Agreement between mothers and children with malocclusion in rating children’s oral health-related quality of life

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Introduction: The aim of this study was to compare the assessment of oral health-related quality of life (OH-QoL) between children with malocclusion and their mothers, by using responses to the child perceptions questionnaire and the parental-caregivers perceptions questionnaire. Methods: The study was conducted in 90 children, aged 11 to 14 years, with a malocclusion grade of 4 or 5 according to the index of orthodontic treatment need dental health component. The children and their mothers completed the questionnaires independently. Results: The mean ratings were similar for total scores (children, 20.4; mothers, 20.1), oral symptoms (children, 5.2; mothers, 4.7), and social well-being (children, 4.3; mothers, 4.8). However, the mothers group had a lower mean score for functional limitations (children, 5.3; mothers, 3.6) and a higher mean score for emotional well-being (children, 5.6; mothers, 7.1). The correlations between children’s and mothers’ responses ranged from rs = 0.545 for total score and emotional well-being to rs = 0.357 for functional limitations. There were good correlations between their responses to global (rs = 0.466) and life overall (rs = 0.427) questions, but poor correlations between the 2 questions, suggesting that these concepts were considered differently. Conclusions: Maternal opinions were similar to those of their children for the overall impact on OH-QoL of malocclusion, but mothers were more dissatisfied with the appearance of their children’s teeth and overestimated the emotional impact of malocclusion. It would be useful to develop a specific measure to assess OH-QoL in children with malocclusion. (Am J Orthod Dentofacial Orthop 2010;137:631-8)

Quality-of-life measures are increasingly being developed and used in dentistry as the importance of gaining the perspectives of patients and the public is acknowledged. These measures are patient-centered because they capture how oral conditions impact people’s lives, rather than a narrow focus on disease and mouth-centered approaches to the assessment of oral health. Potential uses include political applications to influence policy makers, the development of theory by exploring models of health, and practical purposes to evaluate the effectiveness of interventions or to aid discussion of problems with patients. Recently, oral health-related quality of life (OH-QoL) has been defined as “the impact of oral disorders on aspects of everyday life that are important to patients and persons, with those impacts being of sufficient magnitude, whether in terms of severity, frequency or duration, to affect an individual’s perception of the life overall.”

Several measures have been designed to assess OH-QoL, although the relationship between their outcomes and OH-QoL has recently been questioned. Many of the measures were developed for adults and might not address issues relevant to children. A further problem with the assessment of quality of life is that it is a dynamic rather than a static phenomenon. People alter the standards by which they rate their OH-QoL over time, because of changes in circumstances or their physical and emotional development. To overcome this limitation, it was suggested that a range of measures should be used to evaluate OH-QoL, one of which could include information from parents or caregivers when children’s OH-QoL is investigated.

Jokovic et al developed the child oral health quality of life questionnaire, which includes age-specific measures for children 6 to 14 years of age (child perceptions questionnaire [CPQ]) and the parental-caregiver perceptions...
questionnaire (P-CPQ).\textsuperscript{11} The CPQ for ages 11 to 14 years and the P-CPQ are comparable questionnaires with 31 items in common organized into 4 domains: oral symptoms, functional limitations, emotional well-being, and social well-being. In a study of 42 mothers and children, Jokovic et al\textsuperscript{12} found generally good agreement in the groups. However, there were significant discrepancies between pairs, particularly in the emotional and social well-being domains. This suggests that it is not appropriate to use mothers as proxies for their children at the individual level.

Zhang et al\textsuperscript{13} examined agreement between P-CPQ and CPQ in mothers, fathers, and children with orthodontic treatment need in Hong Kong. They found that the parents rated the OH-QoL poorer than did the children in all domains. They showed that, although there was generally good agreement between mothers and fathers at the group level, agreement among mothers, fathers, and their children at the individual level was poor. They concluded that not only did the children and parents have differing views about the impact of malocclusion, but also the 2 parents sometimes disagreed. This underlined the importance of consulting the whole family when discussing orthodontic need and treatment.

The aim of this study was to examine the relationship between reports of OH-QoL from children with malocclusion and their mothers in a sample in the United Kingdom. More specifically, we examined in which of the 4 domains of the child oral health quality of life questionnaire the agreement or disagreement occurred and to what extent it was apparent.

MATERIAL AND METHODS

Ethical approval was granted by the South Sheffield Research Ethics Committee (reference number 03/262), and site-specific issues were reviewed by the Research and Development Department at Chesterfield Royal Hospital.

The sample consisted of consecutive orthodontic patients between the ages of 11 and 14 years who were removed from a treatment waiting list, had pretreatment records taken, and were considered ready to start treatment at the Charles Clifford Dental Hospital in Sheffield or the Chesterfield and North Derbyshire Royal Hospital in Chesterfield. The subjects were recruited to a study examining the effect of malocclusion on OH-QoL.\textsuperscript{14} They were assessed to be in grades 4 or 5 of the index of orthodontic treatment dental health component by a trained and calibrated examiner C.O.'B., and all agreed to take part before treatment. Patients with active dental disease, cleft lip or palate, complicating medical history, or severe dental mottling were excluded. A sample size calculation suggested that 90 patients should be recruited to detect a difference of 30% in the total CPQ ($\alpha = 0.05; \beta = 0.90$) between subjects with and without malocclusion.\textsuperscript{14}

The child and the parent who was present at the consultation were asked to independently complete the CPQ for children aged 11-14 years and the P-CPQ, respectively. The child and the parent completed the questionnaires separately in a quiet area of the orthodontic clinic with a researcher available to answer questions. Both the CPQ and P-CPQ have been evaluated for use in the United Kingdom and were found to have acceptable psychometric properties.\textsuperscript{15,16} These questionnaires also include 2 global questions: (1) rating the health of their, or their child’s, teeth, lips, jaws, and mouth; and (2) how much their, or their child’s, teeth, lips, jaws, or mouth affect life overall. These global questions were previously evaluated.\textsuperscript{17} They were worded, “would you say that the health of your teeth, lips, jaws, and mouth is ___?” with a 5-point response format from excellent to poor; and “how much does the condition of your teeth, lips, jaws, or mouth affect your life overall?” with a response range from not at all to very much. A third question asked about satisfaction with their, or their child’s, teeth on a 5-point scale from very satisfied to very dissatisfied.

Statistical analysis

The response option codes used for both the CPQ and P-CPQ were 0, never; 1, once or twice; 2, sometimes; 3, often; and 4, every day or almost every day. The P-CPQ questions also had a “don’t know” response option that was given a score of 0 in the analysis.\textsuperscript{18} The “don’t know” response was included in the parents’ questionnaire to acknowledge the limitations of the parent’s knowledge of the child’s oral health or everyday activities. Total and domain scores were obtained by summing the response option codes for each question. The response format for the global, life overall, and satisfaction with teeth questions was also a 5-point Likert scale.

The relationship between the CPQ and the P-CPQ was assessed in a number of ways. Comparisons were made by examining the mean scores and the differences between the scores. Mean directional differences were tested by using a paired $t$ test. The magnitude of any systematic differences was examined by dividing the mean by the standard deviation to obtain a standardized difference.\textsuperscript{12} A standardized difference of 0.2 was considered small, 0.5 was moderate, and 0.8 was great.\textsuperscript{11} An absolute mean difference was calculated by ignoring the
RESULTS

A total of 116 pairs of children and parents or caregivers completed both questionnaires. The parents and caregivers included 90 mothers, 20 fathers, and 6 others. Because there were few fathers and others, only the responses between the children and the mothers were compared. The sex and age of these children are shown in Table I.

The number of “don’t know” responses per mother ranged from 0 to 12. Almost half (47.8%) of the mothers responded “don’t know” at least once, 28.9% had 3 or more “don’t know” responses, and 15.6% had 6 or more.

The Cronbach’s alpha values were 0.91 for the total CPQ score and 0.90 for the total P-CPQ score. The Cronbach’s alpha values for the respective CPQ and P-CPQ domain scores were 0.70 and 0.58 for oral symptoms, 0.58 and 0.67 for functional limitations, 0.89 and 0.90 emotional well-being, and 0.74 and 0.77 for social well-being. These figures are slightly lower than those obtained by Jokovic et al11 but still represent good internal consistency.

Comparisons between the mean total and 4 domain scores from the CPQ and P-CPQ responses are shown in Table II. The mean ratings were similar for the total score (children, 20.4; mothers, 20.1), oral symptoms (children, 5.2; mothers, 4.7), and social well-being (children, 4.3; mothers, 4.8) domains. Differences in the mean scores suggest that mothers underestimated functional impacts (children, 5.3; mothers, 3.6) and overestimated emotional impacts (children, 5.6; mothers, 7.1) compared with the children’s scores.

The difference between the answers of the children and their mothers in the functional impacts domain was mainly due to 2 questions. The biggest discrepancy in responses was to the question “in the past 3 months, because of your or your child’s teeth, mouth, lips, and jaws, how often have you, or has your child, breathed through the mouth?” The proportion of children responding “never” to this question was 26%; the proportion of mothers responding “never” was 43%, and 20% responded “don’t know.” The second question causing the discrepancy in the functional domain was: “in the past 3 months, because of your or your child’s teeth, mouth, lips, and jaws, how often have you, or has your child, taken longer than others to eat a meal?” The proportion of children responding “never” to this question was 50%; the proportion of mothers responding “never” was 75%, with no mothers responding “don’t know.”

The difference in the answers between children and mothers in the emotional well-being domain was also mainly due to the responses to 2 questions. The question, “in the past 3 months, because of your or your child’s teeth, mouth, lips, and jaws, how often have you, or has your child, been upset?” produced a “never” response in 64% of children compared with 44% of mothers, with just 3 mothers choosing “don’t know.” The question, “in the past 3 months, because of your or your child’s teeth, mouth, lips, and jaws, how often have you, or has your child, been nervous, anxious, or fearful?” produced a “never” response in 72% of children compared with 50% of mothers, with 7 mothers choosing “don’t know.”

Table III shows the mean directional differences and confirms that the responses for the functional limitations ($P < 0.001$) and emotional domains ($P = 0.026$) were significantly different. The standardized differences are shown in Table IV. They were generally small, ranging from –0.02 for the total score to –0.46 for the

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<th>Table I. Descriptive characteristics for the children in the study</th>
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<td>Mean age (SD)</td>
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functional limitations domain, which approaches moderate disagreement. The absolute differences for the total and domain scores are also shown in Table IV. They ranged from 0 to 31, with 59% of the child-mother pairs showing a difference of 10 or less. The mean absolute differences ranged from 7% of the maximum score for social well-being to 15% of the maximum score for emotional well-being.

Nearly half of the mother and child total scores (46%) were within .5 SD above and below a difference of zero, although this was true for only 25% of the functional limitations domain, with 52% of the children scoring higher than their mothers. Conversely, 41% of the mothers scored higher than their children in the emotional well-being domain. The concordance between mother and child was similar for both oral symptoms and social well-being.

Table V shows the mean scores from the global, life overall, and satisfaction with teeth questions, and Table VI shows the correlations between the mother and child responses to the global question, the life overall, the satisfaction with teeth, and the CPQ and P-CPQ total and domain scores. The Spearman correlations (rs) ranged from 0.545 for total CPQ and emotional well-being to 0.097 for satisfaction with teeth. The correlations were all significant, except for satisfaction with teeth. The intraclass correlation coefficients ranged from substantial for social well-being (0.62) to moderate for oral symptoms 0.42. The association between the global and life overall responses were weak for both children (rs = 0.390) and mothers (rs = 0.265).

The Figure shows the concordance between the child and mother for the global, life overall, and satisfaction with teeth questions. The concordance between pairs for the global and life overall questions was good. Mothers and children gave the same score for the global rating in 39% of pairs, and 92% were within 1 point on either side of the score. The results for the life overall question were also very similar, with 38% equal, and 87% within 1 point on either side. The concordance for the satisfaction with teeth question was poor, with only 19% of child-mother pairs recording the same score; in 46% of the pairs, the mother scored higher than the child—i.e., nearly half of the mothers were more dissatisfied with their children’s teeth than were the children.

**DISCUSSION**

We found generally good agreement between children with malocclusion and their mothers at the group level regarding their perceptions of the impact of occlusal deviations. Means and standardized and absolute differences were small for the total CPQ and the
P-CPQ scores, and for the oral symptoms and social well-being domains.

The numbers of children and mothers involved were close to similar studies published in this area.\textsuperscript{12,13} Although the sample size was based on the difference in the total CPQ scores between groups with and without malocclusion, a power calculation with the data obtained showed that a sample size of 90 provided a power of 0.87 to detect a 40% difference in the total CPQ scores between children and mothers (the standard deviation of the differences was 12.4).

These results differ from those of Jokovic et al,\textsuperscript{12} who found that Canadian children had higher overall CPQ scores compared with their mothers’ P-CPQ scores; however, they also found good agreement between mothers and children at the group level. Their sample included children with various dental problems, including orthodontic and orofacial conditions, which might have been more severe than those in our study.

Zhang et al\textsuperscript{13} found that children with malocclusion had significantly lower CPQ scores (ie, rated their OH-QoL better) than did their parents across all domains, although the functional limitations and social well-being domains were not statistically significant. Their sample consisted of children with malocclusion accepted for orthodontic treatment, but it is not clear where the study was undertaken and whether cultural differences might explain this difference in outcome.\textsuperscript{21} The intraclass correlation coefficients for the total and domain scores in this study were lower than those found by Jokovic et al\textsuperscript{12} but higher than those of Zhang et al\textsuperscript{13}; this might reflect the differences in the samples.

Wilson-Genderson et al\textsuperscript{19} found low to moderate agreement between the child and the caregiver with the child oral health impact profile. Their sample included children with pediatric, orthodontic, and craniofacial conditions from 3 sites in North America. The lowest correlations were found in the craniofacial group, and the authors concluded that children in the pediatric and orthodontic groups were more likely to agree with caregivers or to rate their OH-QoL more negatively than those in the craniofacial group.

There was a statistically significant systematic difference between the children’s and mothers’ scores in the functional and emotional domains in this study. Examination of the mean differences gives an indication of the discrepancies in the groups, but the more important comparisons for these data are the differences within mother-child pairs. This was determined by using standardized and absolute differences as well as concordance levels. There was a higher standardized difference for the functional and emotional domains, and a higher absolute difference for the emotional domain. Closer examination of the responses to individual questions clearly showed that the differences between child and mother were due to 2 of the 7 questions in the functional domain and 2 of the 8 questions in the emotional well-being domain.

In the functional domain, mothers underestimated the frequency of mouth-breathing and the length of time it took for their children to eat a meal than did their children. Jokovic et al\textsuperscript{12} also found poor agreement between children and mothers for this question in the functional domain; however, this question also produced the most “don’t know” responses from mothers; this agrees with a previous study.\textsuperscript{18} A high prevalence of “don’t know” responses by a mother does not represent a difference in views between the mother and the child but a lack of knowledge about whether the child is afflicted

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<th>Table V. Comparison of the mean scores from the global, life overall, and satisfaction with teeth questions</th>
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<td><strong>Children</strong></td>
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<td><strong>Mean</strong></td>
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<td>Would you say the health of your (child’s) teeth, lips, jaws, and mouth is: (0=0 excellent to 5=poor)</td>
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<td>How much does the condition of your (child’s) teeth, lips, jaws, or mouth affect your (child’s) life overall? (0=not at all to 5=very much)</td>
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<td>How satisfied are you with the appearance of your (child’s) teeth? (0=very satisfied to 5=very dissatisfied)</td>
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<th>Table VI. Spearman and intraclass correlation coefficients (ICC) for mothers’ and children’s responses to the global question, life overall, satisfaction with teeth, and the CPQ and P-CPQ total and domain scores</th>
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<td><strong>Spearman (rs)</strong></td>
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<td><strong>Global</strong></td>
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<td><strong>Life overall</strong></td>
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<td><strong>Total CPQ/P-CPQ</strong></td>
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<td><strong>Domains</strong></td>
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<td><strong>Emotional well-being</strong></td>
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with this particular condition. This finding therefore should be interpreted with caution.

The mouth-breathing item produced one of the highest prevalence of impacts from the children’s responses; 74% of the children scored this as occurring once or twice or more frequently in the past 3 months, with a mean item score of 2.0. The frequency with which children report mouth-breathing might suggest that they consider this normal, rather than an impact on their life because of an oral condition. Therefore, this might not be a useful question to include in a questionnaire designed to assess OH-QoL, and it was excluded from the short form of the questionnaire. This finding also supports the need for qualitative work with children on the measure and its meaning for them, because some questions, particularly in the oral symptom and functional limitation domains of the CPQ, might not seem relevant to patients with malocclusion. Hence, it might be appropriate to develop a condition-specific measure to assess OH-QoL in children with malocclusion. The relevant content of a malocclusion-specific measure would make it more sensitive, acceptable to participants, and responsive to change. Such a measure could be used to evaluate the relative effectiveness of various orthodontic treatments or to monitor patient care or patient preference.

In the emotional domain, the mothers overestimated how frequently the teeth, lips, mouth, or jaws caused their children to be upset, or nervous, afraid, anxious, or fearful compared with the children’s responses. Jokovic et al also found poor agreement between child and mother for the first question. The second question has different wording between the CPQ and the P-CPQ. The CPQ asks children how often they have “felt nervous or afraid,” whereas the P-CPQ asks the parent how often their child has been “anxious or fearful.” This difference in wording between the 2 questionnaires might explain the difference in responses; however, unlike this study, Jokovic et al found good agreement between child and mother for this question.

The responses to the global and life overall questions were similar to those of Jokovic et al, who found that 77% of children in their sample rated the health of their teeth, lips, jaws, and mouth as excellent to good. In our study, 76% of the children rated their oral health excellent to good, compared with 68% of their mothers. Therefore, neither group viewed the child’s malocclusion as detrimental to oral health. Just under half of the children (43%) said that the condition of their teeth, lips, jaws, and mouth affected their life some, a lot, or very much, compared with just over half of the mothers (52%). This is a higher proportion than Jokovic et al found, when 30% of the children said that the condition of their teeth, lips, jaws, and mouth affected their life some, a lot, or very much.

Similar proportions of children (44%) and mothers (48%) who stated that their or their child’s oral health was excellent to good also responded that their or their child’s teeth affected their life some, a lot, or very much. A higher proportion of children (59%) compared with
mothers (38%) who stated that their (or their child’s) oral health was fair or poor also claimed that their (or their child’s) teeth affected their life little or not at all. These data support the view of Jokovic et al25 that children and, to a lesser extent, their parents view the concepts of health and well-being differently. This seems particularly to apply in our sample of children with malocclusion, which can be viewed not as a disease, but as a condition that varies from what is considered normal by society.

We found that mothers expressed more dissatisfaction with their children’s teeth than did the children. This is a common finding. Evans and Shaw26 showed that parents were more critical of their children’s teeth than the children when developing a scale to rate dental attractiveness. Chew and Aw27 found that more parents were dissatisfied with their children’s dental appearance and had a greater desire for their children to have orthodontic treatment than did their children. Although it is important to involve parents in the decision of whether a child should undergo orthodontic treatment, clinicians should be cautious about overemphasizing a parent’s opinion, because they might exaggerate the impact of dental appearance on the child. In this study, mothers overestimated the emotional impacts of a malocclusion compared with the children’s opinions. Hunt et al28 found that parents of children with cleft lip and palate considered their children to be less happy with their facial appearance than the children actually were. Patel et al.29 using a video-based assessment of children smiling, found poor correlation between the child’s self-assessment of the smile and the parent’s proxy assessment based on the responses to the questions “my child likes his or her smile” and “my child is happy with his or her teeth.”

In addition, the parental desire for orthodontic treatment for the child might not be rationalized in terms of the perceived psychosocial benefits. Birkeland et al30 examined the relationship between dental appearance and satisfaction longitudinally in orthodontically treated and untreated subjects. They found that, although 92% of the treated children’s parents were sure that they would allow their child have the same treatment again, only 34% were sure that the treatment result had a positive impact on their child’s social skills; 23% said that it was likely to have a positive influence on the future choice of a mate, and 19% stated that it would have significance for their child’s future working career. Using an OH-QoL measure at the start of treatment for both the child and the parent would help to identify their concerns and enable the appropriate help and guidance when making decisions about whether the child should undergo treatment.

**CONCLUSIONS**

The CPQ scores of a child with malocclusion and the P-CPQ scores of the mother were similar, suggesting good agreement between them on the effect of occlusal deviations on the child’s OH-QoL. We therefore recommend obtaining parental opinions to supplement the information from the child, but not to replace that information.

Mothers of children with malocclusion were more dissatisfied with the appearance of their children’s teeth than were the children; however, they overestimated the emotional impact of the malocclusion on the child. This shows the need to provide appropriate advice and guidance to parents, along with their children, when discussing orthodontic services.

Most children and mothers did not believe that malocclusion affected the child’s oral health, but half believed that it affected their life overall. Therefore, the 2 concepts were considered different.

It would be useful to develop a specific measure to assess OH-QoL in children with malocclusion.

We thank the children and their parents who freely gave their time to complete the questionnaires.

**REFERENCES**