

ORIGINAL ARTICLE



Agreement between children and parents in rating oral health-related quality of life using the Swedish versions of the short-form Child Perceptions Questionnaire 11–14 and Parental Perceptions Questionnaire

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ABSTRACT

Objective: To explore the agreement between children and parents on children's oral health-related quality of life (OHRQoL) when using the Swedish short forms of CPQ_{11–14} and P-CPQ, and to evaluate the impact on agreement of oral health including malocclusion and background characteristics (dental fear, family situation, gender of informant).

Material and methods: A total of 257 children and their accompanying parents were asked to fill in the Swedish versions of the short-form CPQ_{11–14} and P-CPQ separately in connection with a clinical examination.

Results: The participants comprised 247 child-parent pairs: 116 (47%) boys, 131 (53%) girls, 166 (67%) mothers and 81 (33%) fathers. The agreement between the child and parental ratings of the children's OHRQoL was low, with an ICC of 0.22 (95% CI: 0.04–0.37) for the total scale.

Conclusions: There was a low agreement between children's and parents' answers. For best care, it is advisable to consider perceptions of both children and parents because they can complement each other in estimating the child's OHRQoL.

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Introduction

Oral health-related quality of life (OHRQoL) is an important aspect of patient-related outcome measures, and its use is increasing in orthodontic research [1]. Several instruments have been developed for measuring OHRQoL in adults, and during the last 20 years, specific instruments for use in children have been designed. One commonly used instrument is the Child Perceptions Questionnaire (CPQ), originally developed by Jokovic et al. in 2002 [2] and adapted for use among children of different ages (8–10 or 11–14 years; CPQ_{8–10} and CPQ_{11–14}, respectively) [2,3]. Before the 21st century, the general opinion was that information given by children themselves was not sufficiently valid and reliable, and so early assessments of children's health-related quality of life were based on proxy reports by parents or caregivers [4]. However, with increasing knowledge and focus on the importance of listening to children's voices, the general opinion has changed. With appropriate questionnaire techniques, it is possible to get valid and reliable information from self-ratings of HRQoL outcomes by children about 8 years of age [5,6]. In 2003, Jokovic and co-workers developed the Parental-Caregiver Perceptions Questionnaire (P-CPQ) to supplement children's self-ratings [3].

There have been several evaluations of agreement between children and parents concerning OHRQoL implying that this connection is not completely understood. Zang et al. [7] studied agreement between mothers, fathers and children with orthodontic treatment need using the P-CPQ and CPQ. Their results showed that parents rated the OHRQoL poorer than did the children, while there was good agreement among mothers and fathers. On the contrary, in the study by Jokovic et al. [8] there was a good agreement on a group level (children total score compared to parents total score) but significant differences between pairs (child/parent pair score). Benson et al. [9] showed that mothers' opinions on the overall impact of malocclusions on OHRQoL were similar to those of their children, but that the mothers were more dissatisfied with the appearance of their children's teeth and overestimated the emotional impact of the malocclusions. Perhaps agreement increases if the malocclusion is severe and clearly visible and there is no doubt about the need. In a study concerning dental fear, an internal phenomenon, agreement between children and parents showed a reversed pattern: the higher the score for dental fear, the worse the agreement between children and parents [10]. In Sweden, orthodontic treatment is free of charge if the professional evaluation or the so-called 'objective treatment

need' reaches at least moderate need according to the Index of Orthodontic Treatment Need (IOTN) [11] and taking the subjective treatment need into consideration. A common experience in clinical practice is that the parents may be more eager for orthodontic treatment than the child, with parents seeming to exaggerate the need for treatment in order to get the treatment started as early as possible. One problem with the treatment of children is that the child's motivation is sometimes low and the treatment outcome may be less favourable due to lack of cooperation.

Since there is an unclear level of agreement of self-rating of OHRQoL between children and their parents, especially on the individual level, and since eagerness for orthodontic treatment may differ between children and their parents, the primary aim of this study was to explore the agreement between children and parents on children's OHRQoL when using the Swedish short forms of the CPQ₁₁₋₁₄ and P-CPQ. A second aim was to evaluate the impact on agreement of the level of OHRQoL and gender of informants and with available background characteristics of potential confounding impact taken into account.

Material and methods

Participants

Participants were drawn from a longitudinal study of children and their accompanying parents which included a follow-up examination at about 12 years of age [12]. A total of 277 child-parent pairs with valid data on the OHRQoL measures were selected for the evaluation of agreement. Children with ongoing orthodontic treatment with a fixed appliance ($n = 13$) were excluded, seven children were excluded due to missing data in the short form CPQ₁₁₋₁₄ resulting in 257 child-parent pairs available for this study.

OHRQoL measures

Children and their accompanying parents were asked to fill in the Swedish short-form versions [13] of the CPQ₁₁₋₁₄ [14] and P-CPQ separately in connection with a clinical follow-up examination. These short-form questionnaires were translated into Swedish by Talvilahti et al. [13] as described in the study by Dimberg et al. [15] and contain 16 items each, which can be grouped into either four subscales/dimension (four items each); oral symptoms, functional limitations, emotional well-being and social well-being [14] or two subscales/dimensions (eight items each); symptoms and function, and well-being [16]. The items are formulated as questions and each item is related to symptoms from the teeth, lips, jaws and mouth during the last 3 months. Response alternatives are on a 5-point frequency scale range from 0 ('never') to 4 ('every day'), with a total score range of 0–64 (subscale scores range from 0 to 16, and 0–32, respectively). Higher scores correspond to poorer status. The psychometric status, in terms of validity and reliability, of the scales is also presented in the study by Dimberg et al. [15]. Both children and parents had the opportunity to ask questions about the questionnaires

and, if needed, to get support with reading the questions from two of the authors (BL and LD). All parents and all children understood Swedish. If there was more than one item missing in any four-item subscale, the questionnaire was excluded from the analyses.

Other measures

The clinical examinations were performed by two experienced orthodontists (BL and LD) who were calibrated before the examinations started. An inter-examiner test showed kappa statistics ranging from 0.84 to 1.0. Oral health in terms of caries prevalence in permanent teeth was recorded using the DMFS index (decayed/missing/filled surfaces), and the occurrence and severity of malocclusion were evaluated using the Index of Orthodontic Treatment Need-Dental Health Component (IOTN-DHC) [10]. Dental fear was rated by the children in connection with the clinical examination, using the Children's Fear Survey Schedule-Dental Subscale (CFSS-DS) [17]. Family situation was evaluated by questions put to the parents at the time of the examination, concerning the parent's educational level and present occupation. When at least one parent was unemployed and/or neither of the parents had education beyond high school, this was recorded as low socio-economic level. We also recorded cohabitation status (child living with both parents or not).

Ethics approval and consent to participate

The study protocol and informed consent form were approved by the Regional Ethical Review Board in Uppsala, Sweden (ref: 2012/273). Children and their parents were invited to attend and were asked to give their informed consent before entering the study.

Statistical analysis

The analysis was performed using version 22.0 of the IBM SPSS Statistics software package (SPSS, Chicago, IL, USA). Descriptive statistics were calculated as means, medians and proportions due to the character of the data. Absolute differences between child and parental ratings were computed for each child-parent pair and described by group means and standard deviations (SD). The difference between self and parental ratings were also categorized into an acceptable agreement (self- and parental ratings within two scale steps in either direction; -2 to $+2$) or no agreement (difference exceeding two scale steps in either direction; < -2 or $> +2$). The range of acceptable agreement (-2 to $+2$) was chosen according to an assumption, based on reported data of construct validity [14,18], that two steps on the scale were clinically non-significant. Agreement was assessed using the intraclass correlation coefficient (ICC, absolute agreement, two-way random effect, and single measure), 95% confidence intervals (CI), and Bland-Altman plots showing means of (x -axis) and differences between (y -axis) child and parental ratings [19,20]. The level of agreement presented by the ICC was categorized as follows: 0–0.20 (poor), 0.21–0.40 (fair),

Table 1. Sample characteristics in terms of distribution and combination of child's and responding parent's gender.

Responding children	Responding parents	Count	%
Boys	Mothers	79	32
	Fathers	37	15
	All boys	116	47
Girls	Mothers	87	35
	Fathers	44	18
	All girls	131	53
All		247	100

0.41–0.60 (moderate), 0.61–0.80 (substantial) and 0.81–1.0 (excellent) [21]. Differences in agreement by gender of informants, pair mean level on the CPQ-scale (OHRQoL), and background variables were analyzed using Student's *t*-test/ANOVA or chi-squared tests. Logistic regression analyses were performed with the categorical variable acceptable agreement (yes/no) as the dependent variable and gender of informants, pair mean level on the CPQ-scale, and background variables as independents sequentially introduced.

Results

Ten pairs had to be excluded due to missing data on the P-CPQ ($n=8$) or the accompanying person not being a parent ($n=2$), leaving 247 child-parent pairs for analysis: 116 (47%) boys, 131 (53%) girls, 166 (67%) mothers and 81 (33%) fathers (Table 1). Children's self-ratings consistently exceeded the parental ratings through all subscales, as shown by the group means and medians in Table 2. The mean difference between a child and parental ratings was 4.15, with a range from -15 (parent scoring higher, implying poorer OHRQoL than the OHRQoL scored by the child) to $+26$ (child scoring higher OHRQoL than the parent) (Table 2 and Figure 1).

Agreement between children and parents

The agreement between child and parental ratings of the children's OHRQoL using the CPQ_{11–14} and P-CPQ was low, with an ICC of 0.22 (95% CI: 0.04–0.37) for the total scale and ICCs ranging from 0.17 (social well-being) to 0.30 (oral symptoms) for the subscales (Table 2). The mean-difference plot (Figure 1) showed increasing differences (poorer agreement) for higher mean levels on the scale, and a spread clearly illustrating that the parents both underestimated and overestimated OHRQoL as compared to their children's self-assessments.

Impact on agreement

The four plots in Figure 2 illustrate the mean-difference spreads when separated for the different pair gender combinations, and give some indication of a more consistent picture for the combination of girls and their mothers. Descriptive data on agreement in terms of absolute difference between child and parental ratings and category of agreement by gender of informants, level on the CPQ-scale, and background characteristics are given in Table 3. Although means of absolute differences and proportions

Table 2. Descriptive data (mean, SD, median and range) of children's oral health-related quality of life as assessed by the CPQ for self- (CCPQ) and parental (PCPQ) ratings in 247 child-parent pairs (first two columns).

Scale (number of items)	Children's self-ratings				Parental ratings				Absolute differences between self- and parental ratings (ABS (CCPQ-PCPQ)) within each child-parent pair				Agreement between self- and parental ratings expressed as ICC	
	Mean	SD	Median	Range	Mean	SD	Median	Range	Mean	SD	Median	Range	ICC	95% CI
Total CPQ score (16)	9.32	6.30	8	0–33	5.17	4.34	4	0–26	5.76	5.12	4	0–26	0.216	0.042–0.368
Subscale scores (4 dimensions)														
Oral symptoms (4)	3.88	2.09	4	0–11	2.77	1.87	3	0–8	2.00	1.52	2	0–8	0.302	0.140–0.440
Functional limitations (4)	2.21	2.15	2	0–10	1.19	1.56	1	0–9	1.79	1.78	1	0–9	0.213	0.080–0.337
Emotional well-being (4)	1.95	2.34	1	0–11	0.74	1.36	0	0–9	1.77	1.99	1	0–9	0.192	0.054–0.321
Social well-being (4)	1.27	1.75	1	0–10	0.48	0.94	0	0–5	1.18	1.55	1	0–9	0.169	0.044–0.289
Subscale scores (2 dimensions)														
Symptoms/ function (8)	6.10	3.50	6	0–16	3.95	2.91	3	0–16	3.36	2.69	3	0–12.7	0.267	0.090–0.418
Well-being (8)	3.22	3.76	2	0–21	1.22	2.07	0	0–11	2.84	3.18	2	0–18	0.189	0.049–0.320

The third column contains descriptives of the absolute differences between the self- and parental ratings within each child-parent pair. The last column shows agreement in terms of ICC and 95% CI between self- and parental ratings.

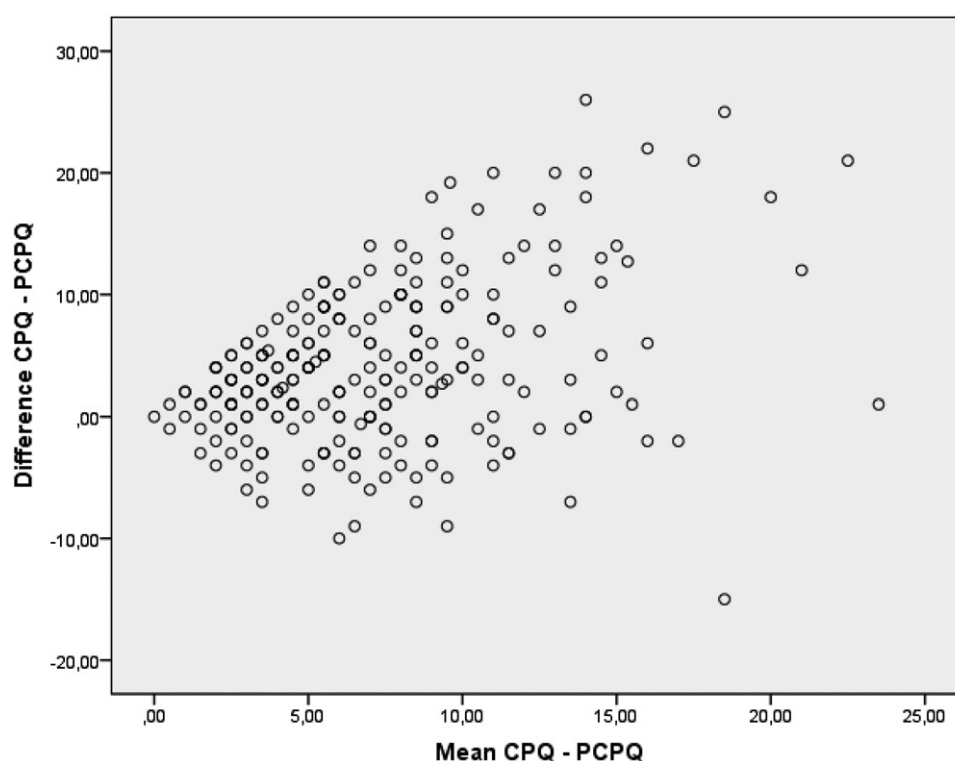


Figure 1. Bland–Altman plot illustrating means of (x-axis) and differences between (y-axis) children's self-ratings and parental ratings of children's oral health-related quality of life as measured on the Child Perception Questionnaire (CPQ_{11–14}). Each plot represents the values for one child-parent pair in the group of 247 child dental patients and their accompanying parents. Values above zero on the y-axis describe pairs where the child's score exceeded that of the parent, and values below zero describe pairs where the parent's score exceeded that of the child.

within the difference range from -2 to $+2$ (acceptable agreement) also indicated better agreement for the combination of girls and their mothers, none of the differences between genders (children or parents or combinations) were statistically significant (Table 3). When the CPQ mean scores for each pair of informants were dichotomized at the median level of 6.5, it was found that the agreement (in terms of absolute difference or proportion in the category of acceptable agreement) was poorer for those pairs with higher levels on the CPQ scale (Table 3). No significant differences in agreement according to parental education or cohabitation status were found (Table 3). There were also no differences in agreement according to dental caries, orthodontic treatment need, anterior visible malocclusions (malocclusions in the aesthetic zone), or dental fear (dichotomized as CFSS-DS ≥ 32 or not) (Table 3).

Impact on agreement – logistic regression models

Gender of informants, level on the CPQ scale and background variables were grouped and stepwise entered as independent variables in a sequence of logistic regression analyses, with acceptable agreement as the outcome variable. When, in the final model, all these independent variables were entered together, parental gender, with poorer child-parent agreement for fathers than for mothers, and level on the CPQ scale, with higher odds for acceptable agreement for the child-parent pairs with CPQ mean scores below the median, were significant discriminators (Table 4).

Discussion

This article presents what to date is the only evaluation of agreement between Swedish children's self-rated OHRQoL and parents' ratings of their children's OHRQoL. We found that agreement was low in general, although mothers showed better agreement with their children than fathers did. Also, the agreement was higher when the OHRQoL was less affected. The low general agreement between children and parents is in accordance with the study from Hong Kong by Zang et al. [8] but the opposite to the study from Canada by Jokovic et al. [7].

On average, the children scored their OHRQoL higher than their accompanying parents did. This result is consistent with many other studies [3,8,22,23]. Agreement was lowest on the emotional and social well-being subscale, but slightly better on the function and oral symptoms subscale, which is also consistent with other studies [3,8,24]. Since all the agreements for the subscales were poor to fair we did not find any reason for further discussion concerning the differences among them. A systematic review covering the assessment of agreement between child and parental responses regarding the child's health-related quality of life showed the same result [25].

One factor that seemed to have an impact on agreement was whether the mean CPQ/P-CPQ score was high or low. Child-parent pairs with a mean score below the median of 6.5 had twice the probability of agreement in comparison to those with mean scores above the median. This means that the agreement between parent and child increased with better OHRQoL. This may be considered logical, since it is easier

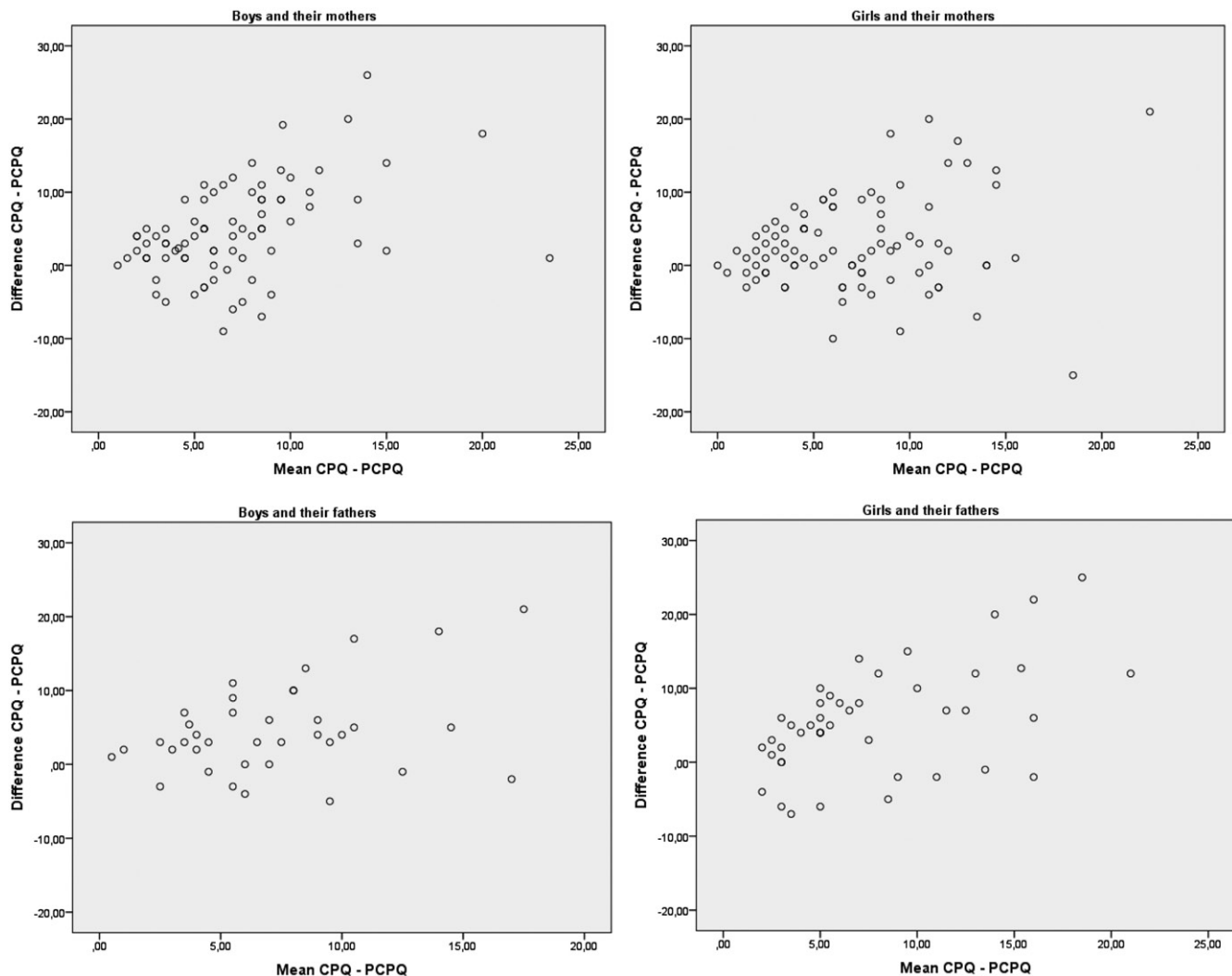


Figure 2. Four Bland–Altman plots illustrating the mean-difference pictures for the different pair combinations.

Table 3. Absolute difference and category of agreement between children’s self-ratings and parental ratings of children’s oral health-related quality of life on the Child Perception Questionnaire (CPQ_{11–14}) by gender, level on the CPQ scale, and background variables.

	<i>n</i>	Absolute difference CCPQ-PCPQ			Category of agreement based on difference CCPQ-PCPQ (%)			Chi ² <i>p</i> value
		Mean	SD	<i>t</i> -test/ ANOVA <i>p</i> value	< −2	−2 to +2	> +2	
All	247	5.76	5.12		13.8	29.6	62.1	
Child gender				.654				.274
Boy	116	5.91	5.03		12.1	25.9	62.1	
Girl	131	5.62	5.21		15.3	32.8	51.9	
Responding parent gender				.158				.085
Mother	166	5.44	4.97		15.1	33.1	51.8	
Father	81	6.42	5.37		11.1	22.2	66.7	
Child-parent pair combination				.103				.124
Boy-mother	79	6.08	5.06		12.7	26.6	60.8	
Girl-mother	87	4.86	4.85		17.2	39.1	43.7	
Boy-father	37	5.58	5.01		10.8	24.3	64.9	
Girl-father	44	7.13	5.61		11.4	20.5	68.2	
Mean CCPQ, PCPQ				<.001				.033
<Median 6.5	121	3.84	2.82		13.2	37.2	49.6	
≥Median 6.5	126	7.60	6.07		14.3	22.2	63.5	
Education level of responding parent				.313				.438
Elementary school/primary education	20	4.67	3.28		20.0	30.0	50.0	
High school/secondary education	142	5.52	5.22		10.6	32.4	57.0	
College or university/post-secondary education	84	6.35	5.25		17.9	25.0	57.1	
Living with both parents				.294				.382
Yes	194	5.59	4.68		13.9	27.3	58.8	
No	51	6.44	6.55		11.8	37.3	51.0	

(continued)

Table 3. Continued.

	<i>n</i>	Absolute difference CCPQ-PCPQ			Category of agreement based on difference CCPQ-PCPQ (%)				Chi ² <i>p</i> value
		Mean	SD	<i>t</i> -test/ ANOVA <i>p</i> value	< −2	−2 to +2	> +2		
Dental caries (decayed, missing, or filled surfaces)				.169				.316	
Yes (DMFS > 0)	64	6.52	5.71		9.4	26.6	64.1		
No (DMFS = 0)	183	5.50	4.88		15.3	30.6	54.1		
Orthodontic treatment need				.788				.659 ^a	
No (IOTN = 1)	61	6.06	5.45		13.1	29.5	57.4		
Mild/little (IOTN = 2)	81	5.70	5.20		12.3	30.9	56.8		
Moderate/borderline (IOTN = 3)	53	5.06	4.86		15.1	35.8	49.1		
Severe (IOTN = 4)	43	6.16	4.58		18.6	23.3	58.1		
Extreme (IOTN = 5)	9	6.59	6.42		0.0	11.1	88.9		
Anterior malocclusion and IOTN 3–5				.371				.754	
Yes	102	5.42	4.67		15.7	29.4	54.9		
No	145	6.01	5.41		12.4	29.7	57.9		
Dental fear (CFSS-DS ≥ 32)				.257				.831	
Yes	35	6.63	5.97		11.4	34.3	54.3		
No	207	5.56	4.98		13.5	29.5	57.0		

Data are based on sum scores on the total CPQ scale. The outcome variable is acceptable agreement, defined as a difference of less than two scale steps between self-rating and parental rating. Significant *p*-values are given in *italics*.

aFisher's exact test.

Table 4. The final model from a sequence of logistic regression analyses (using the ENTER command in SPSS) with dichotomized agreement as the dependent variable (difference between children's self-ratings and parental ratings of less than [Yes/1] or at least [No/0] two steps on CPQ total score).

	Final model: all aspects together (<i>r</i> ² : 0.113)	
	OR	95% CI
Child gender		
Girl (ref)		
Boy	0.54	0.27–1.10
Responding parent gender		
Mother (ref)		
Father	0.39	0.16–0.94
Child and responding parent gender interaction	2.35	0.65–8.53
Mean CCPQ, PCPQ		
≥ Median 6.5 (ref)		
< Median 6.5	2.29	1.26–4.19
Education level of responding parent		
Primary (ref)		
Secondary	1.22	0.42–3.58
Post-secondary	0.91	0.29–2.85
Living with both parents		
Yes (ref)		
No	1.61	0.81–3.21
Dental caries		
No (ref)		
Yes	0.73	0.37–1.45
Orthodontic treatment need		
No (ref)		
Mild/little	1.10	0.51–2.39
Moderate/borderline	1.13	0.48–2.66
Severe	0.71	0.28–1.81
Extreme	0.27	0.03–2.53
Dental fear		
No (ref)		
Yes	1.21	0.52–2.81

Gender of informants, level on the CPQ scale, and background variables were sequentially entered as independents. Data from 244 valid child-parent pairs. Significant results are in *italics*.

for the parent to rate in agreement with the child if there are no problems. The same pattern regarding agreement between children and parents has been seen in dental fear studies; the higher the score for dental fear, the worse the agreement between children and parents [10].

None of the background characteristics – malocclusions, dental caries, dental fear and family situation – had any significant impact on agreement in this study. A study by Benson et al. [9] showed that mothers' opinions on the overall impact of malocclusions on OHRQoL were similar to those of their children, but that the mothers were more dissatisfied with the appearance of their children's teeth and overestimated the emotional impact of malocclusions.

The children participating in this study were all healthy, which is relevant given that a previous study showed that agreement on health-related quality of life was better between children and parents if the children were chronically ill [25]. The low agreement between children and parents in the present study may partly be explained by the fact that OHRQoL is complex and involves many psychometric parameters and personal experiences.

One strength of this study was the even distribution of gender and age among the children. In addition, the response rate was high for both children and parents. This was a cross-sectional study, and it would be interesting to perform longitudinal studies specifically evaluating how self-reported OHRQoL and the agreement between children and parents may change over time, and how both OHRQoL and agreement may be affected by orthodontic treatment.

Conclusion

There was a low agreement of answers between children and parents, although mothers showed better agreement with their children than fathers did. Also, the agreement was higher when the OHRQoL was less affected while no significant differences were found when consideration was given to the child's orthodontic treatment need, dental caries, dental fear and family situation. For the best care, it can be advisable to consider a combined child and parent perception because they may complement each other when estimating child OHRQoL.

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Disclosure statement

No potential conflict of interest was reported by the authors.

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