

# Who knows more about the impact of malocclusion on children's quality of life, mothers or fathers?

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**SUMMARY** Shared decision making between children and parents is required in orthodontics. This study compared agreement among mothers, fathers, and children regarding the oral health-related quality of life (OHRQoL) of children. A sample of 71 child patients (41 girls and 30 boys) aged 12.6 years with an orthodontic treatment need, together with both their parents completed components of the child OHRQoL measure. Agreement among children, mothers, and fathers was derived from the 31 analogous questions and assessed using comparison and correlation analyses.

Comparison analyses identified significant differences between mother's and children's reports and between father's and children's reports. The magnitude of the difference between mother's and children's reports, and between father's and children's reports could best be described as moderate (standard difference >0.2). In addition, absolute differences in scores constituted between 12 and 18 per cent of domain and overall scores for both mother's and children's, and father's and children's reports. Correlation analysis, at the individual family unit level, showed that agreement between mothers and children, and between fathers and children was fair [intraclass correlation coefficient (ICC) < 0.04].

Neither mothers nor fathers know their child's oral health status very well, as there was significant disagreement between mothers', fathers', and children's perceptions. The disagreement between mothers and children, and fathers and children was similar. While at the group level, mothers and fathers tended to agree on perception of their children's oral health status, at an individual family unit level they did not.

## Introduction

It is now widely accepted that there are serious limitations when clinical assessment tools alone are employed when measuring health needs, treatment planning and evaluating health outcomes (Bowling, 2002). To this end, a plethora of patient-centred assessment measures, termed 'quality of life' or 'oral health-related quality of life' (OHRQoL) instruments, have been developed for adult populations, which are now routinely being used in epidemiological surveys and increasingly in outcome assessments (McGrath *et al.*, 2003; O'Brien *et al.*, 2003; de Oliveira and Sheiham, 2004). Assessing the impact of oral health status on the life quality of children is a more complex phenomenon, not just because childhood is a period with immense changes in psychosocial awareness but because children's physical features change rapidly (McGrath *et al.*, 2004). Furthermore, children's cognitive development varies such that the wording of items and the meaning and relevance of specific dimensions can differ somewhat, even among children of a similar age, and the changes in a child over time can make repeated measurements difficult to compare (Christakis *et al.*, 2001).

It has been suggested that these measurement difficulties encountered, due to the nature and amount of changes during childhood, can be minimized by having a proxy, a

parent, guardian or other primary caregiver, to report on the child's quality of life (Theunissen *et al.*, 1998; Eiser and Morse, 2001). However, this approach raises several concerns as to how well a proxy's report represents the reality experienced by a child, as well as issues such as the depth of parental awareness and the effect of social desirability. While some studies have reported the parent-child agreement to be low (Ennett *et al.*, 1991; Theunissen *et al.*, 1998; Matza *et al.*, 2004), most have found the parent-child agreement on health status to be good (Sawyer *et al.*, 1999; Jokovic *et al.*, 2003).

Another issue with respect to use of proxies is which parent should be used as a proxy. As mothers tend to be more involved in child care (Landgraf and Abetz, 1997), mothers have more frequently been used as a proxy for children than fathers (Feeny *et al.*, 1992; Jokovic *et al.*, 2003). Very few studies have employed both mothers and fathers as proxies and when they have, parents simultaneously and collectively reported on their children (Theunissen *et al.*, 1998; Varni *et al.*, 1998; Phipps *et al.*, 1999). In these situations, the mothers' and fathers' reports are treated equally. However, it does not appear that any previous study has investigated whether mothers' and fathers' reports of the impact of malocclusion on their children's life quality are similar despite their common difference in child

care. This is an important issue to address since the views of mothers and fathers may be an alternative or complementary sources of information.

In order to answer these questions, the agreement among mothers, fathers, and their children regarding the impact of malocclusion on the child's OHRQoL was compared. The aim of this study was to address the following questions. What is the level of agreement among mothers, fathers, and children? Who has a higher level of agreement with children: fathers or mothers? Are mothers' and fathers' views alternative or complementary sources of information concerning children's OHRQoL?

## Subjects and methods

### Sample

The sample required for the study was based on the size necessary to assess agreement using the intraclass correlation coefficient (ICC). The null hypothesis for the ICC was set at 0.2 (poor agreement). The ICC regarded as indicating a significant level of agreement was set at 0.6 (moderate agreement). Consequently, with  $\alpha$  at 0.05 and  $\beta$  at 0.2, the minimum number of parent-child pairs required was 30 for a one-tailed test.

Ethical approval was obtained from the local ethics committee and informed consent from both parents and children.

Children admitted for orthodontic treatment of a malocclusion, and both their parents, were recruited for this study. Inclusion criteria were that children had to be 'fit and healthy' according to the American Society of Anaesthesiologists: having had no systemic health problems or taken a course of medication in the past year, having a treatment need, as assessed by the Index of Orthodontic Treatment Need (categories 4 and 5; Brook and Shaw, 1989), and both parents present at the time of orthodontic consultation. Exclusion criteria included evidence of tooth decay, periodontal disease, or oral mucosal lesions.

### Data collection

The impact of children's malocclusion on their life quality was assessed using the child OHRQoL questionnaire (Jokovic *et al.*, 2002). This instrument comprises two analogous components, the Child Perception Questionnaire (CPQ) and the Parental Perception Questionnaire (PPQ). In this study, the PPQ had two copies which were completed by the fathers (F) and mothers (M) and named as FPQ and MPQ, respectively. The CPQ, MPQ, and FPQ had 31 questions in common organized across four domains: oral symptoms, functional limitations, emotional well-being, and social well-being. All questions asked about the frequency of an event occurring in the past 3 months because of problems with the child's teeth, lips, jaws, or mouth. Each item is scored on a five-point Likert scale (0, 'never', to 4,

'everyday or almost everyday'). The father, mother, and child self-completed the questionnaires separately, without consultation, and at the same time.

### Data analysis

Overall COHQoL and domain scores of the FPQ, MPQ, and CPQ were derived by summing responses to items within each domain, and overall scores by summing domain scores. Possible scores for oral symptoms range from 0 to 24, for functional limitations from 0 to 36, for emotional well-being from 0 to 36, and for social well-being from 0 to 52. The possible overall CPQ scores had a range from 0 to 128. A high overall or domain score represent poor OHRQoL.

The relationship between fathers and children, and between mothers and children, was determined by comparison and correlation analyses. The former assessed agreement at the group level by comparing the mean directional differences and absolute differences, while the latter assessed agreement at an individual level by computing the ICC values.

The directional differences were produced by subtracting CPQ scores from MPQ scores, CPQ scores from FPQ scores, and MPQ from FPQ scores and then the mean of the directional differences (overall and at a domain level) were calculated. The means were then compared with zero to determine whether there were statistical differences. To examine the magnitude of systematic bias, the mean directional differences were standardized by dividing them by the standard deviation (SD) of their own value. This is similar to an effect size calculation for paired observation. The mean absolute differences were calculated by ignoring the positive and negative signs of the directional differences. In the correlation analyses, ICC values were calculated among MPQ, FPQ, and CPQ scores.

## Results

### Sample characteristics

Seventy-one pairs of parents (mother and father) and children completed the questionnaires. Forty-one (58 per cent) were girls and 30 (42 per cent) boys. The mean age of the children was 12.6 years (SD = 1.7). Parents had similar levels of educational attainment; seven mothers (9.9 per cent) and seven fathers (9.9 per cent) reported that they had received tertiary education, while 31 mothers (44 per cent) and 37 fathers (52 per cent) stated that their highest educational attainment was secondary school.

### Children-mothers' agreement

Children had significantly lower overall child OHRQoL scores than mothers (20.1 versus 26.3; Table 1). Children had lower scores across all domains compared with

**Table 1** Agreement between child- and mother-perceived questionnaire scores.

Scale	No. of items	Child		Mother		Directional differences†			Absolute differences‡			Correlations	
		Mean	SD	Mean	SD	Mean	SD	D§	Mean	SD	%	ICC	95% CI
Overall scale (0–124)	31	20.1	12.8	26.3	17.4	6.2**	18.3	0.34	14.4	12.9	12	0.38*	0.04 to 0.61
Domains													
Oral symptoms (0–24)	6	6.7	3.4	7.8	3.7	1.1*	4.2	0.26	3.3	2.8	14	0.43**	0.09 to 0.64
Functional limitation (0–28)	7	5.2	4.4	6.3	4.9	1.1	6.4	0.17	4.9	4.2	18	0.07	–0.49 to 0.42
Emotional well-being (0–32)	8	4.3	4.8	6.7	6.1	2.4**	6.4	0.38	5.3	4.3	17	0.40*	0.04 to 0.63
Social well-being (0–40)	10	3.8	4.0	5.5	5.5	1.7	6.5	0.26	4.7	4.8	12	0.32	–0.08 to 0.58

\* $P < 0.05$ ; \*\* $P < 0.01$  (paired  $t$ -test); ICC, intraclass correlation coefficient; SD, standard deviation; CI, confidence interval.

†Difference between child and mother scores (mother's score minus child's scores) accounting for the direction of differences (indicator of bias).

‡Difference between child and mother scores irrespective of the direction of differences (indicator of agreement).

§Standardized difference  $D$  = mean directional difference/standard deviation of directional differences ( $D \leq 0.2$ , small;  $0.2 < D \leq 0.5$ , moderate; and  $D \leq 0.8$ , large).

mothers, and statistically significant differences were apparent between children and mothers among the domains of oral symptoms and emotional well-being. The mean directional difference of the overall child OHRQoL scores was 6.2, and among the domains ranged from 1.1 (oral symptoms) to 2.4 (emotional well-being). Compared with zero, there were statistically significant differences in mean directional overall child OHRQoL scores ( $P < 0.01$ ), oral symptoms ( $P < 0.05$ ), and emotional well-being ( $P < 0.01$ ) domain scores. When the mean directional differences were standardized, the magnitude of the directional difference of overall child OHRQoL score was 0.34, and among the domains ranged from 0.17 (functional limitation) to 0.38 (emotional well-being). The mean absolute differences between mother and children of overall child OHRQoL scores was 14.4 (12 per cent of the possible maximum score) and among the domains ranged from 3.3 to 5.3, representing between 12 to 18 per cent difference in possible maximum domain scores.

The distribution of directional differences between mothers and children was such that mothers had higher scores than children (Table 2). Most mothers had higher overall child OHRQoL and domain scores than the children, none had exactly the same overall child OHRQoL score as their child, and rarely did they have the same domain scores. None scored all items exactly the same. The ICC values (Table 1) of mothers' and children's overall child OHRQoL score was 0.38, and among the domains ranged from 0.07 (functional limitation) to 0.43 (oral symptoms).

#### Children's–fathers' agreement

Children had significantly lower mean overall child OHRQoL scores than fathers (20.1 versus 28.0; Table 3a). In addition, children had lower scores across all domains compared

with fathers, and statistically significant differences were apparent between the scores of children and fathers, for the domains of oral symptoms, emotional well-being, and social well-being. The mean directional difference of overall child OHRQoL scores was 8.0, and among the domains ranged from 1.3 (oral symptoms) to 3.2 (emotional well-being). Compared with zero, there were statistically significant differences in mean directional overall child OHRQoL scores ( $P < 0.01$ ), oral symptom ( $P < 0.05$ ), emotional well-being ( $P < 0.01$ ), and social well-being ( $P < 0.05$ ) domain scores. When the mean directional differences were standardized, the magnitude of the directional difference of overall child OHRQoL scores was 0.43 and among the domains ranged from 0.24 (functional limitation) to 0.46 (emotional well-being). The mean absolute difference between fathers' and children's overall child OHRQoL scores was 15.4 (12 per cent of the possible maximum score), and among the domains ranged from 3.6 to 5.7, representing from 12 to 18 per cent differences in possible maximum domain scores.

The distribution of directional difference between fathers and children was such that fathers had higher child OHRQoL scores than the children (Table 2). Most fathers had higher overall child OHRQoL and domain scores than the children, only two fathers had the same overall child OHRQoL scores as their children and rarely did they have the same domain scores. None scored all items exactly the same. The ICC values (Table 3a) of fathers' and children's overall child OHRQoL score was 0.33 and among the domains ranged from 0.19 (emotional well-being) to 0.39 (oral symptoms).

#### Mother–father agreement

Fathers had higher mean overall child OHRQoL and domain scores than mothers, although not statistically significant (Table 3b). The mean directional differences between MPQ

**Table 2** Distribution of directional differences among child-perceived questionnaire (CPQ), mother-perceived questionnaire (MPQ), and father-perceived questionnaire (FPQ) scores.

Scale	MPQ > CPQ, <i>n</i> (%)	MPQ = CPQ, <i>n</i> (%)	MPQ < CPQ, <i>n</i> (%)	FPQ > CPQ, <i>n</i> (%)	FPQ = CPQ, <i>n</i> (%)	FPQ < CPQ, <i>n</i> (%)	MPQ > FPQ, <i>n</i> (%)	MPQ = FPQ, <i>n</i> (%)	MPQ < FPQ, <i>n</i> (%)
Overall scale	45 (73.4)	0 (0)	26 (36.6)	42 (59.2)	2 (2.8)	27 (38.0)	33 (46.5)	4 (5.6)	34 (47.9)
Domains									
Oral symptoms	40 (56.3)	7 (9.9)	24 (33.8)	37 (52.1)	8 (11.3)	26 (36.6)	28 (39.4)	12 (16.9)	31 (43.7)
Functional limitation	37 (52.1)	7 (9.9)	27 (38.0)	39 (54.9)	7 (9.9)	25 (35.2)	29 (41.2)	7 (9.9)	35 (49.3)
Emotional well-being	42 (59.1)	7 (9.9)	22 (31.0)	41 (57.7)	11 (15.5)	19 (26.8)	29 (40.8)	9 (12.7)	33 (46.5)
Social well-being	35 (49.3)	8 (11.3)	28 (39.4)	38 (53.5)	8 (11.3)	25 (35.2)	27 (38.0)	12 (16.9)	32 (45.1)

and FPQ overall scores was 1.8 and ranged from 0.2 (oral symptom and functional limitation) to 0.8 (emotional well-being) among the domains. Compared with zero, there were no statistically significant differences in mean directional overall child OHRQoL and domain scores. When the mean directional differences were standardized, the magnitudes of the directional differences of overall child OHRQoL score was 0.09, and among the domains ranged from 0.04 (oral symptoms and functional limitation) to 0.11 (emotional well-being). The mean absolute differences between overall child OHRQoL

score of mothers and fathers was 15.8 (13 per cent of the possible maximum score), and among the domains ranged from 13 per cent (social well-being) to 18 per cent (emotional well-being) of the possible maximum domain scores.

The distribution of directional differences between mothers and fathers was such that in four cases mothers and fathers had similar overall or domain scores. The proportion of mothers who overestimated the report of the fathers was similar to those who underestimated the report of the fathers. For example, in 47.9 per cent of cases the fathers' overall

**Table 3** Agreement between (a) child- and father-perceived questionnaire scores and (b) mother- and father-perceived questionnaire scores.

Scale	No. of items					Directional differences†			Absolute differences‡			Correlations	
		Mean	SD	Mean	SD	Mean	SD	<i>D</i> §	Mean	SD	%	ICC	95% CI
(a)		Child		Father									
Overall scale (0–124)	31	20.1	12.8	28.0	17.3	8.0**	18.3	0.43	15.4	12.6	12	0.33*	–0.07 to 0.58
Domains													
Oral symptoms (0–24)	6	6.7	3.4	7.9	3.8	1.3*	4.3	0.30	3.6	2.6	15	0.39*	0.02 to 0.62
Functional limitation (0–28)	7	5.2	4.4	6.5	4.3	1.3	5.5	0.24	4.3	3.5	15	0.33*	–0.08 to 0.59
Emotional well-being (0–32)	8	4.3	4.8	7.6	6.1	3.2***	7.0	0.46	5.7	5.1	18	0.19	0.29 to 0.57
Social well-being (0–40)	10	3.8	4.0	6.1	6.2	2.3*	6.2	0.37	4.8	4.5	12	0.28	–0.16 to 0.55
(b)		Mother		Father									
Overall scale (0–124)	31	26.3	17.4	28.0	17.3	1.8	20.8	0.09	15.8	13.4	13	0.45***	0.12 to 0.66
Domains													
Oral symptom (0–24)	6	7.8	3.7	7.9	3.8	0.2	5.1	0.04	4.0	3.1	17	0.13	–0.40 to 0.45
Functional limitations (0–28)	7	6.3	4.9	6.5	4.3	0.2	5.6	0.04	4.3	3.5	15	0.41*	–0.05 to 0.63
Emotional well-being (0–32)	8	6.7	6.1	7.6	6.1	0.8	7.3	0.11	5.7	4.7	18	0.43*	0.08 to 0.64
Social well-being (0–40)	10	5.5	5.5	6.1	6.2	0.6	7.1	0.08	5.3	4.7	13	0.45***	0.13 to 0.66

\* $P < 0.05$ ; \*\* $P < 0.01$  (paired *t*-test); ICC, intraclass correlation coefficient; SD, standard deviation; CI, confidence interval.

†Difference between child/mother and father scores (father's score minus child's/mother's scores) accounting for the direction of differences (indicator of bias).

‡Difference between child/mother and father scores irrespective of the direction of differences (indicator of agreement).

§Standardized difference  $D$  = mean directional difference/SD of directional differences ( $D \leq 0.2$  small,  $0.2 < D \leq 0.5$  moderate, and  $D \geq 0.5$  large).



scores were larger than the mothers' scores and in 46.5 per cent of cases the fathers' scores were less than the mothers' scores (Table 2). Mothers and fathers never scored all items exactly the same. The ICC values (Table 3a) of mothers' and fathers' overall child OHQoL score was 0.45, and among the domains ranged from 0.13 (oral symptoms) to 0.45 (social well-being).

## Discussion

In general, children are considered unreliable respondents who lack the linguistic and cognitive skills to understand and respond to questionnaires about abstract phenomena, such as quality of life (Eiser and Morse, 2001). However, child development psychologists argue that children have the ability for abstract thinking and self-concept from an early age, 6 years, which gradually develops through middle childhood, such that by 9 years of age children can express anxieties and appearance concerns and by 12 years of age can clearly understand complex emotions such as worry, shame, and jealousy, and their self-concept acquires sophisticated dimensions such as romantic appeal and popularity with peers (Bee, 1998; Eiser and Morse, 2001).

If it is assumed that a child provides more accurate reports of their oral health status on the basis of the subjective nature of child OHRQoL, then the findings of this study suggest that both mothers and fathers tend to rate their children's child OHRQoL as poorer (higher scores on this particular scale relative to their children). This is consistent with some reports (Ennett *et al.*, 1991; Matza *et al.*, 2004), but contrary to others (Landgraf and Abetz, 1997; Jokovic *et al.*, 2003). Interestingly, mothers and fathers overestimated the impact of malocclusion on all domains except oral functional limitation. This means the differences between parents and children were less in observable physical functioning and greater in non-observable functioning, such as emotional and social well-being. This finding is supported by other studies (Achenbach *et al.*, 1987; Varni *et al.*, 1999). Moreover, the findings suggest that mothers and fathers overestimate their child's perception of their oral health status by a similar amount.

The standardized directional difference indicates systematic bias and is similar to an effect size calculation for paired observation. A standardized difference of 0.2 can be taken to indicate small bias, 0.5 moderate bias, and 0.8 large bias (Cohen, 1988). The standardized directional differences (systematic bias) between mothers' and children's scores could be interpreted, for the most part, as being moderate, except with respect to functional limitation where it was small. Systematic bias was greatest with respect to emotional well-being, as reported by Achenbach *et al.* (1987) and Theunissen *et al.* (1998). There was little evidence of systematic bias between fathers' and mothers' reports.

The distribution of directional difference between parents (mothers and fathers) and children also indicated that parents

tend to overestimate children's own perceptions. In addition, approximately equal proportions of mothers overestimated the fathers' reports and underestimated their own. Rarely did they have similar scores and in no case was there absolute agreement, i.e. the same score for every item.

It is difficult to interpret absolute differences between the scores of the children and those of their parents (fathers and mothers), since there are no general rules or particular statistical tests for this type of data. Nevertheless, it is common to interpret absolute differences in scores relative to the maximum obtainable score. The findings of this study suggest that absolute differences in overall scores between fathers and children, mothers and children, and between mothers and fathers was greater than 10 per cent of the maximum obtainable score, and among the domains approached a 20 per cent difference of the maximum obtainable score.

In summary, the findings for mean directional difference, the distribution of directional difference, the standardized difference, and the absolute difference indicates that at the group level there is considerable disagreement between parents' and children's reports. This suggests that where the unit of analysis is the 'group' as is the case in research, audit and public health practice, parents' views should be considered as complementary rather than as an alternative. In addition, the findings at the group level indicate considerable agreement between mothers' and fathers' opinions, suggesting that either the views of the mother or father can be used when considering parental views, and thus are alternative views. In other words, in research, audit, and public health practice assessment, 'a' parent's view with respect to child OHRQoL is required as it is an additional source of such information, but that either of the parent's views (the mother or father) would suffice.

At the individual level, ICC values were used to assess agreement among father, mother, and child at the individual family unit. The standard of agreement strength for ICC can be interpreted as: <0.2, poor; 0.21–0.40, fair; 0.41–0.60, moderate; 0.61–0.80, substantial; and 0.81–1.0, excellent to perfect (Nelson *et al.*, 1990). In this study, the agreement among mothers', fathers', and children's overall and domains scores could be categorized as poor to fair. Conversely at the group level, fathers' and mothers' reports had good agreement, while at the individual level the ICC values indicated poor agreement. This was confirmed by examining the raw data and illustrates the case in point of differences between the group and the individual unit level. These findings suggest that at the individual level of analyses, as in the case of a family unit, not only are parents' views distinct from child's own reports but also the view of the mother and father are different. This has implications in clinical practice where the impact of malocclusion on life quality is being considered. In assessing treatment need, treatment planning and evaluating the outcome of intervention for an individual child and then the views of the children and both parents' views should be ascertained.

# Conclusion

At both a group and individual family unit (mother–father–child) level, there was a poor agreement between parents and their children. At the group level, the level of disagreement between mothers and children was similar to that between fathers and children. At the individual level (family unit), mothers and fathers tended to disagree on their child's OHRQoL.

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