Comparison of Two Survey Instruments Measuring Quality of Life in Pediatric Dentofacial Patients

THESIS

Presented in Partial Fulfillment of the Requirements for the Degree Master of Science in the Graduate School of The Ohio State University

By

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ABSTRACT

Objectives: (1) To assess the effectiveness of two instruments, 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 normal controls. (2) To assess for any correlations between reported OHRQoL from the OQLQ and COHIP domains with the type and severity of the skeletal malrelationship. (3) To assess if the COHIP and OQLQ are identifying unique or overlapping OHRQoL concerns.

Methods: Subjects were under age 18, presented for orthodontic treatment with a dentofacial deformity, were offered a treatment plan of combined orthodontic and orthognathic therapy, and completed the OQLQ and COHIP prior to treatment. Matched controls completed the same surveys, had no apparent dentofacial deformity, and were not undergoing active orthodontic treatment. Severity for subjects was assessed with lateral cephalograms by recording overjet, overbite, and ANB values and subjects were classified as skeletal Class I, II, or III.

Results: Enrollment yielded 30 subjects and 31 controls. There were no significant differences between subjects and controls for age, gender, education level, and
employment status. For the OQLQ, significant differences between subjects and controls were found for the Facial esthetics and Oral Function domains as well as total score. For the COHIP, significant differences were found for the scores for the Social/Emotional Well-Being and Self-Image domains plus total score. Of the subjects, 3 were skeletal Class I open bite, 9 were skeletal Class II, and 18 skeletal Class III. There were no significant correlations between the severity of the skeletal Class II or III condition as measured by overjet and the reported OHRQoL for any of the instrument domains.

**Conclusions:** The OQLQ and COHIP are effective at detecting significant OHRQoL differences between pediatric patients with dentofacial deformities and matched controls. While there is some overlap in the results of the instruments, they also appear to identify different OHRQoL concerns. Finally, there does not appear to be a relationship between the type and severity of a skeletal malrelationship and OHRQoL.
Dedication

This document is dedicated to my family, friends, and teachers.
ACKNOWLEDGMENTS

I would like to take this opportunity to thank the following:

Dr. Allen Firestone, for being my thesis advisor, a wonderful mentor, and a passionate educator. You care about your students and residents and it does not go unnoticed.

Dr. Shiva Shanker, for being on my thesis committee. Thank you for your advice on research and in the clinic. Please always keep our clinic sessions fun and educational.

Dr. Mike Beck, for being on my thesis committee. Thank you for your time and effort in helping me understand statistics and your advice in general on this project.

Delta Dental Foundation, thank you for your financial support to make this study possible.

Dr. Lydia Lancaster and Joseph Charnas, thank you for your assistance with data collection and entry. I appreciate all your efforts and dedication to this project.

Jennifer Daughtery and Andrea Holley, for recruiting subjects in the faculty practice.

My co-residents, thank you for a wonderful journey during residency and all of your support. Best of luck in the future.
VITA

April 9, 1987......................................................... Born – Hartford, CT

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FIELDS OF STUDY

Major Field: Dentistry
Specialty: Orthodontics
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Dentofacial deformity: condition, treatment, and consequences

Individuals with facial, dental, and/or skeletal relationships that deviate severely from the norm are said to have a dentofacial deformity. Dentofacial deformities are present in approximately 2.5% of the United States population and in about 5% of individuals seeking orthodontic treatment. Examples include, but are not limited to, a Class II relationship with a retrusive mandible and increased dental overjet (OJ), a Class III relationship with a protrusive mandible and reverse OJ, and a skeletal discrepancy resulting in a severe dental open bite. Ideal treatment for patients with a dentofacial deformity calls for both 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 dentofacial patients seeking treatment and research has demonstrated that these self-image concerns can have a negative psychological effect. When compared with the general population,
individuals with dentofacial deformities report increased levels of stress, reduced self-esteem, and increased difficulty navigating social interactions. Furthermore, some evidence suggests that the severity of the skeletal malrelationship correlates with the prevalence of psychological problems: patients with severe conditions are more likely to report issues of emotional instability, introversion, anxiety, and unsociability. Physical concerns are the second most common reason for this population to seek treatment and include reduced occlusal function, difficulty speaking, airway issues, and pain associated with the temporomandibular joint.

Quality of life and instruments for measuring

Physical and psychological ailments like those 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. 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. HRQOL is subjective and multidimensional and includes physical and occupational function, psychological state, social interaction, and somatic sensation. 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, etc.) affects overall health and quality of life. The World Health Organization now recognizes the term as part of their Global Oral Health Program.\textsuperscript{12}

Researchers have developed various tools to measure OHRQoL. One example is the Orthognathic Quality of Life Questionnaire (OQLQ) developed by Cunningham et al. in 2000, which seeks to measure quality of life outcomes in patients with dentofacial deformities.\textsuperscript{13} The instrument 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.\textsuperscript{13} In a subsequent study, Cunningham et al. demonstrated that the OQLQ showed good evidence of validity and responsiveness.\textsuperscript{14} The OQLQ was not designed for a specific age group and has been administered to both 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.\textsuperscript{15,16} A short-form version of the questionnaire (COHIP-SF 19, henceforth denoted as “COHIP”) has been released.\textsuperscript{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.\textsuperscript{17} The COHIP also contains a 20\textsuperscript{th} question asking the subject to rate his overall health but the answer is not reflected in any of the individual domain scores. A higher COHIP score indicates better OHRQoL. While researchers
have administered the COHIP in the pediatric dental, orthodontic, and cleft lip/palate patient populations, it has not been used extensively in patients with dentofacial deformities.\textsuperscript{17} Given that dentofacial deformities manifest early in life and typically become further apparent during the adolescent growth spurt, these individuals often present for treatment as pediatric patients.

**OBJECTIVES**

1. To assess the effectiveness of the OQLQ and COHIP to detect differences in OHRQoL between pediatric patients with dentofacial deformities presenting for treatment and the general pediatric population.

2. To assess the correlation between quality of life outcomes for the OQLQ and COHIP with the type and severity of the skeletal malrelationship in pediatric patients at initial presentation.

3. To assess if the COHIP and OQLQ are identifying unique or overlapping OHRQoL concerns.
HYPOTHESES

H₀₁: There is no difference in the quality of life of pediatric patients presenting with a dentofacial deformity compared with non-surgical controls.

H₀₂: There is no correlation between the quality of life outcomes for the OQLQ and COHIP with the type and severity of the skeletal malrelationship in pediatric patients at initial presentation.

H₀₃: There is no difference in the OHRQoL concerns identified by the COHIP and OQLQ.
CHAPTER 2

MATERIALS & 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 and recruited from The Ohio State College of Dentistry graduate orthodontic clinic and faculty orthodontic practice. Subjects completed both the OQLQ and COHIP questionnaires at an appointment prior to starting any treatment (i.e. before the placement of any orthodontic appliances). The following were inclusion criteria: 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 (e.g. cleft lip or palate, hemifacial microsomia, etc.). Controls from the general population were recruited from the pediatric dental clinic at the College of Dentistry and from the main campus of The Ohio State University. Individuals were eligible for enrollment if they did not have a marked appearance of a dentofacial deformity and were not actively undergoing orthodontic treatment. These
controls were intended to reflect the general population and were matched to subjects for age, gender, employment, and educational level. Subjects and controls received a $10 gift card as compensation.

The questionnaires were de-identified and coded so that data could be collected for the same subject over the course of treatment and beyond to continue the study for future longitudinal analysis. Demographic information of age, gender, education level, and employment status was 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 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. 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 Bonferroni method of Holm. Spearman’s coefficients were
used to detect correlation between the domains of each questionnaire and the severity of a Class II or III condition as measured by overjet. Finally, 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 generated using SAS/STAT software, version 9.4 of the SAS System for X64_7PRO platform (Copyright 2002-2012 SAS Institute Inc, Cary, NC).
CHAPTER 3

MANUSCRIPT

Comparison of Two Survey Instruments Measuring Quality of Life in Pediatric Dentofacial Patients

ABSTRACT

Objectives: (1) To assess the effectiveness of two instruments, 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 normal controls. (2) To assess for any correlations between reported OHRQoL from the OQLQ and COHIP domains with the type and severity of the skeletal malrelationship. (3) To assess if the COHIP and OQLQ are identifying unique or overlapping OHRQoL concerns.

Methods: Subjects were under age 18, presented for orthodontic treatment with a dentofacial deformity, were offered a treatment plan of combined orthodontic and orthognathic therapy, and completed the OQLQ and COHIP prior to treatment. Matched controls completed the same surveys, had no apparent dentofacial deformity, and were...
not undergoing active orthodontic treatment. Severity for subjects was assessed with lateral cephalograms by recording overjet, overbite, and ANB values and subjects were classified as skeletal Class I, II, or III.

**Results:** Enrollment yielded 30 subjects and 31 controls. There were no significant differences between subjects and controls for age, gender, education level, and employment status. For the OQLQ, significant differences between subjects and controls were found for the Facial esthetics and Oral Function domains as well as total score. For the COHIP, significant differences were found for the scores for the Social/Emotional Well-Being and Self-Image domains plus total score. Of the subjects, 3 were skeletal Class I open bite, 9 were skeletal Class II, and 18 skeletal Class III. There were no significant correlations between the severity of the skeletal Class II or III condition as measured by overjet and the reported OHRQoL for any of the instrument domains.

**Conclusions:** The OQLQ and COHIP are effective at detecting significant OHRQoL differences between pediatric patients with dentofacial deformities and matched controls. While there is some overlap in the results of the instruments, they also appear to identify different OHRQoL concerns. Finally, there does not appear to be a relationship between the type and severity of a skeletal malrelationship and OHRQoL.

*Key words:* orthognathic surgery, quality of life
INTRODUCTION

Individuals with facial, dental, and/or skeletal relationships that deviate severely from the norm are said to have a dentofacial deformity. Dentofacial deformities are present in approximately 2.5% of the United States population and in about 5% of individuals seeking orthodontic treatment. Examples include, but are not limited to, a Class II relationship with a retrusive mandible and increased dental overjet (OJ), a Class III relationship with a protrusive mandible and reverse OJ, and a skeletal discrepancy resulting in a severe dental open bite. Ideal treatment for patients with a dentofacial deformity calls for both 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 dentofacial patients seeking treatment and research has demonstrated that these self-image concerns can have a negative psychological effect. When compared with the general population, individuals with dentofacial deformities report increased levels of stress, reduced self-esteem, and increased difficulty navigating social interactions. Furthermore, some evidence suggests that the severity of the skeletal malrelationship correlates with the prevalence of psychological problems: patients with severe conditions are more likely to report issues of emotional instability, introversion, anxiety, and unsociability. Physical concerns are the second most common reason for this population to seek treatment and
include reduced occlusal function, difficulty speaking, airway issues, and pain associated with the temporomandibular joint.7,8

Physical and psychological ailments like those 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, etc.) affects overall health and quality of life. The World Health Organization now recognizes the term as part of their Global Oral Health Program.12

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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 malrelationship, (2) to assess for
any correlations between reported OHRQoL from the OQLQ and COHIP domains with the type and severity of the skeletal malrelationship, and (3) to assess if the COHIP and OQLQ are identifying unique or overlapping OHRQoL concerns.

MATERIALS & 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 and recruited from The Ohio State College of Dentistry graduate orthodontic clinic and faculty orthodontic practice. Subjects completed both the OQLQ and COHIP questionnaires at an appointment prior to starting any treatment (i.e. before the placement of any orthodontic appliances). The following were inclusion criteria: 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 (e.g. cleft lip or palate, hemifacial microsomia, etc.). Controls from the general population were recruited from the pediatric dental clinic at the College of Dentistry and from the main campus of The Ohio State University. Individuals were eligible for enrollment if they did not have a marked appearance of a dentofacial deformity and were not actively undergoing orthodontic treatment. These controls were intended to reflect the general population and were matched to subjects for
age, gender, employment, and educational level. Subjects and controls received a $10 gift card as compensation.

The questionnaires were de-identified and coded so that data could be collected for the same subject over the course of treatment and beyond to continue the study for future longitudinal analysis. Demographic information of age, gender, education level, and employment status was 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.

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Class II or III condition as measured by overjet. Finally, 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 generated using SAS/STAT software, version 9.4 of the SAS System for X64_7PRO platform (Copyright 2002-2012 SAS Institute Inc, Cary, NC).

RESULTS

Enrollment yielded 30 subjects with dentofacial deformities and 31 controls. Table 1 contains demographic information and statistical analyses comparing these two groups. The mean subject age was 16.1 years and there 20 females and 10 males. There were no significant differences between subjects and controls for age, gender, education level, and employment status.

Table 2 lists the mean scores for each domain of the COHIP and OQLQ for subjects and controls. Subjects reported decreased QoL (higher OQLQ scores and lower COHIP scores) for each domain and total score, though only some of these differences were significant. For the OQLQ, significant differences in scores between subjects and controls were found for the Facial Esthetics and Oral Function domains as well as total score (p=0.004, p=0.019, and p=0.019, respectively). For the COHIP, significant
differences resulted in the scores for the Social/Emotional Well-Being and Self-Image domains as well as total score (p=0.028, p=0.005, and p=0.004, respectively).

Of the 30 subjects with dentofacial deformities, 9 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 3 subjects were classified as skeletal Class I with open bite and correlation analyses were not performed for this group due to this small sample size. Tables 3 and 4 contain Spearman correlation coefficients and raw p-values comparing OJ and each of the OQLQ and COHIP domains for Class II and Class III subjects, respectively. The only significant correlation was between the Oral Function OQLQ domain and OJ in Class II subjects but these results were not corrected for multiple comparisons.

Tables 5 and 6 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 while the correlations for the total COHIP score were significant with all OQLQ domains except Awareness.
<table>
<thead>
<tr>
<th></th>
<th>Mean Age (years)</th>
<th>Gender (M=male, F=female)</th>
<th>Education Level*</th>
<th>Employment Status</th>
<th>Randomization Test for Age</th>
<th>Chi-Squared Test for Gender</th>
<th>Mann-Whitney Test for Education Level</th>
<th>Chi-Squared Test for Employment Status</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Subjects</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(n=30)</td>
<td>16.1</td>
<td>M=10</td>
<td>86.7% A</td>
<td>10% Yes</td>
<td>p=0.868</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>F=20</td>
<td>13.3% B</td>
<td>90% No</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Controls</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(n=31)</td>
<td>16.0</td>
<td>M=9</td>
<td>96.8% A</td>
<td>29% Yes</td>
<td>p=0.786</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>F=22</td>
<td>3.2% B</td>
<td>71% No</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 1. Demographics of Subjects and Controls (*A = current grade level between 0-12, B = completion of high school)
<table>
<thead>
<tr>
<th>OQLQ Domain</th>
<th>Mean Score Subjects</th>
<th>Mean Score Controls</th>
<th>Bonferroni-Adjusted P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Social Aspects of Deformity</td>
<td>13.90 (8.48)</td>
<td>8.48 (7.46)</td>
<td>0.051</td>
</tr>
<tr>
<td>Facial Esthetics</td>
<td>11.80 (5.01)</td>
<td>6.81 (4.76)</td>
<td>0.004*</td>
</tr>
<tr>
<td>Oral Function</td>
<td>7.93 (4.46)</td>
<td>4.45 (3.91)</td>
<td>0.019*</td>
</tr>
<tr>
<td>Awareness of Deformity</td>
<td>6.23 (4.10)</td>
<td>4.74 (3.99)</td>
<td>0.232</td>
</tr>
<tr>
<td>Total</td>
<td>39.87 (18.91)</td>
<td>24.48 (15.34)</td>
<td>0.019*</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>COHIP Domain</th>
<th>Mean Score Subjects</th>
<th>Mean Score Controls</th>
<th>Bonferroni-Adjusted P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oral Health</td>
<td>11.67 (2.71)</td>
<td>12.77 (3.10)</td>
<td>0.232</td>
</tr>
<tr>
<td>Functional Well-Being</td>
<td>11.73 (2.98)</td>
<td>13.35 (2.30)</td>
<td>0.132</td>
</tr>
<tr>
<td>Social/Emotional Well-Being</td>
<td>14.50 (5.37)</td>
<td>18.32 (4.47)</td>
<td>0.028*</td>
</tr>
<tr>
<td>School Environment</td>
<td>6.73 (1.14)</td>
<td>7.19 (1.08)</td>
<td>0.210</td>
</tr>
<tr>
<td>Self-Image</td>
<td>2.63 (1.79)</td>
<td>4.55 (2.13)</td>
<td>0.005*</td>
</tr>
<tr>
<td>Total</td>
<td>50.43 (8.54)</td>
<td>59.61 (9.68)</td>
<td>0.004*</td>
</tr>
</tbody>
</table>

Table 2. Instrument Comparisons for Subjects and Controls (Standard deviations in parentheses, * indicates p < 0.05)
<table>
<thead>
<tr>
<th></th>
<th>OQLQ Social Aspect</th>
<th>OQLQ Facial Esthetics</th>
<th>OQLQ Oral Function</th>
<th>OQLQ Awareness</th>
<th>OQLQ Total</th>
<th>COHIP Oral Health</th>
<th>COHIP Functional Well-Being</th>
<th>COHIP Social/Emotional Well-Being</th>
<th>COHIP School Environment</th>
<th>COHIP Self-Image</th>
<th>COHIP Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coefficient</td>
<td>0.37</td>
<td>0.26</td>
<td>0.76</td>
<td>0.34</td>
<td>0.43</td>
<td>0.15</td>
<td>-0.19</td>
<td>-0.025</td>
<td>0.022</td>
<td>0.17</td>
<td>0.03</td>
</tr>
<tr>
<td>p-value</td>
<td>0.33</td>
<td>0.49</td>
<td><strong>0.017</strong></td>
<td>0.37</td>
<td>0.24</td>
<td>0.70</td>
<td>0.63</td>
<td>0.95</td>
<td>0.95</td>
<td>0.67</td>
<td>0.93</td>
</tr>
</tbody>
</table>

Table 3. Spearman Correlation Between OJ and Domain Score for Class II Subjects (n=9; * indicates p<0.05)

<table>
<thead>
<tr>
<th></th>
<th>OQLQ Social Aspect</th>
<th>OQLQ Facial Esthetics</th>
<th>OQLQ Oral Function</th>
<th>OQLQ Awareness</th>
<th>OQLQ Total</th>
<th>COHIP Oral Health</th>
<th>COHIP Functional Well-Being</th>
<th>COHIP Social/Emotional Well-Being</th>
<th>COHIP School Environment</th>
<th>COHIP Self-Image</th>
<th>COHIP Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coefficient</td>
<td>0.35</td>
<td>0.40</td>
<td>0.12</td>
<td>0.19</td>
<td>0.34</td>
<td>0.16</td>
<td>0.07</td>
<td>-0.40</td>
<td>-0.31</td>
<td>-0.07</td>
<td>-0.25</td>
</tr>
<tr>
<td>p-value</td>
<td>0.15</td>
<td>0.10</td>
<td>0.65</td>
<td>0.45</td>
<td>0.17</td>
<td>0.53</td>
<td>0.77</td>
<td>0.096</td>
<td>0.20</td>
<td>0.79</td>
<td>0.31</td>
</tr>
</tbody>
</table>

Table 4. Spearman Correlation Between OJ and Domain Score for Class III Subjects (n=18)
<table>
<thead>
<tr>
<th>COHIP- Oral Health</th>
<th>OQLQ Social Aspect</th>
<th>OQLQ Facial Esthetics</th>
<th>OQLQ Oral Function</th>
<th>OQLQ Awareness</th>
<th>OQLQ Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>-0.005</td>
<td>-0.0293</td>
<td>0.088</td>
<td>0.025</td>
<td>0.059</td>
</tr>
<tr>
<td></td>
<td>(0.980)</td>
<td>(0.878)</td>
<td>(0.645)</td>
<td>(0.894)</td>
<td>(0.758)</td>
</tr>
<tr>
<td>COHIP- Functional Well-Being</td>
<td>-0.338</td>
<td>-0.210</td>
<td>-0.280</td>
<td>-0.353</td>
<td>-0.355</td>
</tr>
<tr>
<td></td>
<td>(0.068)</td>
<td>(0.267)</td>
<td>(0.134)</td>
<td>(0.056)</td>
<td>(0.054)</td>
</tr>
<tr>
<td>COHIP- Social/Emotional Well-Being</td>
<td>-0.752</td>
<td>-0.740</td>
<td>-0.429</td>
<td>-0.635</td>
<td>-0.772</td>
</tr>
<tr>
<td></td>
<td>(&lt;.001)*</td>
<td>(&lt;.001)*</td>
<td>(0.018)*</td>
<td>(&lt;.001)*</td>
<td>(&lt;.001)*</td>
</tr>
<tr>
<td>COHIP- School Environment</td>
<td>-0.320</td>
<td>-0.025</td>
<td>-0.300</td>
<td>-0.187</td>
<td>-0.239</td>
</tr>
<tr>
<td></td>
<td>(0.085)</td>
<td>(0.896)</td>
<td>(0.108)</td>
<td>(0.322)</td>
<td>(0.203)</td>
</tr>
<tr>
<td>COHIP- Self-Image</td>
<td>-0.394</td>
<td>-0.430</td>
<td>-0.258</td>
<td>-0.296</td>
<td>-0.399</td>
</tr>
<tr>
<td></td>
<td>(0.031)*</td>
<td>(0.018)*</td>
<td>(0.168)</td>
<td>(0.112)</td>
<td>(0.029)*</td>
</tr>
<tr>
<td>COHIP- Total</td>
<td>-0.705</td>
<td>-0.609</td>
<td>-0.369</td>
<td>-0.561</td>
<td>-0.665</td>
</tr>
<tr>
<td></td>
<td>(&lt;.001)*</td>
<td>(&lt;.001)*</td>
<td>(0.045)*</td>
<td>(0.001)*</td>
<td>(&lt;.001)*</td>
</tr>
</tbody>
</table>

Table 5. Domain Correlation Matrix Values for Subjects (P-Value in Parentheses; * indicates p<0.05)
<table>
<thead>
<tr>
<th></th>
<th>OQLQ Social Aspect</th>
<th>OQLQ Facial Esthetics</th>
<th>OQLQ Oral Function</th>
<th>OQLQ Awareness</th>
<th>OQLQ Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>COHIP - Oral Health</td>
<td>-0.252 (0.171)</td>
<td>-0.261 (0.157)</td>
<td>-0.501 (0.004)*</td>
<td>-0.232 (0.210)</td>
<td>-0.374 (0.038)*</td>
</tr>
<tr>
<td>COHIP - Functional Well-Being</td>
<td>-0.169 (0.365)</td>
<td>-0.209 (0.260)</td>
<td>-0.369 (0.041)*</td>
<td>0.089 (0.636)</td>
<td>-0.166 (0.372)</td>
</tr>
<tr>
<td>COHIP - Social/Emotional Well-Being</td>
<td>-0.553 (0.001)*</td>
<td>-0.559 (0.001)*</td>
<td>-0.353 (0.051)</td>
<td>-0.463 (0.009)*</td>
<td>-0.663 (&lt;.001)*</td>
</tr>
<tr>
<td>COHIP - School Environment</td>
<td>-0.014 (0.939)</td>
<td>0.007 (0.970)</td>
<td>-0.071 (0.706)</td>
<td>0.045 (0.811)</td>
<td>-0.009 (0.962)</td>
</tr>
<tr>
<td>COHIP - Self-Image</td>
<td>-0.070 (0.709)</td>
<td>-0.475 (0.007)*</td>
<td>-0.214 (0.247)</td>
<td>0.094 (0.615)</td>
<td>-0.242 (0.189)</td>
</tr>
<tr>
<td>COHIP - Total</td>
<td>-0.385 (0.033)*</td>
<td>-0.494 (0.004)*</td>
<td>-0.469 (0.008)*</td>
<td>-0.216 (0.243)</td>
<td>-0.511 (0.003)*</td>
</tr>
</tbody>
</table>

Table 6. Domain Correlation Matrix Values for Controls (P-Value in Parentheses; * indicates p<0.05)
DISCUSSION

The aims of this study were to assess the effectiveness of the OQLQ and COHIP to detect OHRQoL differences in pediatric patients with dentofacial deformities and normal controls, assess for any correlations between OHRQoL with the type and severity of skeletal malrelationship, and determine if the COHIP and OQLQ are identifying unique or overlapping OHRQoL concerns.

In agreement with the results of this study, other researchers using the OQLQ have reported significant differences between dentofacial subjects and controls prior to treatment. A Chinese study found significant differences between controls and subjects for all OQLQ domains prior to treatment. \(^{18}\) This project found two OQLQ domains to be significantly different (Facial Esthetics and Oral Function) with a third nearly significant (Social Aspect, adjusted p-value of 0.051), but it should be noted that our study contained a younger population of patients in the United States and had a reduced sample size. However, many of the other studies that employed the OQLQ analyzed changes in subjects over time, did not use matched controls, and were conducted outside of the United States.\(^{14,19,25}\) These heterogeneous methodologies complicate comparison of current results with these previous studies.

By restricting enrollment to patients under age 18, the mean subject age of 16.1 was younger compared to other studies analyzing OHRQoL in patients with dentofacial deformities, which typically have an average age of subjects in the third decade of life.\(^{18,19}\) Therefore, it is possible that the OHRQoL outcomes in this study population, which is of high-school age, are 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 our results may be more reflective of the OHRQoL state of females. This high prevalence of female patients seeking treatment for dentofacial deformities is consistent with some studies while others have reported a more even gender distribution.\textsuperscript{14,19-25}

In agreement with the results of this study, other researchers using the OQLQ have reported significant differences between dentofacial subjects and controls prior to treatment. A Chinese study found significant differences between controls and subjects for all OQLQ domains prior to treatment.\textsuperscript{18} This project found two OQLQ domains to be significantly different (Facial Esthetics and Oral Function) with a third nearly significant (Social Aspect, adjusted p-value of 0.051), but it should be noted that our study contained a younger population of patients in the United States and had a reduced sample size. However, many of the other studies that employed the OQLQ analyzed changes in subjects over time, did not use matched controls, and were conducted outside of the United States.\textsuperscript{14,19,25} These heterogeneous methodologies complicate comparison of current results with these previous studies.

Though not originally designed for patients with dentofacial deformities, the results suggest that the COHIP is effective at detecting quality of life concerns in this population. Previously the COHIP has been used to measure OHRQoL in children with orthodontic needs, craniofacial conditions (such as cleft lip/palate), pediatric patients with chronic conditions such as sickle cell anemia and cystic fibrosis, and to assess the relationship between OHRQoL and dental esthetics.\textsuperscript{17,26-29} The most appropriate
comparison for the results of our study would be with others that also employed the short-form version of the COHIP. However, given its recent development in 2012, most studies use the original version of the questionnaire, making comparisons difficult. One study that employed the short-form version found significant differences between groups of children with fewer caries compared to those with more caries for the Oral Health and Functional Well-Being domains as well as total score. Another study using the original version of the COHIP compared children with orofacial clefts to controls and found significant differences in overall COHIP score and the Functional Well-Being domain. The discrepancies in which domains proved significantly different in other studies compared to ours may reflect variability in OHRQoL concerns in those populations compared to our subjects.

To our knowledge, no version of the COHIP (original or short-form) has been administered extensively to pediatric patients with dentofacial deformities that were not due to cleft lip/palate, trauma, or other congenital conditions (like hemifacial macrosomia). 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 appears effective at identifying OHRQoL concerns for the subject population in this study. One potential limitation of using the COHIP for this population is 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. While the OQLQ was designed specifically for those with dentofacial deformities and the COHIP was a broader quality of life measure for school-aged children and adolescents, the instruments contain some questions and domains that are similarly worded. The OQLQ Facial Esthetics and COHIP Self-Image domains both proved statistically significant in our between-group comparisons and contain questions that seek comparable information. For instance, a question contained in the OQLQ Facial Esthetics domain asks patients if they are “self-conscious about the appearance of [their] teeth” while a similar question in the COHIP Self-Image domain asks 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 domains are similarly worded, the questions are different in nature: the Oral Function OQLQ domain asks about “problems biting”, “problems chewing”, or “pains in [the] face or jaw” while the COHIP domain inquires about “trouble sleeping” or “difficulty keeping…teeth clean”. Identifying particular OHRQoL concerns for a given patient population depends on the wording of the questions and this could explain disparate results for the between-group comparisons for the instrument domains.

It does not appear that the objective severity of the skeletal Class II or Class III condition as measured by OJ correlates with the subjective reports of OHRQoL using these instruments. This is consistent with other studies. One explanation is that the
perceived degree of disfigurement from a dentofacial condition is a better predictor of quality of life than a clinically objective measurement of severity. A small but statistically significant relationship was seen between the severity of the mal-relationship for Class II patients and the OQLQ domain Oral Function but these tests were not adjusted for multiple comparisons and thus only suggestive of a relationship.

For subjects, the COHIP domain Social/Emotional Well-Being was significantly correlated with all OQLQ domains, suggesting that this COHIP domain may be identifying OHRQoL issues that are more specifically assessed in the OQLQ. The domain asks individuals if they have been “teased or bullied”, “been worried about what other people think”, “or “felt that you look different” because of your teeth, mouth, or face. 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 are similar but less severe to the concerns of subjects and that both subjects and controls place great emphasis on how their perceived social stature affects their quality of life.

There were limitations of this study. The sample size was relatively small, especially when subjects were broken down into skeletal classification. Also, 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. There were variables that may affect OHRQoL not controlled for, including socioeconomic status, for which there is evidence suggesting children from higher income families have higher OHRQoL. Psychosocial variables like anxiety and depression were not
controlled for, though there is data to suggest there is no difference between those with
dentofacial condition and the general population. Finally, the study was cross-sectional
in nature and does not show how OHRQoL measures for these subjects change with
treatment and time. Future research is needed to follow American patients with
dentofacial deformities longitudinally and compare their OHRQoL with controls at
multiple timepoints. A demonstration of change in OQLQ and COHIP scores with
treatment would provide further indication of validity for these instruments.

CONCLUSIONS

1. The OQLQ and COHIP are effective at detecting significant OHRQoL differences
   between pediatric patients with dentofacial deformities and matched controls.
2. There does not appear to be a correlation between the severity of a dentofacial
   condition and OHRQoL in this patient population.
3. While there is some overlap in the results of the COHIP and OQLQ, they also
   appear to identify different OHRQoL concerns.
ACKNOWLEDGMENTS

We would like to thank Lydia Lancaster, DDS and Joseph Charnas for their assistance in recruitment of subjects and controls. We are grateful to The Ohio State University Division of Orthodontics and Dental Faculty Practice for their cooperation and participation. We would like to recognize financial support for this research provided by the Delta Dental Foundation.

REFERENCES


CHAPTER 4

CONCLUSIONS

1. The OQLQ and COHIP are effective at detecting significant OHRQoL differences between pediatric patients with dentofacial deformities and matched controls.

2. There does not appear to be a correlation between the severity of a dentofacial condition and OHRQoL in this patient population.

3. While there is some overlap in the results of the COHIP and OQLQ, they also appear to identify different OHRQoL concerns.
BIBLIOGRAPHY


APPENDIX A
Parental Permission Form
The Ohio State University Parental Permission
For Child’s Participation in Research

Effects of Orthognathic Surgery on Quality of Life
Compared with Non-Surgical Controls in an American
Population: A Mixed Cross-Sectional and Longitudinal
Study

Principal Investigator: Dr. Allen Firestone
Sponsor: Department of Orthodontics, OSU

- This is a parental permission form for research participation. It contains important information about this study and what to expect if you permit your child to participate. Please consider the information carefully. Feel free to discuss the study with your friends and family and to ask questions before making your decision whether or not to permit your child to participate.

- Your child’s participation is voluntary. You or your child may refuse participation in this study. If your child takes part in the study, you or your child may decide to leave the study at any time. No matter what decision you make, there will be no penalty to your child and neither you nor your child will lose any of your usual benefits. Your decision will not affect your future relationship with The Ohio State University. If you or your child is a student or employee at Ohio State, your decision will not affect your grades or employment status.

- Your child may or may not benefit as a result of participating in this study. Also, as explained below, your child’s participation may result in unintended or harmful effects for him or her that may be minor or may be serious depending on the nature of the research.

- You and your child will be provided with any new information that develops during the study that may affect your decision whether or not to continue to participate. If you permit your child to participate, you will be asked to sign this form and will receive a copy of the form. You are being asked to consider permitting your child to participate in this study for the reasons explained below.

1. Why is this study being done?
This study is to test the effects that treatment of upper and lower jaws that don’t line up correctly (dentofacial problem) through jaw surgery and straightening of teeth has on a patient’s overall quality of life, and psychological well-being.

2. **How many people will take part in this study?**

Approximately 300

3. **What will happen if my child takes part in this study?**

Your child will fill out four questionnaires regarding their teeth and face and psychological well-being and send them back in provided envelopes or at the conclusion of their appointment. We estimate it will take 20 minutes to complete the questionnaires. Your child may be asked to participate in the study at a future time period for an additional 20 minutes to complete the same four questionnaires. Please check if interested in your child participating in the study in the future:

- Yes, I agree for my child to be re-contacted
- No, I do not wish for my child to be re-contacted to participate

4. **How long will my child be in the study?**

Your child will be in the study the duration of time required to complete the questionnaires.

5. **Can my child stop being in the study?**

Your child may leave the study at any time. If you or your child decides to stop participation in the study, there will be no penalty and neither you nor your child will lose any benefits to which you are otherwise entitled. Your decision will not affect your future relationship with The Ohio State University.

6. **What risks, side effects or discomforts can my child expect from being in the study?**

There are no side-effects or discomforts to be expected from participating in the study. There is a small risk that your child’s responses to the questionnaires could be seen by others not involved in the research (breach of confidentiality). We will lessen this risk by keeping your child’s name off of the questionnaire, and by placing the information into a computer using the code number so that no one will be able to connect your child to their responses.
7. What benefits can my child expect from being in the study?

There are no direct benefits from this study; however the knowledge gained by this study may benefit people who may be considering treatment similar to your child’s.

8. What other choices does my child have if he/she does not take part in the study?

You or your child may choose not to participate without penalty or loss of benefits to which you are otherwise entitled.

9. Will my child’s study-related information be kept private?

Efforts will be made to keep your child’s study-related information confidential. However, there may be circumstances where this information must be released. For example, personal information regarding your child’s participation in this study may be disclosed if required by state law. Also, your child’s records may be reviewed by the following groups (as applicable to the research):

- Office for Human Research Protections or other federal, state, or international regulatory agencies;
- U.S. Food and Drug Administration;
- The Ohio State University Institutional Review Board or Office of Responsible Research Practices;
- The sponsor supporting the study, their agents or study monitors; and
- Your insurance company (if charges are billed to insurance).

If the study involves the use of your child’s protected health information, you may also be asked to sign a separate Health Insurance Portability and Accountability Act (HIPAA) research authorization form.
10. What are the costs of taking part in this study?

None

11. Will I or my child be paid for taking part in this study?

Yes, your child will receive a $10.00 gift certificate after completion of the questionnaires. By law, payments to subjects are considered taxable income. If asked to participate in the study again, your child will receive another $10.00 gift certificate after completion of all questionnaires.

12. What happens if my child is injured because he/she took part in this study?

If your child suffers an injury from participating in this study, you should notify the researcher or study doctor immediately, who will determine if your child should obtain medical treatment at The Ohio State University Medical Center.

The cost for this treatment will be billed to you or your medical or hospital insurance. The Ohio State University has no funds set aside for the payment of health care expenses for this study.

13. What are my child’s rights if he/she takes part in this study?

If you and your child choose to participate in the study, you may discontinue participation at any time without penalty or loss of benefits. By signing this form, you do not give up any personal legal rights your child may have as a participant in this study.

You and your child will be provided with any new information that develops during the course of the research that may affect your decision whether or not to continue participation in the study.

You or your child may refuse to participate in this study without penalty or loss of benefits to which you are otherwise entitled.
An Institutional Review Board responsible for human subjects research at The Ohio State University reviewed this research project and found it to be acceptable, according to applicable state and federal regulations and University policies designed to protect the rights and welfare of participants in research.

14. Who can answer my questions about the study?

For questions, concerns, or complaints about the study you may contact Dr. Allen Firestone at 614 292 - 1172.

For questions about your child’s rights as a participant in this study or to discuss other study-related concerns or complaints with someone who is not part of the research team, you may contact Ms. Sandra Meadows in the Office of Responsible Research Practices at 1-800-678-6251.

If your child is injured as a result of participating in this study or for questions about a study-related injury, you may contact Dr. Allen Firestone at 614 292 - 1172.
**Signing the consent form**

I have read (or someone has read to me) this form and I am aware that I am being asked to participate in a research study. I have had the opportunity to ask questions and have had them answered to my satisfaction. I voluntarily agree to participate in this study. I am not giving up any legal rights by signing this form. I will be given a copy of this form.

<table>
<thead>
<tr>
<th>Printed name of subject</th>
<th>Signature of subject</th>
<th>AM/PM</th>
</tr>
</thead>
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<td>Date and time</td>
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</table>

<table>
<thead>
<tr>
<th>Printed name of person authorized to consent for subject (when applicable)</th>
<th>Signature of person authorized to consent for subject (when applicable)</th>
<th>AM/PM</th>
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</tr>
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<tr>
<td></td>
<td>Date and time</td>
</tr>
</tbody>
</table>

**Investigator/Research Staff**

I have explained the research to the participant or his/her representative before requesting the signature(s) above. There are no blanks in this document. A copy of this form has been given to the participant or his/her representative.

<table>
<thead>
<tr>
<th>Printed name of person obtaining consent</th>
<th>Signature of person obtaining consent</th>
<th>AM/PM</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Date and time</td>
</tr>
</tbody>
</table>

**Witness(es) - May be left blank if not required by the IRB**

<table>
<thead>
<tr>
<th>Printed name of witness</th>
<th>Signature of witness</th>
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<td></td>
<td>Date and time</td>
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</table>
APPENDIX B

Child Assent Form
The Ohio State University Assent to Participate in Research


Study Title: Effects of Orthognathic Surgery on Quality of Life Compared with Non-Surgical Controls in an American Population: A Mixed Cross-Sectional and Longitudinal Study.

Researcher: Dr. Allen Firestone

Sponsor: OSU Department of Orthodontics

- You are being asked to be in a research study. Studies are done to find better ways to treat people or to understand things better.
- This form will tell you about the study to help you decide whether or not you want to participate.
- You should ask any questions you have before making up your mind. You can think about it and discuss it with your family or friends before you decide.
- It is okay to say “No” if you don’t want to be in the study. If you say “Yes” you can change your mind and quit being in the study at any time without getting in trouble.
- If you decide you want to be in the study, an adult (usually a parent) will also need to give permission for you to be in the study.

1. What is this study about?

This study is to examine how using surgery to correct problems with bite and with upper and lower jaws that don’t line up correctly, have on individuals’ overall quality of life, and psychological well-being.

2. What will I need to do if I am in this study?

We will ask you to fill out four questionnaires regarding your teeth and face and your psychological well-being, and return them by mail or in person at your appointment.
3. How long will I be in the study?

You will be in this study for approximately 20 minutes. You may be asked in the future to participate in this study again for an additional 20 minutes. Please check if interested in participating in the study in the future:

☐ Yes, I agree to be re-contacted
☐ No, I do not wish to be re-contacted to participate

4. Can I stop being in the study?

You may stop being in the study at any time.

5. What bad things might happen to me if I am in the study?

No bad things will happen to you in this study. There is no chance that someone might find out your answers to the questionnaires because the questionnaires will be coded and have no personal identifiable information.

6. What good things might happen to me if I am in the study?

There is no direct benefit to you, however the answers will help us to decide whether these questionnaires are good enough to be used in future and thereby help people who may be considering going through the same kind of treatment.

7. Will I be given anything for being in this study?

Yes, you will get a $10 gift certificate after completion of all the questionnaires. If you are asked to participate in this study again, you will be given an additional $10 gift certificate after completion of all the questionnaires. By law, payments to subjects are considered taxable income.

8. Who can I talk to about the study?

For questions about the study you may contact Dr. Allen Firestone at 614 292 - 1172.

To discuss other study-related questions with someone who is not part of the research team, you may contact Ms. Sandra Meadows in the Office of Responsible Research Practices at 1-800-678-6251.
Signing the assent form

I have read (or someone has read to me) this form. I have had a chance to ask questions before making up my mind. I want to be in this research study.

______________________________   ________________
Signature or printed name of subject  Date and time

Investigator/Research Staff

I have explained the research to the participant before requesting the signature above. There are no blanks in this document. A copy of this form has been given to the participant or his/her representative.

______________________________   ______________________
Printed name of person obtaining assent  Signature of person obtaining assent

AM/PM   ______________________
Date and time

This form must be accompanied by an IRB approved parental permission form signed by a parent/guardian.
APPENDIX C

Orthognathic Quality of Life Questionnaire
Please read the following statements carefully. In order to find out how important each of the statements is to you. Please circle 1, 2, 3, 4 or N/A where:

1 means it bothers you a little
4 means it bothers you a lot
2+3 lie between these statements
N/A means the statement does not apply to you or does not bother you

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. I am self-conscious about the appearance of my teeth</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>N/A</td>
</tr>
<tr>
<td>2. I have problems biting</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>N/A</td>
</tr>
<tr>
<td>3. I have problems chewing</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>N/A</td>
</tr>
<tr>
<td>4. There are some foods I avoid eating because the way my teeth meet makes it difficult</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>N/A</td>
</tr>
<tr>
<td>5. I don’t like eating in public places</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>N/A</td>
</tr>
<tr>
<td>6. I get pains in my face or jaw</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>N/A</td>
</tr>
<tr>
<td>7. I don’t like seeing a side view of my face (profile)</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>N/A</td>
</tr>
<tr>
<td>8. I spend a lot of time studying my face in the mirror</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>N/A</td>
</tr>
<tr>
<td>9. I spend a lot of time studying my teeth in the mirror</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>N/A</td>
</tr>
<tr>
<td>10. I dislike having my photograph taken</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>N/A</td>
</tr>
<tr>
<td>11. I dislike being seen on video</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>N/A</td>
</tr>
<tr>
<td>12. I often stare at other people’s teeth</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>N/A</td>
</tr>
<tr>
<td>13. I often stare at other people’s faces</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>N/A</td>
</tr>
<tr>
<td>14. I am self-conscious about my facial appearance</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>N/A</td>
</tr>
<tr>
<td>15. I try to cover my mouth when I meet people for the first time</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>N/A</td>
</tr>
<tr>
<td>16. I worry about meeting people for the first time</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>N/A</td>
</tr>
<tr>
<td>17. I worry that people will make hurtful comments about my appearance</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>N/A</td>
</tr>
<tr>
<td>18. I lack confidence when I am out socially</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>N/A</td>
</tr>
<tr>
<td>19. I do not like smiling when I meet people</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>N/A</td>
</tr>
<tr>
<td>20. I sometimes get depressed about my appearance</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>N/A</td>
</tr>
<tr>
<td>21. I sometimes think that people are staring at me</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>N/A</td>
</tr>
<tr>
<td>22. Comments about my appearance really upset me, even when I know people are only joking</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>N/A</td>
</tr>
</tbody>
</table>
APPENDIX D

Child Oral Health Impact Profile- Short Form 19
Hello!

Thank you for helping us with our study. We are doing this study to better understand how children feel about their teeth and themselves.

Please read carefully each statement and choose the answer that best describes you in the past 3 months regarding your teeth, mouth, or face. There are no right or wrong answers. We want to know how you really feel.

Example: During the past 3 months, how often have you felt shy because of your teeth, mouth, or face?

If you have felt shy because of your teeth, mouth, or face then choose the appropriate response. If you felt shy for other reasons choose "Never."

Never  Almost never  Sometimes  Fairly often  Almost all the time

[ checkboxes ]

Some things to keep in mind:

- Answer the questions as honestly as you can.
- Don’t talk to anyone about the questions when you are answering them.
- Before you answer, ask yourself: Does this happen because of my teeth, mouth, and face?
- Choose the answer that best describes you in the past 3 months.
1. Had pain in your teeth/toothache.
2. Had **crooked teeth** or **spaces** between your teeth.
3. Had **sores or sore spots** in or around your mouth.
4. Had **bad breath**.
5. Had **bleeding gums**.
6. Been **unhappy** or **sad** because of your teeth, mouth, or face.
7. Missed school for any reason because of your teeth, mouth, or face.
8. Been **confident** because of your teeth, mouth, or face.
9. Had **difficulty eating foods** you would like to because of your teeth, mouth, or face.
10. Felt **worried** or **anxious** because of your teeth, mouth, or face.
11. Had **difficulty paying attention** in school because of your teeth, mouth, or face.
12. Avoided smiling or laughing with other children because of your teeth, mouth or face.
13. Had **trouble sleeping** because of your teeth, mouth, or face.
14. Been teased, bullied or called names by other children because of your teeth, mouth or face.
15. Felt that you were **attractive** (**good looking**) because of your teeth, mouth, or face.
16. Felt that you look **different** because of your mouth, teeth, or face.
17. Had **people** have difficulty understanding what you were saying.
18. Had **difficulty** keeping your teeth clean.
19. Been worried about what other people think about your teeth, mouth or face.
20. Overall, please rate your **oral health?**  poor fair average good excellent
APPENDIX E

Demographics and Information Form
Age: ___________yr ____________mo

Sex: M F

Employment status: Y N

Education level: a. 0-12th grade
   b. Completed High School or equivalent
   c. Some College
   d. Completed College
   e. Graduate education
APPENDIX F

Participant Suicide Hotline Letter
Dear Participant,

In the event that you have suicidal thoughts please contact the following national toll-free hotline:

1-800-273-8255

TTY: 1-800-799-4TTY (4889)

Or call the Franklin County Suicide Prevention Hotline at: 614-221-5445. Or go to the Ohio State University Department of Psychiatry for an evaluation.

OSU Harding Hospital
1670 Upham Drive
Columbus, OH 43210
Ph: 614.293.8283

Thank you again for your participation!

Best regards,

[Signature]

Dr. Allen Firestone