Original Article

Comparison of two survey instruments measuring quality of life in pediatric dentofacial patients

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ABSTRACT

Objectives: (1) To assess the effectiveness of the Orthognathic Quality of Life Questionnaire (OQLQ) and the Child Oral Health Impact Profile (COHIP) to detect differences in Oral Health-Related Quality of Life (OHRQoL) between pediatric patients with dentofacial deformities and controls. (2) To assess for correlations between scores from the OQLQ and COHIP domains with the type and severity of the skeletal mal-relationship. (3) To assess if the COHIP and OQLQ were identifying unique or overlapping OHRQoL concerns.

Materials and Methods: Subjects were under age 18, presented with a dentofacial deformity, and completed both surveys. Matched controls completed the same. Severity for conditions was recorded via overjet, overbite, and ANB values and subjects were classified as skeletal Class I, II, or III.

Results: Enrollment yielded 30 subjects and 31 controls. For the OQLQ, significant differences between subjects and controls were found for the Facial Esthetics domain, Oral Function domain, and total score. For the COHIP, significant differences were found for the Social/Emotional Well-Being and Self-Image domains plus total score. There were no significant correlations between the severity of the condition as measured by overjet and reported OHRQoL for any domains.

Conclusions: The OQLQ and COHIP are effective at detecting significant OHRQoL differences between pediatric patients with dentofacial deformities and controls. Although there is some overlap in the results, the instruments appear to identify different OHRQoL concerns. (*Angle Orthod.* 2021;91:371–376.)

KEY WORDS: Orthognathics; Quality of life

INTRODUCTION

Individuals with facial skeletal relationships that deviate severely from the norm are said to have a dentofacial deformity.[1] These are present in approximately 2.5% of the U.S. population and in about 5% of individuals seeking orthodontic treatment.[2,3] Ideal treatment for patients with a dentofacial deformity calls for orthodontic treatment to optimally position teeth within each jaw and orthognathic surgery to address the underlying skeletal discrepancy.

Patients with a dentofacial deformity may suffer physical and psychological consequences as a result of their condition and how they and others perceive their appearance. Esthetics is the most commonly cited reason for these patients seeking treatment and these self-image concerns can have a negative psychological effect.[4,5] Individuals with dentofacial deformities report increased levels of stress, reduced self-esteem, and increased difficulty navigating social interactions.[4,5] Some evidence suggests that the severity of the skeletal mal-relationship correlates with the prevalence of psychological problems.[6] Physical concerns are the second most common reason for this population to seek treatment and include reduced occlusal function,

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difficulty speaking, airway issues, and pain associated with the temporomandibular joint.[7,8]

Physical and psychological conditions experienced by patients with dentofacial deformities can negatively affect quality of life, which is a broad term used to describe how people perceive their position in life in the context of health, finances, and other factors their culture deems important.[9] Healthcare fields have broadened their focus to include health-related quality of life (HRQOL), which can be thought of as the effect of a medical condition and/or its consequent therapy upon a patient's ability to carry out the tasks of everyday life.[10,11] HRQOL is subjective and multidimensional and includes physical and occupational function, psychological state, social interaction, and somatic sensation.[11] In the past few decades, the more specific term, Oral-Health Related Quality of Life (OHRQoL), has emerged in the literature in studies seeking to understand how oral health (which is composed of the presence/absence of oral disease, ability to function, esthetics of the craniofacial area, and so on) affects quality of life. The World Health Organization now recognizes the term as part of their Global Oral Health Program.[12]

One example of a tool to measure OHRQoL is the Orthognathic Quality of Life Questionnaire (OQLQ) developed by Cunningham et al. to measure quality of life outcomes in patients with dentofacial deformities; it is a "condition-specific" instrument. [13] It contains 22 questions resulting in a score range of 0–88 with a higher score indicating poorer quality of life. The instrument is reliable and consists of four clinically meaningful domains: (1) Social Aspects of the Deformity; (2) Facial Esthetics; (3) Oral Function; and (4) Awareness of Facial Deformities.[13] The OQLQ showed good evidence of validity and responsiveness.[14] It was not designed for a specific age group and has been administered to adult and pediatric patients.

The Child Oral Health Impact Profile is a valid and reliable instrument designed to assess OHRQoL in school-aged pediatric populations.[15,16] A short-form version of the questionnaire (COHIP-SF 19, henceforth denoted as COHIP) has been released.[17] It contains 19 questions at a grade 3.2 readability level broken down into five domains: (1) Oral Health; (2) Functional Well-Being; (3) Social/Emotional Well-Being; (4) School Environment; and (5) Self-Image.[17] The COHIP also contains a 20th question asking the subject to rate his/her overall health but the answer is not reflected in any of the individual domain scores. A higher COHIP score indicates better OHRQoL. The COHIP is not "condition specific" and has been administered in pediatric dental, orthodontic, and cleft lip/palate patient populations including patients who were at least 18 years old, but has not been used extensively in patients with dentofacial deformities.[17] Because dentofacial deformities become apparent during the adolescent growth spurt, these individuals often present for treatment as pediatric patients.

The aims of this study were (1) to assess the effectiveness of the OQLQ and COHIP to detect differences in OHRQoL between pediatric patients with dentofacial deformities and controls with no apparent facial/skeletal mal-relationship, (2) to assess for any correlations between reported OHRQoL from the OQLQ and COHIP domains with the type and severity of the skeletal mal-relationship, and (3) to assess if the COHIP and OQLQ are identifying unique or overlapping OHRQoL concerns.

MATERIALS AND METHODS

The Ohio State University Institutional Review Board approved this project. Pediatric patients (defined as under age 18) with a dentofacial deformity were eligible for enrollment. Subjects completed both the OQLQ and COHIP questionnaires prior to starting any treatment. Inclusion criteria were: assent of the subject and signed consent of a parent or guardian, ability to communicate in English and complete the questionnaires, a treatment plan option that included combined orthodontics and orthognathic surgery, and a dentofacial deformity that was not the result of trauma or any genetic/developmental condition. Controls were recruited from a pediatric dental clinic and from a university campus. Individuals were eligible for enrollment if they did not have a marked appearance of a dentofacial deformity and were not actively undergoing orthodontic treatment. Controls were matched to subjects for age, gender, employment, and educational level. Subjects and controls received a $10 gift card as compensation for the time needed to answer the questionnaires only. There were no radiographs taken in the control group.

Demographic information of age, gender, education level, and employment status were obtained for subjects and controls. The severity of the dentofacial deformity was evaluated for subjects using digitized lateral cephalograms (Dolphin Imaging 11.9, Dolphin Imaging, Chatsworth, CA). The following measurements were recorded: overjet (mm), overbite (mm), and ANB angle (degrees). All patients were classified as skeletal Class I, II, or III based on their ANB values compared to racial norms. An ANB within the normal range was considered Class I, an ANB increased by more than one standard deviation Class II, and an ANB decreased by more than one standard deviation Class III.

Sample size determination was based upon OQLQ, the instrument with higher variability. With an alpha risk

Table 1. Demographics of Subjects and Controls[a]

	Mean Age (years + SD)	Gender (in numbers)		Education Level, %[b]		Employment Status, %		Randomization Test for Age	Chi-Squared Test for Gender	Kruskal-Wallis Test for Education Level	Chi-Squared Test for Employment Status
		M	F	A	B	Yes	No				
Subjects (n = 30)	16.1 ± 2.4	10	20	86.7	13.3	10	90	$P = .868$	$P = .786$	$P = .154$	$P = .106$
Controls (n = 31)	16.0 ± 2.7	9	22	96.8	3.2	29	71				

[a] F indicates female; M, male; SD, standard deviation.
[b] A = current grade level between 0 and 12; B = completion of high school.

and power of 0.05 and 0.85, respectively, a sample size of 28 per group (subjects and controls) was required to demonstrate a difference of ±16 in total score.[18] Descriptive and inferential statistics were used to assess for differences between subjects and controls for age, sex, employment status, and education level. Multiple Wilcoxon-Mann-Whitney tests were used to detect differences between subjects and controls for each of the domains and total scores for both surveys with *P* values adjusted using the step-down Holm-Bonferroni method. Correlation matrices were used to assess correlations between total scores and scores for each domain of both indices. Two matrices were run: subjects only and controls only. Raw *P* values for all correlation tests were not adjusted for multiple comparisons and should be interpreted as preliminary. Data analysis was performed using statistical software (SAS/STAT, version 9.4, SAS Institute Inc., Cary, NC).

RESULTS

There were 30 subjects with dentofacial deformities and 31 controls. The mean subject age was 16.1 years (20 females, 10 males). There were no significant differences between subjects and controls for age, gender, education level, and employment status (Table 1).

For the OQLQ, there were significant differences (Table 2) between subjects and controls for the Facial Esthetics and Oral Function domains as well as total score ($P = .004$, $P = .019$, and $P = .019$, respectively). For COHIP, there were significant differences in the Social/Emotional Well-Being and Self-Image domains and total score ($P = .028$, $P = .005$, and $P = .004$, respectively).

Of the 30 subjects with dentofacial deformities, nine were classified as skeletal Class II (mean OJ = 7.5 mm, SD = 2.58) and 18 as skeletal Class III (mean OJ = -1.57, SD = 2.89). The remaining three subjects were classified as skeletal Class I with open bite.

Tables 3 and 4 reflect domain correlation matrices for subjects and controls, respectively. For subjects, the COHIP domain of Social/Emotional Well-Being and COHIP total score showed significant negative correlations with each OQLQ domain. For controls, the COHIP Social/Emotional Well-Being domain showed significant negative correlations for all OQLQ domains except Oral Function. Correlations for the total COHIP score were significant with all OQLQ domains except Awareness.

DISCUSSION

In agreement with the results of this study, other researchers using the OQLQ have reported significant

Table 2. Instrument Comparisons for Subjects and Controls[a]

	Mean Score Subjects	Mean Score Controls	Bonferroni-Adjusted *P* Value
OQLQ Domain[b]			
Social Aspects of Deformity	13.90 (8.48)	8.48 (7.46)	.051
Facial Esthetics	11.80 (5.01)	6.81 (4.76)	.004*
Oral Function	7.93 (4.46)	4.45 (3.91)	.019*
Awareness of Deformity	6.23 (4.10)	4.74 (3.99)	.232
Total	39.87 (18.91)	24.48 (15.34)	.019*
COHIP Domain[b]			
Oral Health	11.67 (2.71)	12.77 (3.10)	.232
Functional Well-Being	11.73 (2.98)	13.35 (2.30)	.132
Social/Emotional Well-Being	14.50 (5.37)	18.32 (4.47)	.028*
School Environment	6.73 (1.14)	7.19 (1.08)	.210
Self-Image	2.63 (1.79)	4.55 (2.13)	.005*
Total	50.43 (8.54)	59.61 (9.68)	.004*

[a] Standard deviations in parentheses; * indicates $P < .05$.
[b] COHIP indicates Child Oral Health Impact Profile; OQLQ, Orthognathic Quality of Life Questionnaire.

Table 3. Domain Correlation Matrix Values for Subjects[a]

	OQLQ Social Aspect[b]	OQLQ Facial Esthetics	OQLQ Oral Function	OQLQ Awareness	OQLQ Total
COHIP: Oral Health[b]	−0.005 (.980)	−0.0293 (.878)	0.088 (.645)	0.025 (.894)	0.059 (.758)
COHIP: Functional Well-Being	−0.338 (.068)	−0.210 (.267)	−0.280 (.134)	−0.353 (.056)	−0.355 (.054)
COHIP: Social/Emotional Well-Being	−0.752 (<.001)*	−0.740 (<.001)*	−0.429 (.018)*	−0.635 (<.001)*	−0.772 (<.001)*
COHIP: School Environment	−0.320 (.085)	−0.025 (.896)	−0.300 (.108)	−0.187 (.322)	−0.239 (.203)
COHIP: Self-Image	−0.394 (.031)*	−0.430 (.018)*	−0.258 (.168)	−0.296 (.112)	−0.399 (.029)*
COHIP: Total	−0.705 (<.001)*	−0.609 (<.001)*	−0.369 (.045)*	−0.561 (.001)*	−0.665 (<.001)*

[a] *P* value in parentheses; * indicates $P < .05$.
[b] COHIP indicates Child Oral Health Impact Profile; OQLQ, Orthognathic Quality of Life Questionnaire.

differences in the domains Facial Esthetics and Oral Function between dentofacial subjects and controls prior to treatment.[18] However, many of the other studies that employed the OQLQ analyzed changes in subjects over time, did not use matched controls, and looked at other populations.[14,19–25]

The mean age of subjects in the present study was younger compared to other studies of OHRQoL in patients with dentofacial deformities.[18,19] Therefore, it is possible that the OHRQoL outcomes in this study population were unique based on this age difference. It should also be noted that the gender distribution for subjects and controls resulted in a 2:1 female to male ratio and the results may be more reflective of the OHRQoL state of females. This high prevalence of female patients seeking treatment for dentofacial deformities was consistent with some studies while others have reported a more even gender distribution.[14,19–25]

The results suggested that the COHIP was effective at detecting quality of life concerns in patients with dentofacial deformities. The COHIP has been used to measure OHRQoL in several populations of children with dental, craniofacial, and chronic conditions.[17, 26–31] The discrepancies in which domains proved significantly different in other studies compared to the current study may reflect variability in OHRQoL concerns in those populations compared to the current subjects.

No version of the COHIP (original or short-form) has been administered to pediatric patients with dentofacial deformities that were not due to cleft lip/palate, trauma, or other congenital conditions. Given the significant differences observed in multiple COHIP domains (Social/Emotional Well-Being and Self-Image) and total score between subjects and controls, the instrument appeared effective at identifying OHRQoL concerns for the subject population in this study. One potential limitation of using the COHIP for this population was its inability to identify physical concerns. The Functional Well-Being domain score was not significantly different between subjects and controls and physical concerns are frequently cited as a reason for these patients seeking treatment.

The OQLQ and COHIP each identified OHRQoL concerns that were unique for some domains and overlapping for others. The OQLQ was designed specifically for those with dentofacial deformities and the COHIP is a broader quality of life measure, though the instruments contain some questions and domains that are similarly worded. A question contained in the OQLQ Facial Esthetics domain asked patients if they are "self-conscious about the appearance of [their] teeth" and a similar question in the COHIP Self-Image domain asked if they are "confident because of [their] teeth, mouth, or face." On the other hand, the Oral Function OQLQ domain showed a significant difference between subjects and controls while its analogous domain in the COHIP (Functional Well-Being) did not. Though the domain names are similar, the questions were different in nature. These differences in the wording of the questions could explain disparate results for the between-group comparisons for the two instruments.

Table 4. Domain Correlation Matrix Values for Controls[a]

	OQLQ Social Aspect[b]	OQLQ Facial Esthetics	OQLQ Oral Function	OQLQ Awareness	OQLQ Total
COHIP- Oral Health[b]	−0.252 (.171)	−0.261 (.157)	−0.501 (.004)*	−0.232 (0.210)	−0.374 (0.038)*
COHIP- Functional Well-Being	−0.169 (.365)	−0.209 (.260)	−0.369 (.041)*	0.089 (0.636)	−0.166 (0.372)
COHIP- Social/Emotional Well-Being	−0.553 (.001)*	−0.559 (.001)*	−0.353 (.051)	−0.463 (0.009)*	−0.663 (<.001)*
COHIP- School Environment	−0.014 (.939)	0.007 (.970)	−0.071 (.706)	0.045 (0.811)	−0.009 (0.962)
COHIP- Self-Image	−0.070 (.709)	−0.475 (.007)*	−0.214 (.247)	0.094 (0.615)	−0.242 (0.189)
COHIP- Total	−0.385 (.033)*	−0.494 (.004)*	−0.469 (.008)*	−0.216 (0.243)	−0.511 (0.003)*

[a] *P* value in parentheses; * indicates $P < .05$.
[b] COHIP indicates Child Oral Health Impact Profile; OQLQ, Orthognathic Quality of Life Questionnaire.

For subjects, the COHIP domain Social/Emotional Well-Being was significantly correlated with all OQLQ domains, suggesting that this COHIP domain may have identified OHRQoL issues that were more specifically assessed in the OQLQ. In the control group, this domain showed significant correlations with all OQLQ domains except Oral Function. This may indicate that the nature of the OHRQoL concerns of controls were similar to, but less severe than the concerns of subjects and that both subjects and controls placed great emphasis on how their perceived social stature affected their quality of life. On the basis of the results of this study, COHIP can be used in a population of pediatric patients that includes children with facial skeletal mal-relationships to examine HRQoL. The instrument will accurately reflect issues of social and emotional well-being that are common to all the children in the group. However, a "condition-specific" instrument, like OQLQ will be necessary to examine functional concerns of this group.

There were limitations of this study. Correlations, while statistically significant, between the COHIP and OQLQ domains and total scores, may not have been robust enough to support "equivalence" in their results. The investigator should be aware of this when choosing one or the other to use in a study. The sample size was relatively small and the number of female subjects in the study was twice that of males, thereby limiting the ability of the results to reflect the OHRQoL concerns for males with dentofacial conditions. Finally, the study was cross-sectional in nature and did not show how OHRQoL measures for these subjects changed with treatment and time. Future research is needed to follow patients with dentofacial deformities longitudinally and compare their OHRQoL with controls over treatment and time.

CONCLUSIONS

- The OQLQ and COHIP are effective at detecting significant OHRQoL differences between pediatric patients with dentofacial deformities and matched controls.
- Though there is some overlap in the results of the COHIP and OQLQ, they also appear to identify different OHRQoL concerns.

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