing firm foods (FL)	0.564	0.367
Uzrujan • Upset (EW)		0.819
Razdražljivo ili nezadovoljno • Felt irritable/dissatisfied (EW)		0.832
Izbjegavao se smijati • Avoided smiling/laughing (SW)		0.830
Druga djeca ispitivala su o zubima • Asked questions (SW)		0.736
RSF:8		
Ranice u ustima • Mouth sores (OS)	0.719	
Neugodan zadah • Bad breath (OS)	0.553	
Problemi sa spavanjem noću • Unable to sleep (FL)	0.559	
Problemi pri izgovoru • Difficulty saying words (FL)	0.680	
Uzrujan • Upset (EW)	0.477	0.633
Zabrinut zbog toga što će drugi ljudi misliti o zubima/ustima • Concerned what people think about teeth/mouth (EW)	0.388	0.673
Druga djeca zadirivala su ili davala podrugljiva imena • Teased/called names (SW)		0.776
Prepirao se s drugom djecom/svojom obitelji • Argued with children/family (SW)		0.808

\*originalno grupiranje čestica / \*original items' grouping

## Reliability

Internal consistency was higher for ISF:8 and for EW+SW domain. No significant differences were observed in absolute reliability assessment, while for relative reliability, higher level of agreement was observed in RSF domains (Table 2).

## Pouzdanost

Unutarnja konzistentnost bila je veća za ISF:8 i za dimenziju EW + SW. Nisu uočene značajne razlike za apsolutne mjere pouzdanosti, a za relativne mjere zapažena je veća podudarnost za dimenzije RSF-a (tablica 2.).

**Table 2.** Reliability assessment  
**Tablica 2.** Pouzdanost

	ISF:8		RSF:8	
	OS + FL	EW + SW	OS + FL	EW + SW
Unutarnja konzistentnost • Internal consistency (n = 237)				
Aritmetička sredina ± SD • Mean ± SD	4.6 ± 2.9	2.4 ± 3.1	2.5 ± 2.2	2.1 ± 2.7
Raspon • Range	0 - 15	0 - 15	0 - 12	0 - 14
α	0.67	0.85	0.56	0.75
α uz izbrisanu česticu • α if item deleted	0.55 - 0.65	0.78 - 0.85	0.40 - 0.54	0.63 - 0.74
Međučestična korelacija (raspon) • Inter-item correlation (range)	0.34 (0.22 - 0.50)	0.56 (0.47 - 0.73)	0.25 (0.17 - 0.35)	0.44 (0.32 - 0.65)
Apsolutna pouzdanost • Absolute reliability (n = 50)				
Pogreška mjerenja* • ME*	0.83	0.61	0.74	0.68
Najmanja uočljiva promjena* • SDC*	2.29	1.70	2.06	1.89
Razlika uparenih aritmetičkih sredina (95 % CI) • Paired differences mean (95 % CI)	0.04 (-0.10 - 0.17)	0.12 (-0.06 - 0.29)	0.06 (-0.15 - 0.03)	0.01 (-0.09 - 0.12)
p*	0.569	0.182	0.182	0.709
Granice podudaranja* • LOA*	-0.92 - 1.10 (90.19 %)	-1.10 - 1.33 (98.04 %)	-0.55 - 0.67 (91.18 %)	-0.72 - 0.74 (93.14 %)
Relativna pouzdanost • Relative reliability (n = 50)				
Spearman r	0.626	0.646	0.878	0.785
Težinska kapa • Weighted kappa	0.535	0.453	0.832	0.732
Unutarklasni korelacijski koeficijent (95 % CI)* • ICC (95 % CI)*	0.98 (0.96 - 0.99)	0.88 (0.79 - 0.93)	0.98 (0.97 - 0.99)	0.98 (0.97 - 0.99)

\* Pogreška mjerenja dobivena je iz korijena rezidualne varijance. Najmanja uočljiva promjena izračunata je kao  $1.96 \cdot \sqrt{2}$  \* pogreška mjerenja. P-vrijednost t-testa za zavisne uzorke. Granice podudaranja izračunate su kao razlika uparenih aritmetičkih sredina  $\pm 1.96$  \* standardna devijacija razlike između dvaju mjerenja (postotak test i retest upitnika koji su unutar granica podudaranja). Intraklasni korelacijski koeficijent ICC (95 % granice pouzdanosti CI). \* \* Measurement error ME was calculated as square root of the residual variance. Smallest detectable change SDC was calculated as  $1.96 \cdot \sqrt{2}$  \* ME. P-value of the Paired t-test. Limits of agreement LOA were calculated as paired differences mean  $\pm 1.96$  \* standard deviation of the differences between two measurements (percentage of test and retest that are within limits of agreement). Intraclass correlation coefficient ICC (95% confidence interval CI)

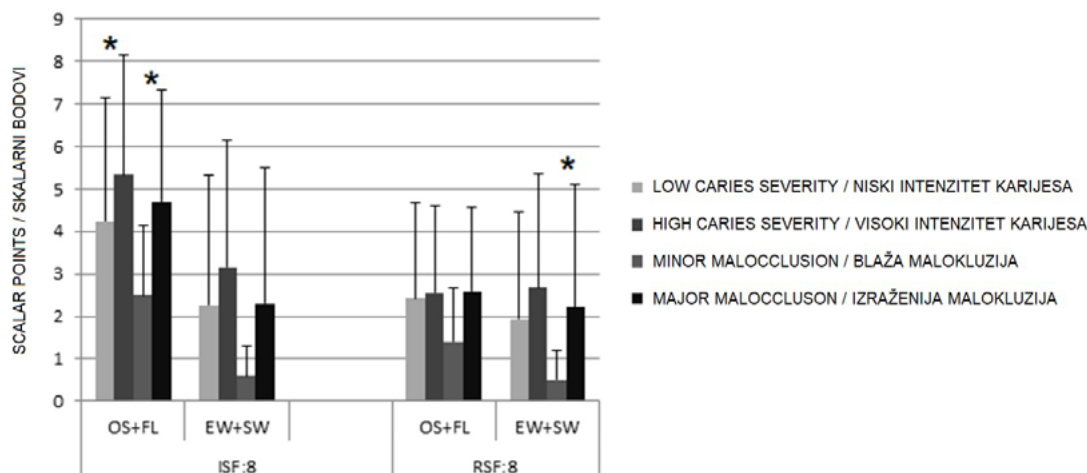


### Convergent validity

Convergent validity was better in EW+SW, compared to OS+FL ( $r=0.34-0.54$ , compared to  $0.19-0.37$ ). Additionally, all domains correlated with PIDAQ PI ( $r=0.32-0.39$ ,  $p<0.05$ ). In ISF:8 EW+SW correlated with PIDAQ SI and OHIP summary score ( $r=0.37$  and  $0.55$ ,  $p<0.05$ ), and OS+FL with PIDAQ SI ( $r=0.41$ ,  $p=0.006$ ). In RSF:8, EW+SW correlated with OIDP and OHIP summary scores ( $r=0.41$  and  $0.53$ ,  $p<0.05$ ). No correlations were observed for dental caries and IOTN DHC.

### Discriminant validity

The areas under the Receiver Operating Characteristic curve of 0.616 for dental caries, and of 0.746 for IOTN DHC were detected. For IOTN DHC the cut-off point of three and for dental caries of four were determined. ISF:8 OS+FL was able to detect differences between subjects based on caries and malocclusion severity, while RSF:8 EW+SW for malocclusion severity (Figure 1).



**Figure 1** Discriminant validity between clinical groups based on severity of dental caries, and based on malocclusion severity (asterisks mark differences significant at  $p<0.05$ )

**Slika 1.** Diskriminacijska valjanost između kliničkih skupina s obzirom na intenzitet karijesa i na težinu malokluzije (zvjezdice označuju razlike značajne na razini  $p<0,05$ )

### Responsiveness

Following orthodontic treatment, 13 children reported no change, little improvement was reported by 12 and great improvement by eight (global transition judgements). All domains had a significant difference between clinical groups based on global transition judgement, except for EW+SW in RSF:8 ( $p=0.068$ ). All domains were able to detect differences in OHRQoL provided by orthodontic treatment ( $p<0.05$ ). Changes in RSF:8 EW+SW demonstrated a linear correlation with the amount of OJ reduction (Table 3).

### Discussion

Although reduced number of questions could affect the content validity of the questionnaire, the findings in the literature indicate that short-forms show good psychometric properties (3), which is similar to our results. Nevertheless, two domains instead of four might be more appropriate for

### Konvergentna valjanost

Konvergentna valjanost bila je veća za EW + SW, u usporedbi s OS + FL-om ( $r = 0,34 - 0,54$ , u usporedbi s  $0,19 - 0,37$ ). Sve dimenzije korelirale su s PIDAQ PI-jem ( $r = 0,32 - 0,39$ ,  $p < 0,05$ ). ISF:8 EW + SW korelirao je s PIDAQ SI-om i OHIP-om ukupnim rezultatom ( $r = 0,37$  i  $0,55$ ,  $p < 0,05$ ) i OS + FL s PIDAQ SI-om ( $r = 0,41$ ,  $p = 0,006$ ). RSF:8 EW + SW korelirao je s OIDP-om i OHIP-om ukupnim rezultatom ( $r = 0,41$  i  $0,53$ ,  $p < 0,05$ ). Za dentalni karijes i IOTN DHC nisu uočene korelacije.

### Diskriminacijska valjanost

Dobivene su vrijednosti područja ispod krivulje osjetljivosti i specifičnosti od 0,616 za dentalni karijes i 0,746 za IOTN DHC. Za IOTN DHC utvrđen je graničnik tri, a za dentalni karijes četiri. ISF:8 OS+FL uočio je razlike između ispitanika s obzirom na intenzitet karijesa i malokluzije, a RSF:8 EW + SW s obzirom na intenzitet malokluzije (slika 1.).

### Prikladnost

Nakon završetka ortodontske terapije osam ispitanika prijavilo je značajno poboljšanje svojega oralnog zdravlja, 12 blago, a 13 nije uočilo nikakvu promjenu. Uočene su značajne razlike u dimenzijama obzirom na razinu prijavljenog poboljšanja, osim za RSF:8 EW + SW ( $p = 0,068$ ). Sve dimenzije uočavale su promjene u OHRQoL-u inducirane ortodontskom terapijom ( $p < 0,05$ ). Promjene RSF:8 EW + SW-a linearno su korelirale s redukcijom pregriza (tablica 3.).

### Rasprava

Iako bi smanjeni broj pitanja mogao utjecati na valjanost sadržaja upitnika, dosadašnja istraživanja pokazuju da kratki oblici pokazuju dobra psihometrijska svojstva (3), slično našim rezultatima. Štoviše, dvije dimenzije umjesto četiriju mogle bi biti prikladnije za procjenu OHRQoL-a. Oralni simptomi i funkcionalna ograničenja grupirani su u dimen-

**Table 3.** Responsiveness  
**Tablica 3.** Prikladnost

	RSF:8		ISF:8	
	OS + FL	EW + SW	OS + FL	EW + SW
Nema promjene • No change (n = 13) <sup>a</sup>	0.00 (1.29)	0.46 (1.33)	0.23 (2.05)	0.31 (0.75)
Blago poboljšanje • Little improvement (n = 12) <sup>a</sup>	0.33 (1.23)	0.67 (1.97)	0.58 (2.02)	0.67 (1.67)
Značajno poboljšanje • Great improvement (n = 8) <sup>a</sup>	3.25 (1.67)	3.88 (3.64)	5.00 (2.67)	5.75 (2.92)
p <sup>b</sup>	0.001	0.068	0.001	<.001
Svi • All (n = 33) <sup>a</sup>	0.91 (1.89)	1.36 (2.64)	1.52 (2.93)	1.76 (2.88)
p <sup>c</sup>	0.010	0.006	0.008	0.001
Snaga učinka • ES <sup>d</sup>	0.45	0.48	0.46	0.56
Standardizirana aritmetička sredina odgovora • SRM <sup>e</sup>	0.48	0.52	0.52	0.61
r <sup>f</sup>	0.187	0.463	0.179	0.176
p <sup>f</sup>	0.322	0.010	0.343	0.352

<sup>a</sup> Aritmetička sredina prije početka terapije – aritmetička sredina nakon završetka terapije (standardna devijacija). <sup>b</sup> Kruskal-Wallisov test za usporedbu između skupina s obzirom na samoprocijenjeno poboljšanje nakon završetka terapije. <sup>c</sup> Wilcoxonov test za usporedbu ukupnog rezultata ispitanika prije terapije i poslije nje. <sup>d</sup> Snaga učinka izračunata je kao  $Z/\sqrt{n}$ . <sup>e</sup> Standardizirana aritmetička sredina odgovora izračunata je kao razlika aritmetičkih sredina prije i poslije terapije/standardna devijacija razlike. <sup>f</sup> Pearsonov korelacijski koeficijent r s pripadajućom p vrijednosti za korelaciju između promjene u CPQ rezultatu i promjene u vrijednosti pregriza (mm). <sup>g</sup> Mean baseline score - mean follow-up score (standard deviation). <sup>h</sup> Kruskal-Wallis Test for between-subjects comparisons by global transition judgement collected post-treatment. <sup>i</sup> Wilcoxon Signed Ranks Test for within-subjects comparisons for total score before and after treatment. <sup>j</sup> Effect size ES was calculated as  $Z/\sqrt{n}$ . <sup>k</sup> Standardized response mean SRM was calculated as mean change/standard deviation of the change scores. <sup>l</sup> Pearson correlation coefficient r with corresponding p value for correlation between changes in CPQ domains and changes in overjet (mm).

the assessment of OHRQoL. Oral symptoms and functional limitations are grouped in a dimension of oral function, while emotional and social well-being in a dimension of psychosocial well-being. Four-item structure allows for a more detailed evaluation of the instrument's properties by performing within domain analyses (8). Although unidimensionality of the 8-item CPQ was originally suggested (3), a recent study also pointed to a two-factor structure of the CPQ short-forms (9).

Dimension of psychosocial well-being shows better consistency than oral function dimension. RSF:8 and ISF:8 are stable and do not detect changes in OHRQoL unless there is a change in the oral condition. This is important because they will not generate error due to imprecision and accuracy in reporting well-being. The results of the RSF applied on two separate occasions may be considered essentially equivalent since Bland and Altman limits of agreement for both ISF domains were, although narrow, 1.7 times wider compared to RSF.

Although ISF manages to detect the difference between patients with low and high caries and malocclusion severity, in dimension of oral function relationship between them is not linear. This means that an increased severity of malocclusion or number of cariogenic lesions does not indicate proportional increase in functional disability. Recently, in a systematic review, the authors highlighted the fact that the impact of malocclusion on OHRQoL is presumed to affect predominantly dimensions of emotional and social well-being (10). Nevertheless, effects of malocclusion on OHRQoL should be evaluated and interpreted carefully and individually. Specific malocclusion could have greater impact on one's OHRQoL, while presence of any malocclusion *per se* may not (11). These findings emphasize the importance of cross-cultural adaptation in the process of validation of the OHRQoL instruments.

ziju oralne funkcije, a emocionalno i društveno blagostanje u dimenziji su psihosocijalnog blagostanja. Struktura s četirima česticama omogućuje detaljnije vrjednovanje svojstava instrumenta obavljanjem analize unutar svake dimenzije (8). Iako je izvorno sugerirana jednodimenzionalnost 8-čestičnog CPQ-a (3), nedavno istraživanje također je uputilo na dvofaktorsku strukturu kratkog oblika CPQ-a (9).

Dimenzija psihosocijalnog blagostanja pokazuje bolju konzistentnost negoli dimenzija oralne funkcije. RSF:8 i ISF:8 stabilni su i ne otkrivaju promjene u OHRQoL-u, osim ako nema promjene u oralnom stanju. To je važno jer neće stvarati pogrešku zbog nepreciznosti i netočnosti u reportiranju blagostanja. Rezultati RSF-a primijenjeni u dvjema odvojenim prilikama mogu se smatrati bazično jednako-vrijednima, jer su Bland-Altmanove granice podudaranja za obje dimenzije ISF-a bile, iako uske, i dalje 1,7 puta šire u usporedbi s RSF-om.

Iako ISF uspijeva detektirati razliku između pacijenata s niskim i visokim intenzitetom karijesa i malokluzije, u dimenziji oralne funkcije veza između njih nije linearna. To znači da porast intenziteta malokluzije ili broja karioznih lezija ne upućuje na proporcionalno povećanje funkcionalnih smetnji. Nedavno, u sustavnom pregledu literature, autori su istaknuli kako pretpostavljaju da malokluzija utječe na OHRQoL uglavnom tako što djeluje na dimenzije emocionalnog i društvenog blagostanja (10). Štoviše, utjecaji malokluzije na OHRQoL trebali bi biti pomno vrjednovani i interpretirani te individualno prilagođeni. Određena malokluzija mogla bi imati veći utjecaj na nečiji OHRQoL, a prisutnost bilo koje malokluzije *per se* ne bi morala (11). Ti nalazi ističu važnost međukulturne prilagodbe u procesu validacije OHRQoL instrumenata.

Oba kratka oblika CPQ-a mogu detektirati promjene nakon ortodontske terapije, s većim utjecajem na psihosocijalnu dimenziju negoli na oralne funkcije. Emocionalna kom-

Both CPQ short-forms are capable to detect changes after orthodontic treatment, with greater effect in psychosocial rather than oral function dimension. Emotional component of the OHRQoL has higher sensitivity to change in oral health and dental esthetics. This is important when assessing the need for, and planning of the orthodontic treatment. The relationship between the degree of malocclusion correction and QoL (Quality of Life) is not linear since most of the children report increase in QoL regardless of the degree of correction. The reason could be in children's individual psychological traits.

In both RSF:8 and ISF:8, domain which defines psychosocial well-being performed better in within domain analyses, describing the latent construct, stability of the results over time, correlated to the more measurements of the similar construct and, in RSF model, correlated linearly to the amount of actual clinical improvement. Moreover, the context of the dimension of psychosocial well-being measures the concept of satisfaction with teeth appearance and their function to a greater extent than the oral function domain does. This implicates that emotional and social aspects are more important to children, rather than the symptomatology related to the oral condition. Furthermore, the dimension of psychosocial well-being can distinguish children with low and high severity of caries, although this is significant only in RSF version.

A possible limitation of this study could be a high variability in CPQ results. This may be due to children's individual psychological characteristics and different comprehension of esthetics (12-14), as well as their current emotional state when reporting the impacts of oro-facial condition on OHRQoL. The results of our study are based on a convenience sample of a clinical population. Future studies on general samples in various settings are needed in order to further evaluate RSF:8 and ISF:8 performance in our socio-cultural setting.

## Conclusion

Two domains are most appropriate for the assessment of OHRQoL by 8-item CPQ in 11-14 year-olds. Oral symptoms and functional limitations are grouped under dimension that defines oral function, while the emotional and social well-beings are grouped in a dimension of psychosocial well-being. 8-item instruments could be more effective in detecting alterations of OHRQoL than the original long form since they reduce the time needed to complete the questionnaire, and therefore reduce the risk of item non-response.

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## Conflict of interest

The authors report no conflict of interest.

ponenta OHRQoL-a osjetljivija je na promjene u oralnom zdravlju i dentalnoj estetici. To je važno pri procjeni potrebe za ortodontskom terapijom te za planiranje terapije. Odnos između stupnja korekcije malokluzije i QoL-a (kvalitete života) nije linearan – većina djece izvještava o povećanju QoL-a bez obzira na stupanj korekcije. Razlog bi mogao biti u individualnim psihološkim osobinama djece.

U obje inačice – RSF:8 i ISF:8, dimenzija koja opisuje psihosocijalno blagostanje pokazala se boljom u analizi unutar dimenzije, opisujući latentni konstrukt, stabilnost rezultata tijekom vremena i korelaciju s više mjera sličnog konstrukt, a u modelu RSF linearnu korelaciju s iznosom stvarnoga kliničkog poboljšanja. Nadalje, kontekst dimenzije psihosocijalnog blagostanja u većem iznosu mjeri koncept zadovoljstva izgledom zuba i njihovom funkcijom više negoli dimenzija oralne funkcije. To pokazuje da su djeci važniji emocionalni i društveni aspekti negoli simptomatologija povezana s oralnim stanjem. Nadalje, dimenzija psihosocijalnog blagostanja može razlikovati djecu s niskim i visokim intenzitetom karijesa, iako je to značajno samo u RSF verziji.

Ograničenje ove studije mogla bi biti visoka varijabilnost CPQ rezultata. To bi moglo biti zbog individualnih osobina djece i različitog poimanja estetike (12-14) te njihova trenutačnog emocionalnog stanja tijekom izvještavanja o utjecaju orofacijalnog stanja na OHRQoL. Rezultati našeg istraživanja temelje se na prigodnom uzorku kliničke populacije. Buduća istraživanja, na uzorku opće populacije u različitim okruženjima, potrebna su da bi se dodatno evaluiralo korištenje RSF:8 i ISF:8 u našem sociokulturnom okruženju.

## Zaključak

Dvije dimenzije najprikladnije su za procjenu OHRoL-a CPQ-om od 8 čestica kod djece u dobi od 11 do 14 godina u Hrvatskoj. Oralni simptomi i funkcionalna ograničenja grupirani su u dimenziju koja definira oralnu funkciju, a emocionalno i društveno blagostanje uvršteno je u dimenziju psihosocijalnog blagostanja. Instrumenti od 8 čestica mogli bi biti učinkovitiji u detektiranju promjena OHRQoL-a negoli originalni dugi oblik, jer skraćuju vrijeme potrebno za ispunjavanje upitnika te zato smanjuju rizik od neodgovorenih čestica.

## Zahvale

Istraživanje je provedeno u sklopu dvaju projekata Sveučilišta u Rijeci: Prediktivni čimbenici uspjeha ortodontske terapije u djece i adolescenata (13.06.2.1.53) i Odrednice učinkovitosti terapije narušenih funkcija i izgleda orofacijalnog područja (uniri-biomed-18-22).

## Sukob interesa

Nije bilo sukoba interesa.

**Sažetak**

**Cilj:** Provesti međukulturnu prilagodbu i testiranje psihometrijskih svojstava Upitnika o dječjoj percepciji (engl. Child Perceptions Questionnaire – CPQ), kratke inačice od osam čestica za dob od 11 do 14 godina: regresijske (engl. Regression Short Form – RSF:8) i čestične (engl. Item Short Form–ISF:8). **Materijali i metode:** Uzorak je obuhvatio 237 ortodontskih pacijenata u dobi od 11 do 14 godina na dvjema sveučilišnim stomatološkim klinikama u Hrvatskoj. Procijenjena je strukturna i konstruktivna valjanost, pouzdanost i prikladnost. Intraoralni pregled uključivao je procjenu intenziteta karijesa i malokluzije. **Rezultati:** Dvije dimenzije, umjesto prvotno predloženih četiriju, prikladnije su za procjenu kvalitete života povezane s oralnim zdravljem (engl. Oral Health-Related Quality of Life – OHRQoL) s oba instrumenta – ISF:8 i RSF:8 (60,05 % i 52,24 % varijance;  $\alpha = 0,56 - 0,85$ ). Oralni simptomi i funkcionalna ograničenja originalnog instrumenta grupirani su u jednu dimenziju koja definira oralnu funkciju, a emocionalno i društveno blagostanje dimenzija je psihosocijalnog blagostanja. Instrumenti mogu otkriti razlike između osoba s niskim i visokim intenzitetom karijesa te malokluzije. Stabilni su kada nema promjena oralnih uvjeta, a u stanju su detektirati razlike uzrokovane korekcijom malokluzije ortodontskom terapijom ( $p < 0,05$ ). **Zaključak:** CPQ od osam čestica ima dobra psihometrijska svojstva, no u Hrvatskoj su prikladnije dvije umjesto četiri dimenzije za procjenu OHRQoL-a u dobi između 11 i 14 godina.

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**Adresa za dopisivanje**

Martina Brumini  
Dom zdravlja Primorsko-goranske  
županije  
Krešimirova 52A  
51000 Rijeka  
tel.: 051 666 000, fax: 051 337 405  
martina.brumini@gmail.com

**Ključne riječi**

adolescent; oralno zdravlje; kvaliteta života; prikupljanje podataka o zdravlju zubi; ponovljivost rezultata

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