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What do children's global ratings of oral health and well-being measure?

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Abstract – *Objectives:* To explore the constructs children incorporate in the responses to global ratings of their oral health (OH) and OH-related overall well-being (OWB). *Methods:* Data were collected as part of a project to validate the Child Perceptions Questionnaire for ages 11–14 (CPQ_{11-14}), a self-report measure of OH-related quality of life. Its 37 questions are organized in the symptoms, functional limitations, emotional and social well-being domains. Children were recruited from paediatric dentistry, orthodontic and orofacial dental clinics. To identify the CPQ_{11-14} domain scores and questions predicting the global ratings, correlation and multiple regression analyses were used. *Results:* Of the 123 children, 22.8% rated their OH as 'Fair/Poor' and 30.1% reported that their OWB was affected by their oral/orofacial condition. Positive significant correlations were observed between the OH ratings and the CPQ_{11-14} oral symptoms and emotional well-being domains, and between the OWB ratings and all four CPQ_{11-14} domains. The number of the CPQ_{11-14} questions significantly correlated with the OH and OWB ratings were 8 and 19, respectively. Only the symptoms domain entered the model for the OH ($R^2 = 0.05$), while age, functional limitations and emotional well-being domains predicted the OWB ($R^2 = 0.18$). The OH model included three questions ($R^2 = 0.13$) and the OWB model included age and six questions ($R^2 = 0.25$). In both models all but one of the questions came from the emotional and social well-being domains. *Conclusions:* These findings suggest that children view OH and its impact on well-being as multidimensional concepts. Further research, including qualitative studies, is needed to better understand the referents children use when responding to global ratings and the factors that determine their responses.

Key words: child; global ratings; oral health; quality of life

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Theory and research in psychology indicate a continual process of cognitive, emotional, social and language development throughout childhood (1, 2). The age of 6 marks a shift from concrete to more abstract thinking. Children start to compare their physical features and personality traits with those of other people or a norm. By the age of 11 or 12, their self-concept acquires various dimensions such as romantic appeal and popularity with peers.

Between the ages of 6 and 8 significant advances in children's concept of health appear (3). From an understanding of health as a series of health practices in 6-year-olds, it evolves to an understanding of health as a set of somatic and emotional symptoms in 8-year-olds (3, 4). Gradually, children develop the ability to use a wider spectrum of internal cues to identify their illness. By the age of 11 or 12, they view health as a multidimensional concept organized around the following constructs: being functional, adhering to good lifestyle behaviours, a general sense of well-being and relationships with others (4). How these concepts are

operationalized varies by age and by the types of experiences to which children are exposed in their lives (4).

Around the age of 8, children also begin to perceive the impact of their ill-health on social activities and relationships. Also, a global judgment of self-perception and self-worth seems to appear (1, 2). This means that children become able to answer questions about how they like themselves and their lives.

This indicates that starting at the age of 8 children can be asked to assess both health status and health-related quality of life by means of one question. Clearly, they need to be phrased to accommodate children's age-dependent understanding of health and well-being.

Single-question measures are known as global ratings. They ask either about current health (global ratings) or about current health relative to a previous occasion (global transition ratings). They have the advantage over multi-item measures in that they place a minimal demand on respondents' time. The brevity of global questions is also their main disadvantage, as the summary answers do not provide information about aspects of health compromised by the disease/disorder. Consequently, they cannot be used for clinical decision-making purposes, i.e. treatment and rehabilitation planning. Similarly, global transition ratings do not reveal the opposing trends in different dimensions of health, if such occur. This is something of obvious interest in the context of intervention studies as they may entail unwanted outcomes of the treatment (e.g. medication side effects) in addition to the intended positive outcomes.

Nevertheless, global ratings are widely used in health services research. There is evidence to suggest that they provide a summary of how people perceive their health so that they may be as useful as more complex multi-item scales and indexes (5). There is also research indicating that they are powerful predictors of the use of health services, functional decline and survival (6, 7). As summary indicators they are often used as the 'gold standard' in testing the cross-sectional and longitudinal construct validity of measures of health-related quality of life and determining the minimal clinically important difference in their scores. The latter has a role in establishing the responsiveness of evaluative measures (8, 9).

It is not clear what frame of reference people use when rating their oral health (10). Quantitative and qualitative research on adults' assessments of their general health has indicated that different concepts are reflected in the answers to these questions (11–13). While some refer to their physical state, others refer to their emotional state; some base their rating on comparisons with others who are similar in age and gender and some according to behaviours that promote or compromise health. The referents that children use in rating their either general or oral health have not been studied so far.

Consequently, we conducted a study to explore the concepts that children integrate into their responses to global ratings of oral health and the extent to which oral conditions affect overall well-being. Data were collected as part of a project to validate the Child Perceptions Questionnaire for children aged 11–14 years (CPQ_{11-14}) (14).

Material and methods

Participants

Participants in the study were children aged 11–14 years. Convenience samples were recruited from patient populations attending clinics at the Faculty of Dentistry, University of Toronto; The Hospital for Sick Children, Toronto; and the City of Toronto Public Health Services. Children with dental diseases (primarily caries), malocclusions and orofacial conditions (primarily cleft lip and/or palate) were selected. They are referred to here as a paediatric dentistry group, an orthodontic group and an orofacial group, respectively. The inclusion criteria were fluency in English, absence of systemic and/or developmental disorders, and restorative/orthodontic treatment not started or in its early stages.

The study was approved by the Human Subjects Certification Committee, University of Toronto, the Research Ethics Board, The Hospital for Sick Children, Toronto and the Education and Research Office, Toronto Public Health Services. A parental written consent was obtained prior to seeking a child's verbal assent. A child's dissent superseded the parental consent.

Data collection

Data were collected using the Child Perceptions Questionnaire for children between the ages of 11 and 14 (CPQ_{11-14}) (14). This forms one component of the Child Oral Health Quality of Life Questionnaire that was designed to assess the impact of oral and orofacial conditions on the functional,

emotional and social well-being of 6–14-year-old children and their families (14–17). Children completed the questionnaire at the time of their visits to the clinics from which they were recruited.

The CPQ_{11-14} conforms to contemporary concepts of child health. It is a self-complete questionnaire consisting of 37 questions organized into four health domains: (i) oral symptoms ($n = 6$), (ii) functional limitations ($n = 9$), (iii) emotional well-being ($n = 9$) and (iv) social well-being ($n = 13$). The latter encompasses three subdomains: schooling, peer interactions and leisure activities. All questions ask about the frequency of events in the previous 3 months in relation to the child's oral/orofacial condition. For example: 'In the past 3 months, how often have you: … had trouble sleeping; … felt unsure of yourself; … missed school; … been teased or called names by other children; … avoided taking part in activities like sports, clubs, trips … because of your teeth, lips, jaws or mouth?' The response options and associated response codes are: 'Never' = 1; 'Once/twice' = 2; 'Sometimes' = 3; 'Often' = 4; 'Everyday/almost everyday' = 5. The domain scores were calculated by summing the response codes for their questions. The questionnaire and its domains have demonstrated good measurement sensitivity, validity and reliability (9).

The CPQ_{11-14} also contains global ratings of the child's oral health (OH) and the extent to which the oral/orofacial condition affected his/her overall well-being (OWB). They precede the multi-item scales in the questionnaire. These questions are worded as follows: 'Would you say that the health of your teeth, lips, jaws and mouth is …' and 'How much does the condition of your teeth, lips, jaws or mouth affect your life overall?' These global ratings had a five-point response format ranging from 'Excellent' = 0 to 'Poor' = 5 for oral health, and from 'Not at all' = 0 to 'Very much' = 5 for well-being, respectively.

Data analysis

The associations between the global ratings and the CPQ_{11-14} domain scores were determined using Spearman's rank correlation and multiple linear regression analyses (MLR). These procedures were also used to assess the associations between the global ratings and the items comprising the CPQ_{11-14}. Linear regression is an appropriate approach when the dependent variable is ordinal if the assumptions of linear regression analysis are fulfilled (18). Only those variables showing significant bivariate associations with the global ratings were used as predictor variables. Age and gender were also included in MLRs. Backward procedures were used to build the models since the variables they select from a set of variables that theoretically may be related to the dependent variable are those that best explain that dependent variable (19). This technique is also better than other model building approaches for assessing suppresser effects (18).

Results

Sample characteristics

Data were collected from 123 children, 66 boys and 57 girls. There were approximately equal numbers of 11-, 12-, 13- and 14-year-olds.

Global ratings of oral health and overall well-being

Of the 123 children, 22.8% rated their oral health as 'Fair/Poor' and 30.1% reported that their overall well-being was 'Some/A lot/Very much' affected by their oral/orofacial condition (Table 1). The Spearman's rank correlation between the two ratings was 0.26 ($P < 0.01$). This significant but weak association was also found when the global ratings were dichotomized and subjected to chi-squared test. One-quarter (25.3%) of those rating their OH as 'Excellent/Very good/Good' reported that it affected their life overall, while just over half (53.6%) of those rating their OH as 'Fair/Poor' reported that it had little or no effect on their well-being.

While there was no gender difference in reporting the effects on OWB, the boys were more likely

Table 1. Responses to the global ratings of oral health and overall well-being ($n = 123$)

Global rating	%
Oral health	
Excellent	8.9
Very good	22.0
Good	46.3
Fair	18.7
Poor	4.1
Overall well-being (affected)	
Not at all	19.5
Very little	50.4
Some	23.6
A lot	5.7
Very much	0.8

Table 2. Rank correlations (ρ^a) between the ratings of oral health and overall well-being and the CPQ_{11-14} domain scores

Global rating:	Oral health				Overall well-being			
CPQ_{11-14} domain:	OS	FL	EW	SW	OS	FL	EW	SW
All children	0.24**	0.08	0.23*	0.15	.35***	0.25**	0.43***	0.28**
Gender								
Boys	0.11	0.09	0.22	0.11	0.28*	0.22	0.48**	0.29*
Girls	0.31*	0.01	0.23	0.19	0.43**	0.25	0.35**	0.27*
Age (years)								
11 and 12	0.19	0.08	0.17	0.10	0.41**	0.33**	0.47**	0.37**
13 and 14	0.34*	0.10	0.32*	0.22	0.22	0.11	0.37**	0.15

OS, oral symptoms; FL, functional limitations; EW, emotional well-being; SW, social well-being.
[a]Spearman's correlation coefficient.
*$P < 0.05$; **$P < 0.01$; ***$P < 0.001$.

than the girls to rate their oral health as 'Fair' or 'Poor' (31.8% versus 12.3%, $P < 0.05$). The age of the child was not associated with either of the global ratings.

Associations between the global ratings and the CPQ_{11-14} domain scores and items

Positive significant correlations were observed between the ratings of OH and the oral symptoms and emotional well-being domain scores. They were also positive and significant between the ratings of OWB and the scores for all CPQ_{11-14} domains (Table 2). The Spearman's correlation coefficients were higher for the rating of OWB than the rating of OH. Both global ratings were more strongly associated with the oral symptoms and emotional well-being than the functional limitations and social well-being domain scores (Table 2). The strength of these associations differed across genders and ages but was not consistently higher in any of these groups.

The global rating of OWB was associated with eight CPQ_{11-14} items: three from the oral symptoms domain; three from the emotional well-being domain; and two from the social well-being domain (Table 3). The Spearman's correlation coefficients (ρ) ranged from 0.18 to 0.26. The global rating of OWB was associated with 19 CPQ_{11-14} items: three from the oral symptoms domain; four from the functional limitations domain; seven from the emotional well-being domain; and five from the social well-being domain ($\rho = 0.19$–0.41).

Table 3. Significant rank correlations (ρ^a) between the global ratings and the CPQ_{11-14} questions

Item	Domain	ρ
Global rating of oral health		
Bleeding gums	OS	0.20*
Bad breath	OS	0.21*
Trouble drinking/eating hot/cold foods	FL	0.18*
Feeling shy/withdrawn	EW	0.18*
Concerned what people think	EW	0.26**
Felt less attractive than others	EW	0.24**
Argued with other children/family	SW	0.24**
Left out by other children	SW	0.21**
Global rating of overall well-being		
Pain in the teeth	OS	0.21*
Mouth sores	OS	0.26**
Bad breath	OS	0.27**
Slow eating	FL	0.24**
Difficulty chewing	FL	0.24**
Trouble sleeping	FL	0.22**
Trouble eating foods would like to eat	FL	0.20*
Feeling irritable/frustrated	EW	0.41**
Feeling shy/withdrawn	EW	0.31**
Concerned what people think	EW	0.29**
Felt less attractive than others	EW	0.23*
Upset	EW	0.24**
Nervous or afraid	EW	0.21**
Feel different from others	EW	0.34**
Missed school	SW	0.20*
Avoid speaking in class	SW	0.27**
Avoid talking to other children	SW	0.24**
Avoid smiling	SW	0.20*
Argued with other children/family	SW	0.19*

OS, oral symptoms; FL, functional limitations; EW, emotional well-being; SW, social well-being.
[a]Spearman's correlation coefficient.
*$P < 0.05$; **$P < 0.01$.

Results of the multiple regression analyses

The only domain score that remained in the model predicting the OH global rating was oral symptoms. The associated regression coefficient indicated that those reporting more symptoms rated their oral health less favourably ($\beta = 0.212$; $P < 0.05$). Neither gender nor age remained in the model. The amount of variation explained was low ($R^2 = 0.045$). The model predicting the OWB

Table 4. Results of regression analyses: CPQ_{11-14} questions predicting the global ratings of oral health and overall well-being ($n = 123$)

	Domain	β	P-value
Dependent variable: Global rating of oral health[a]			
CPQ_{11-14} question:			
Bad breath	OS	0.157	0.091
Concerned what other people think	EW	0.173	0.056
Argued with other children/family	SW	0.164	0.078
Dependent variable: Global rating of overall well-being[b]			
CPQ_{11-14} question:			
Not able to eat food would like to eat	FL	0.150	0.074
Felt frustrated/irritable	EW	0.200	0.043
Concerned what other people think	EW	0.157	0.083
Upset	EW	−0.192	0.084
Nervous/afraid	EW	0.238	0.018
Argued with children/family	SW	0.160	0.075
Age		0.173	0.039

[a] $R^2 = 0.125$; $F = 5.74$; $P < 0.01$.
[b] $R^2 = 0.254$; $F = 5.59$; $P < 0.001$.

global rating contained age ($\beta = 0.173$, $P < 0.05$) and two CPQ_{11-14} domain scores: functional limitations ($\beta = 0.219$; $P < 0.05$) and emotional well-being ($\beta = 0.239$, $P < 0.05$). This suggests that older children were more likely to report an effect of oral disease/disorder on their lives as a whole. The R^2 value of this model was 0.180.

Table 4 shows the results when the CPQ_{11-14} questions were used as the independent variables in MLRs. The model predicting the rating of OH contained three questions that explained 12.6% of the variation: one concerned about oral symptoms; one about emotional well-being; and one about social well-being. Neither gender nor age entered this model. The model predicting the OWB rating retained seven variables: six questions (one from the functional limitations domain; four from the emotional well-being domain; one from the social well-being domain) and age. The associated R^2 was 0.254. All regression coefficients were positive except for one emotional well-being question ('Upset') that had a negative coefficient.

Discussion

This study was undertaken as a preliminary exploration of the referents that children use when responding to global questions concerning their perceptions of oral health and its effects on overall well-being. It was achieved by examining the relationships between the answers to these questions and data collected using the COHQoL Child Perceptions Questionnaire for children aged 11–14 years (CPQ_{11-14}).

The CPQ_{11-14} was designed to measure the impact of various oral and orofacial diseases and disorders on children aged 11–14 years (14). It consists of questions that encompass four health domains: oral symptoms, functional limitations, emotional and social well-being. The development process ensured that this questionnaire does not assess only experiences that are related to disease/disorder but also the extent to which these experiences compromise the individual's quality of life. This was accomplished by selecting from the initial item pool those questions that concern problems that are not only the most frequently reported by children but also create the most bother for them (14). The CPQ_{11-14} has demonstrated good validity and excellent reliability in the population included in the research presented here.

Correlation analysis was used to examine the associations between the global ratings and the CPQ_{11-14} domain scores and questions, and multiple linear regression analyses were used to identify the CPQ_{11-14} domain scores and questions that predicted the global ratings. As the correlation analyses suggested that the global ratings provided by children in the study appear to be gender and age dependent, these variables were included in the multiple regression analyses.

The results generated by these analyses provide some preliminary evidence to suggest that 11–14-year-old children view the health of their teeth and mouth and their oral health-related quality of life as multidimensional concepts. Three CPQ_{11-14} domains were found to account for the variability in the responses to global ratings. Further, questions from all four domains comprising the measure entered one or other of the models predicting the global ratings.

These data also suggest that the terms health and well-being may represent different constructs for these respondents. First, the correlation between the two global ratings was significant but low ($\rho = 0.26$). Second, while the oral symptom score was the only domain score to enter the model for oral health, the functional limitations and emotional well-being domain scores were predictors of overall well-being. Third, more questions remained in the model for OWB than OH and accounted for

more variability in the dependent variable. However, that the two constructs are not entirely distinct is suggested by the fact that the models using questions as predictors were similar in that in both all questions but one came from the emotional and social well-being domains and two of the three remaining in the model for OH also contributed to the model for OWB. These two questions concerned self-esteem/self confidence ('Concerned what other people think') and social conflict ('Argued with other children or family members'). Other items in the OWB model ('Feeling nervous/afraid'; 'Feeling irritable/frustrated') also point to self-confidence and conflict as important aspects of these children's lives.

One finding that is difficult to interpret is the negative coefficient associated with the question 'Feeling upset' in the OWB model. However, collinearity diagnostics suggested that this question was problematic in terms of its association with a linear combination of the other independent variables. When it was dropped from the model, there was virtually no loss of explanatory power.

Our findings regarding the referents predicting the global ratings used in this study are consistent with the literature on the psychological and social development of children, as summarized in the introduction. That is, children aged 11–14 years are able to respond to questions concerning their health status and its effects on their lives overall, and to make judgements concerning their emotional states and relationships with others related to their health. The results also support the view that, at this age, peer relationships are important components of their quality of life.

According to the contemporary model of disease/disorder and its consequences (5, 20), the health and health-related quality of life outcomes experienced by an individual are not determined only by the nature and severity of the disease/disorder but also by the personal characteristics and the characteristics of the physical and social environment. Children's understandings of complex concepts such as health and well-being are also affected by variables such as gender, age and the age-related experiences to which they are subject. However, the relatively small sample size and the difficulty of fitting models for each age/gender group did not allow us to explore if these factors had an effect on children's responses to the global questions used in this study. However, the model explaining the global rating of OWB included age and indicated that the older children experienced more impact on their lives as a whole as a result of oral diseases and disorders.

The sample size was not large enough either to determine if the predictors of the global ratings varied according to the clinical condition affecting the children included in the study. It is not unreasonable to suggest that the different clinical conditions represented here have distinct characteristics that affect children's experiences and that, in turn, these experiences shape their conceptions of health and well-being. It is also the case that the age of onset of the three conditions affecting the children in this study differs, with cleft lip and/or palate being present from birth and dental and orthodontic conditions appearing later in childhood. Moreover, the nature of the treatment experiences varies between these groups. Further study is needed to address these issues. This points to a further limitation of the study. The sample in this study did not include children who are free of dental and/or oral disorders. Whether or not conceptions of oral health and its effects on well-being among healthy children differ from those reported here is also worthy of further research. Conversely, children whose lives are affected by oral disorders may be better placed than healthy children to report on the referents that inform their judgements of health and well-being.

Overall, the results presented in this paper are preliminary findings based on quantitative data obtained from a convenience sample. Consequently, additional research is required to verify our findings and to explore variations in child global ratings according to their personal, social and clinical characteristics. Further, to better understand the content areas that are reflected in children's answers to global ratings of their oral health and its impact on daily life and activities, research based on qualitative methods is necessary. While quantitative work can produce useful insights, it does have some limitations (12). First, the functional and psychosocial predictors entering the models are those that are contained within the $CPQ_{(11-14)}$ and may not fully encompass the referents children use in ratings of health and well-being. For example, they do not include items concerning health behaviours or questions that would have enabled us to determine if children compare themselves with others in making self-evaluations. The omission of these factors from the analysis may explain why the R^2 values associated with the models were relatively low (12). Second, in quantitative research the global ratings and their

presumed underlying referents are linked statistically rather than being linked specifically in children's accounts of their health and quality of life. Consequently, qualitative research, in which children can be asked to explain why they rate themselves in particular ways, is needed in order to be certain that the kinds of social and emotional issues described here do in fact inform children's conceptions of oral health and well-being.

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