

The Change in Oral Health Related-Quality of Life among Adolescents and Their Families after Orthodontic Treatment

By

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A thesis submitted to the Faculty of Graduate Studies of
The University of Manitoba
in partial fulfillment of the requirements of the degree of

MASTER OF SCIENCE

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Acknowledgements

I am deeply grateful to my committee members: Dr. Charles Lekic, Dr. William Wiltshire, and Dr. Joanna Asadoorian. You gave endless dedication and guidance throughout the progression of our project. Your guidance and support from the initial to the final level enabled this research experience to be smooth and rewarding. It was a true privilege and a great pleasure to have worked with each of you.

I would like to express my sincere appreciation to my research advisor, Dr. Charles Lekic, whose kindness and patience had inspired me to become a better researcher and orthodontist.

Special thanks to Dr. William Wiltshire for his dedication to teaching and research. He has continuously challenged me to question any assumptions, and motivated me to present my research at local and international scientific conferences.

I am also grateful towards the faculties and staff at the Division of Orthodontics, my colleague residents, and the support staff (Gail Kauk, Laura Friesen, Alison Lecuyer, Jeanette Daniels, Laura Murray, Sandra Munos-Costa, Cathy Watt, and Sandra Dufour). Thank you for making each day more manageable and for all the personal and moral support over the three years.

My deepest gratitude goes to my beloved father for his infinite support, dedication, and selflessness throughout my life. His unconditional love and encouragement had motivated me to succeed and to become who I am today. I am heartily thankful to my mother for her prayers, blessings, and for always believing in me. I feel very proud of my siblings, Sadek, Heba, and Mahmoud, for their amazing achievements in their careers and, most importantly, for being wonderful parents to their young children.

Abstract

The Change in Oral Health-Related Quality of Life among Adolescents and their Families after Orthodontic Treatment

Objective: Assess the changes in oral health-related quality of life (OHRQoL) of adolescents and their parents after overjet reduction.

Materials and Methods: 53 patients between the ages of 11-18 years with increased dental overjet ($\geq 6\text{mm}$) and their parents were selected, of which 28 were pre- and 25 were post-treatment with dental overjet reduced to within normal limits. The data collection instrument was the Child Oral Health Quality of Life (COHQoL) Questionnaire.

Results: Adolescents and their parents reported poorer quality of life before orthodontic treatment than after. The improvement in oral health-related quality of life was statistically significant for all health domains except for the social well-being domain. Parental reports on (OHRQoL) were in agreement with their children's. No statistically significant differences were evident in (OHRQoL) between pre- and post-treatment groups.

Conclusions: Adolescents with increased dental overjet $\geq 6\text{mm}$ experienced substantial psychosocial impacts. Adolescents with increased overjet can accurately recall the initial negative effects of the original malocclusion on their lives, even after a time lapse of five years. Orthodontic treatment significantly improves the perceived quality of life of orthodontic patients and their parents.

Key Words: oral health-related quality of life questionnaire, orthodontic treatment, overjet, adolescents, parents.

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Chapter 1

Introduction and Literature Review

Introduction

Physical appearance can influence an individual's personal life and social acceptance. In interpersonal interactions, the oral and dental structures draw the most attention from others because they are the source of vocal and emotional communication (Kiyak, 2008a). A number of studies have demonstrated the physical, social, and psychological effects of untreated malocclusions (DiBiase & Sandler, 2001). The negative effects of malocclusion can take on a significant psychological impact on the evolving personalities and social skills of children and adolescents. Children with visible malocclusions are often teased and socially challenged by their peers (Shaw, Meek, & Jones, 1980). Visible dental differences, such as crowding, spacing, and increased overjet, are usually associated with high levels of dissatisfaction with appearance and negative impact on children's overall oral health related quality of life (Rodd, Marshman, Porritt, Bradbury, & Baker, 2011b). Moreover, significant relationships exist between low self-esteem and certain occlusal traits such as Class II Division 1 incisor relationship and increased dental overbite (Seehra, Fleming, Newton, & DiBiase, 2011).

Unpleasant teeth arrangement such as an increased overjet and a spaced dentition were found to have a significant negative impact on both the children's and their families' quality of life (Johal, Cheung, & Marcene, 2007). However, the difference in the patients' quality of life that is brought about by orthodontic treatment was not adequately assessed in previous studies. Thus, the aim of the present study was to assess the change in oral health related quality of life of adolescents and their parents after orthodontic correction of increased dental overjet to within normal limits.

Background

Factors affecting patients' expectations for their oral health and esthetics

An adolescent expects that he/she will be able to eat, speak, and socialize without active disease, discomfort, and embarrassment. Any shortfall between the individual's ideal and the perceived expectations, result in discontentment and a desire for improvement. Recently, it has been suggested that various factors may play a role in shaping adolescents' satisfaction, or lack of, with their dental appearance and thus their desire to proceed with orthodontic treatment for cosmetic reasons (Kiyak, 2008a). Discontent with one's dental appearance, suggestion from a dentist, concern on the part of parents, and the influence of classmates who had braces are among the main factors directly involved in the demand for orthodontic treatment (Marques et al., 2009).

Psychological studies suggested that most children and adolescents worldwide developed a bicultural identity that combines their local identity which is based on their social and ethnic backgrounds with an identity attributed to the global culture as a result of media exposure and globalization (Arnett, 2002). The media exposure was found to affect adolescents' self-image and their perceived need for braces, for example subjects aged 11- 14 who admitted to watching more than 2 hours of television were more critical in judging their own dentitions (Ahmed, Gilthorpe, & Bedi, 2001). Another example is that protruding incisors are judged unattractive within populations where most individuals have prominent teeth, such as black Americans, just as they are within less protrusive groups (Farrow, Zarrinnia, & Azizi, 1993).

A study conducted in the UK revealed that Grade 5 in the Aesthetic Component (AC) scale of the Index of Orthodontic Treatment Need (IOTN) represents the threshold of dental aesthetic impairment where orthodontic treatment should be sought, as judged by clinicians and multiethnic school children (Ahmed et al., 2001). The (AC) scale is composed of 10 colour

photographs showing different levels of dental attractiveness where the observer is meant to score the severity of the malocclusion in comparison with the image scale. The most unpleasant teeth arrangement receives the highest grade. For example, Grade 5 in the (AC) corresponds to deep bite and maxillary midline diastema, whereas Grade 7 and Grade 9 correspond to increased dental overjet (Ahmed et al., 2001). The findings from Ahmed and coworkers (2001) study imply that the appearance of protruding teeth is not tolerated by adolescents because it falls two grades beyond the range of aesthetic acceptability on the (AC) scale. Another study conducted in the UK found that a sample of dental patients who visited the dentist every 6 months were more likely to choose a threshold photograph closer to the attractive end of the scale than those who visited their dentist less frequently (Hunt, Hepper, Johnston, Stevenson, & Burden, 2002).

Factors motivating patients and their parents to seek orthodontic treatment

The perceived need and subsequently the desire for braces are sensitive to several cultural factors. Children from an ethnic minority had a wider range of aesthetic acceptability than Caucasian children, when asked to rate faces with crowded teeth, overbite, and diastema (Tung & Kiyak, 1998).

A recent Polish study designed to investigate patients' motivation for seeking orthodontic treatment, assessed two groups; 674 children aged 7-18 years and their parents/guardians and 86 adult patients aged 19-42 years. The study demonstrated that improvement in dental aesthetics was the principle motivational factor for the children (29 to 48 per cent), their parents/guardians (54 per cent), and adult patients (55 per cent) for seeking orthodontic treatment. Interestingly, less than 5 per cent of subjects started treatment because other

children made fun of them, and only 3 per cent of older patients were motivated by future improvements in health (Wedrychowska-Szulc & Syrynska, 2010).

A self-completion questionnaire survey study conducted in the UK to determine patients' and parents'/guardians' motivation for orthodontic treatment assessed 330 new orthodontic patients, half of which were between 11 and 13 year-old, found that most of the patients (87%) were concerned with the appearance of their teeth and significant number (38%) reported teasing related to their dental appearance. In 81% of cases, the dentist initiated the referral for orthodontic treatment and only 20% of subjects thought there was nothing wrong with their teeth (Fleming, Proczek, & DiBiase, 2008).

Early stages of psychological development can influence the child's motive for orthodontic treatment, as well as his/her understanding of, and adherence to treatment regimens (Tung & Kiyak, 1998). When asked about motives and expectation of orthodontic treatment, both children and their parents expected the most improvement in self-image and oral function, with greater expectations by parents on self-image, oral function, and social life than children themselves (Tung & Kiyak, 1998).

Based on the reviewed studies, the enhancement of physical, social and psychological well-being is the key reason why orthodontic care is sought and therefore it can be argued that the best measure of outcome from orthodontic treatment is the improvement in these aspects.

Literature review

Prevalence of malocclusion

High prevalence of malocclusions has been reported in different parts of the world across different ethnic groups, age groups, and methods of registration. Several studies which evaluated different populations reported 92% (Abu Alhaija, Al-Khateeb, & Al-Nimri, 2005), 74.2% (Martins Mda & Lima, 2009), and 91% (Murshid, Amin, & Al-Nowaiser, 2010) as overall prevalence of various malocclusion anomalies.

Malocclusion traits detected in 13-15-year-old North Jordanian school children were crowding (50.4%), midline shift (31.7%), spaced dentition (26.7%), increased overjet (24.7%), deepbite (16.9%), crossbite (6.8), median diastema (6.9%), missing teeth (6%), openbite (2.9%), and reversed overjet (1.9%) (Abu Alhaija et al., 2005). Whereas in sample of Brazilian schoolchildren aged 10 to 12 years, the dental crowding was observed in 62.5% and the presence of midline diastema was observed in 14.8% of the school children (Martins Mda & Lima, 2009).

A study conducted to assess the distribution of occlusal anomalies in a sample of 1,024 adolescents aged 13-14 years in Jeddah city, Saudi Arabia revealed that post-normal occlusion, pre-normal occlusion and bimaxillary protrusion represented 21%, 15% and 8% of the studied sample respectively. Moderate and severe overjet accounted for 24% and 5%, respectively. Moderate and severe overbite accounted for 27% & 13%, respectively. Midline deviation was detected in 24% of the students. Severe maxillary and mandibular dental crowding represented 4% and 9%, respectively. Only 9% of the examined adolescents had normal occlusion (Murshid et al., 2010). The reviewed studies showed that malocclusion is one of the most common oral disorders and its prevalence is high in most countries. Moreover, malocclusion traits remain

remarkably stable if patients do not receive orthodontic treatment (Helm, Kreiborg, & Solow, 1985a). Greater understanding of the physical, social and psychological effects of malocclusion is essential because it provides an insight into the consequences of malocclusion on orthodontic patients' lives {{144 Zhang,M. 2006}}.

Physical impact of malocclusion on oral health and function

Different malocclusion traits have been reported to have several physical effects on subjects' oral health and function. For instance, it has been reported in the dental literature that subjects with Class III malocclusions have the poorest masticatory efficiency and ability, followed by those with Class II and Class I malocclusions, respectively (English, Buschang, & Throckmorton, 2002). Findings from longitudinal studies suggest that there is a significant but weak association between speech disorder and malocclusion, for example patients with a large overjet and deep bite pronounce sibilants such as /s/, /z/, and /ch/ differently (Laine, 1987).

Certain types of malocclusion, such as open bite, Class II malocclusion with a large overjet and deep bite, and Class III malocclusion with posterior crossbite and lateral crossbite, may be linked to temporomandibular disorders (TMD) in the long term (Egermark, Magnusson, & Carlsson, 2003). However, the evidence of the correlation between TMD and different types of malocclusion appear to be weak, although a unilateral crossbite is suggested as factor in some patients (Egermark et al., 2003).

In addition, malocclusion may give rise to pain by causing gingival and mucosal trauma, such as in some cases of very deep overbite where the direct trauma to the palatal aspect of gingiva from the incisal edges of the mandibular incisors may result in gingival recession in the maxillary incisors (Geiger, 2001). Similarly, in severe Class II division 2 malocclusions, the retroclined

maxillary incisors contacting with the labial gingiva of lower incisors can lead to marginal recession of the mandibular incisors (Geiger, 2001).

Psychological impact of malocclusion

The dentition plays an important role in facial appearance because people are frequently concerned with dental arrangement, alignment, and appearance and malocclusion can impact on the overall facial appearance (Kerosuo, Hausen, Laine, & Shaw, 1995). The dentofacial appearance can influence social acceptance as well as the perceived intelligence by others (Langlois et al., 2000). Some studies have found that certain occlusion traits, namely incisor crowding and median diastemas, have the greatest negative impact on the perceived intelligence and beauty by others, and that those individuals were judged to be from a lower social class than those with ideal occlusion (Kerosuo et al., 1995).

Moreover, some patients with severe and deforming malocclusion reported having feelings of uselessness, shame, and inferiority in social interactions (P. Kenealy, Hackett, Frude, Lucas, & Shaw, 1991). A longitudinal Danish study which followed up 977 orthodontically untreated subjects with questionnaire survey 15 years later, concluded that certain malocclusions, especially extreme maxillary overjet, extreme deep bite, and crowding, may adversely affect body image and self-concept during adolescence as well as in adulthood (Helm, Kreiborg, & Solow, 1985b). Self-concept is defined as the perception of one's own ability to master or deal effectively with the environment, and is affected by the reactions of others towards an individual (Tung & Kiyak, 1998).

Prevalence of increased dental overjet

Among the most prevalent malocclusions is increased dental overjet as verified by The Third National Health and Nutrition Examination Survey (NHANES III) that reported that dental overjet of 5 mm or more, suggesting Angle's Class II division 1 malocclusion, occurred in 23% of children (age 8 to 11), 15% in youths (age 12 to 17), and 13% in adults (age 18 to 50) in the US population (Proffit, Fields, & Moray, 1998). Angle's class II malocclusion occurred in 32% and an overjet of 5 mm occurred in 18% of 13- 14 year old youths in Quebec, Canada (Payette & Plante, 1989). In a study conducted in Winnipeg, Manitoba to assess the preventive and interceptive orthodontic needs, 11.2% of the 6-year-old children had an overjet of more than 5 mm compared with 17.5% of the 9-year-old children (Karaiskos, Wiltshire, Odlum, Brothwell, & Hassard, 2005).

The prevalence of an overjet of more than 6 mm in 10-year-old Swedish children is about 15% (Trulsson, Linlav, Mohlin, & Strandmark, 2004). Assessment of a sample of 1975 children aged between 6 and 8 years in Germany revealed that deep overbite and overjet, both more than 3.5 mm, were found to be the most frequent discrepancies affecting 46.2 and 37.5 per cent of children, respectively (Tausche, Luck, & Harzer, 2004).

A cross-sectional study evaluated 502 urban Iranian school children aged 11-14 years found Class II division 1 in 24.1 per cent, an overjet of at least 3.5 mm or more was present in 28.1 per cent; and an overjet of more than 6 mm in 3.6 per cent (Borzabadi-Farahani, Borzabadi-Farahani, & Eslamipour, 2009).

Based on the reviewed studies, increased dental overjet is proved to be highly prevalent among adolescents, thus an appraisal of its various effects on the youths' lives would be of great interest.

Physical impacts of increased dental overjet on oral health and function

Protruding maxillary incisors have greater susceptibility to trauma and injury to the teeth. There is about one chance in three of significant trauma of prominent upper incisors, resulting in a fracture of the tooth and/or devitalization of the pulp (Tulloch, Phillips, Koch, & Proffit, 1997). Risk stakes for traumatic dental injuries (TDI) were found to be high in subjects with increased dental overjet with protrusion, economic deprivation, risk-taking behaviour, children being bullied, and attention-deficit hyperactivity disorder (Glendor, 2009).

In another study, the prevalence of TDI was reported to be 4.15% among 1059 government school children aged 4- 15 years in India (Gupta, Kumar-Jindal, Bansal, & Singla, 2011). Furthermore, incisal overjet and inadequate lip coverage were suggested as risk factors for TDI where 95.45% of the reported injuries affected maxillary anterior teeth (Gupta et al., 2011).

A systematic review aimed to gather the risk factors for TDI concluded that children with an overjet larger than 3 mm had two folds higher risk of injury to anterior teeth than children with an overjet less than 3 mm (Nguyen, Bezemer, Habets, & Prah-Andersen, 1999). Moreover, children with a TDI in the anterior teeth experienced a negative impact on social wellbeing, mainly with regard to avoiding smiling or laughing and being concerned about what other people may think or say (Bendo et al., 2010).

According Singh and coworkers (2008), a history of thumb sucking was present in 13.9% of his subjects and was significantly related to Class II div 1 malocclusion in study sample of 410 individuals aged 12 to 30 years. The Class II malocclusion was further characterized by the presence of open bite and extreme overjet when thumb sucking habit exceeded 18 months of age, as verified by the mothers of these subjects (Singh, Utreja, & Chawla, 2008).

Once established, increased overjet may result in inability to seal the lips (lip incompetence) and may increase the likelihood of an oral muscular disorder, mouth breathing, and gingival inflammation developing. Zicari and coworkers (2009) stated that malocclusion patterns that facilitate oral and nasal dysfunction; such as atypical swallowing, labial incompetence, finger sucking, and sucking of the inner lip, support the assumption that the association between oral breathing and dental malocclusions represents a self-perpetuating circle in which it is difficult to establish if the primary alteration is respiratory or maxillofacial (Zicari et al., 2009).

Harari and colleagues (2010) compared the effects of mouth breathing to nasal breathing in regards to craniofacial and dentofacial development in patients with malocclusion during childhood. They concluded that mouth breathers exhibited significant backward and downward rotation of the mandible, increased overjet, a steep mandibular plane angle, a higher palatal plane, and narrowing of both upper and lower arches at the level of the canines and first molars compared to the nasal breathers group (Harari, Redlich, Miri, Hamud, & Gross, 2010).

A study conducted in Kenya to assess gingival health of 201 schoolchildren aged 11-14 years, concluded that mouth breathing, increased lip separation, and decreased upper lip coverage at rest were all associated with higher levels of plaque and gingival inflammation (Wagaiyu & Ashley, 1991). Moreover, the study found that effect of mouth breathing was confined to palatal sites, whereas lip coverage influenced gingival inflammation at both palatal and labial sites (Wagaiyu & Ashley, 1991).

According to the reviewed literature, it is clear that protruding incisors and increased dental overjet carry potential adverse physical, developmental, and neuro-muscular consequences to children and adolescents.

Psychological impact of increased dental overjet on children and adolescents

Social discrimination and prejudgement because of facial and dental appearance were investigated in various studies. For instance, of 531 school children asked which of their physical features most provoked teasing, teeth came in the fourth place among the physical features that were objects of teasing remarks and they were indicated by 61% of children as the most upsetting (Shaw et al., 1980).

Shaw and coworkers conducted several studies on the influence of children's dentofacial appearance on their social attractiveness. One of these studies found that children with a normal dental appearance were judged to be better looking, preferred as friends, perceived to be bright, and less aggressive (Shaw, 1981). Moreover, the same study concluded that individuals who have unaesthetic protruding teeth can become targets for teasing and ridiculing from other school children and they tend to be unsure of themselves in social interaction and have low self-esteem (Shaw, 1981).

Bullying is common nowadays among school children, and the effects can be devastating and long lasting (DiBiase & Sandler, 2001). A child who is persistently bullied exhibits a certain psychological traits which include poorly developed social skills and a submissive nature (DiBiase & Sandler, 2001). Facial and dental appearances seem to play a role in the incidence of bullying among children as well as body features like height and weight, although it had been demonstrated that teasing related to dental features appears to be particularly hurtful (Shaw et al., 1980). Specific dental malocclusions, such as maxillary crowding, an increased overjet and deep overbite, have been identified that increase the risk of teasing and result in disruption of normal psychological development of the children (Helm, Kreiborg, & Solow, 1985a). Additional dental features include dentoalveolar trauma, absent teeth, and cleft lip with or without cleft palate (Hunt, Burden, Hepper, Stevenson, & Johnston, 2006).

Substantial relationships exist in literature between bullying and certain occlusal traits. A recent cross-sectional study conducted in the UK assessed 336 children aged between 10 and 14 years with an untreated malocclusion (Seehra et al., 2011). It aimed to measure the self-reported frequency and severity of bullying, the individual's self-esteem and oral health-related quality of life (OHRQoL). The study found that the prevalence of bullying was 12.8% and that being bullied was significantly associated with Class II Division 1 incisor relationship, increased overbite, and increased overjet. Moreover, bullied participants also reported lower levels of social competence, athletic competence, physical appearance related self-esteem, and general self-esteem which contributed a negative impact on overall OHRQoL (Seehra et al., 2011). Furthermore, another study demonstrated that peer teasing and negative psychosocial impact was reported by 38% of children in a sample aged between 11 to 13 years as consequence of their dental appearance that included dental crowding, incisors protrusion, and spacing (Fleming et al., 2008).

The reviewed studies strongly suggest that untreated malocclusions have negative psychological and social consequences on quality of life of children and adolescents.

Quality of life concept in orthodontics

The physical, social and psychological aspects of oral health encompass what is referred to as oral-health-related quality of life (QoL), and these provide an insight into how individual oral health status effects life quality and how oral health care and orthodontic treatment bring about improvements to QoL (Cunningham & Hunt, 2001b).

Controversy in oral esthetics and treatment need as perceived by dentists and patients

Several studies warned that a considerable disagreement exists between patients and dentists concerning aesthetics and treatment need (Mohlin & Kuroi, 2003). While visible irregularity of teeth seems to be a common and a logic motive for seeking treatment, one must be cognizant that the long term psychological benefits of orthodontic treatment are difficult to measure.

In regards to untreated malocclusion, the association between individual's concepts of body image and low self esteem persists past childhood into adulthood (Helm, Kreiborg, & Solow, 1985a). A study designed to assess children between 7 and 15 years of age who had early treatment to correct 'buck teeth' found that these patients did not exhibit low self-concept nor did their self-concept improve during the brief period of early orthodontic treatment (Dann, Phillips, Broder, & Tulloch, 1995). Thus the central role played by dentofacial appearance in developing self-concept remains controversial.

Patients and dentists differ in their evaluation of oral health and the perception of oral diseases (Hunt et al., 2002). There is only a modest correlation between patients' perception of their need for orthodontic treatment and an objective, profession-based evaluation of their malocclusion (Kok, Mageson, Harradine, & Sprod, 2004). Traditionally, measures of orthodontic need and outcome have placed little emphasis on the patient's perception of need and more importantly, the difference that orthodontic care makes to the children's and their families' daily lives (Mandall, Wright, Conboy, & O'Brien, 2001). Researchers and clinicians have recently focused more on patient-based outcome measures including change in oral health-related quality of life (OHRQoL) which may be particularly important in those interventions that are perceived as 'cosmetic' or 'elective' (Cunningham & Hunt, 2001a).

Oral health-related quality of life measures

Over the past decade, an extensive amount of studies was published in the dental literature aimed to assess the oral health-related quality of life of different populations with numerous occlusal traits by utilizing several subjective, questionnaire-based measures. There is a wide array of definitions of quality of life. The World Health Organization Quality of Life Group defined quality of life as: "An individual's perception of their position in life in the context of the culture and value system in which they live and in relation to their goals, expectations, standards, and concerns. It is a broad-ranging concept affected in a complex way by the person's physical health, psychological state, level of dependence, social relationships, and their relationships to salient features of their environment" (Study protocol for the world health organization project to develop a quality of life assessment instrument (WHOQOL).1993).

Several measures have been developed to assess oral health-related quality of life using measures relevant to children and their families, the majority of which are generic, for example: Michigan Oral Health-Related Quality of Life Scale-Child Version (Filstrup et al., 2003), Child-Oral Impacts of Daily Performance (Child-OIDP) (Gherunpong, Tsakos, & Sheiham, 2004), and Child Oral Health Quality of Life (COHQoL) Questionnaire (Jokovic et al., 2002). Only a few measures are truly condition-specific, for example the Orthognathic Quality of Life Questionnaire (Cunningham, Garratt, & Hunt, 2000). Mandall et al developed a measure for use in orthodontics and called it Oral Aesthetic Subjective Impact Scale (OASIS) (Mandall, McCord, Blinkhorn, Worthington, & O'Brien, 2000).

Child oral health related quality of life (COHQoL) questionnaires

A team at University of Toronto, Jokovic and colleagues, designed the COHQoL Questionnaire to assess the oral health-related quality of life of children. The COHQoL is a generic questionnaire incorporating a Parental-Caregiver Perceptions Questionnaire (P-CPQ) and Child Perceptions Questionnaires (CPQ) for children aged 8 to 10 years, and 11 to 14 years. The measures are designed to be used for children with a wide range of oral and orofacial conditions including caries, malocclusions, clefts, and other orofacial anomalies. However, it has recently become popular in orthodontics due to age group on which it was developed and tested.

The questionnaires have been shown to have good validity, with the highest impact being noted for the orofacial group and the lowest impact for the pedodontic group; the orthodontic group lying between the two. Repeatability was also good in both the orofacial and orthodontic groups, and which is encouraging for future studies undertaken in orthodontics (Jokovic et al., 2002).

Summary of published studies that utilized COHQoL questionnaires to assess the impact of increased dental overjet on quality of life of patients

A review of literature revealed that only four studies were conducted to investigate the impact of increased dental overjet on the quality of life of children and their families using COHQoL questionnaires:

1. Ninety patients and their parents were recruited on the basis of having an increased overjet, spacing, or a normal occlusion (acting as the control group). Each subject and their parent completed the Child and Parental-Caregiver Perception questionnaire, respectively. The results suggested that occlusal traits such as an increased overjet and a spaced dentition, do have a significant negative impact on both the children's and their families' quality of life. However, no statistically significant difference was detected

between children in the increased overjet and spaced dentition groups (Johal et al., 2007).

2. A cross-sectional study evaluated 116 patients aged 11-14 years about to commence orthodontic treatment which were divided into three groups depending on the malocclusion: crowding, hypodontia, or an increased overjet. The control group consisted of 31 patients with IOTN 1 and 2, and no history of orthodontic treatment. The children completed the CPQ and their parents completed the Parental Perception Questionnaire (P-CPQ). The results showed that the CPQ did not differentiate between the three malocclusion groups, but there was a statistically significant difference between the malocclusion and control total CPQ scores. These differences were significant for the emotional and social well-being domains, and non-significant for the oral symptoms and functional limitations domains, which highlight the fact that some of the questions in the oral symptoms and functional limitations subscales are not relevant to orthodontic patients (O'Brien, Benson, & Marshman, 2007).
3. A study conducted in Brazil aimed to appraise the influence of socioeconomic status on COHQoL of 792 school children aged 12 years found that higher impacts on COHQoL were observed for children presenting with untreated dental caries and maxillary overjet. Socioeconomic factors influenced COHQoL such as poorer scores were reported by children whose mothers have not completed primary education and those with lower household income (Piovesan, Antunes, Guedes, & Ardenghi, 2010).
4. One of the most recent studies which aimed to investigate whether there is a relationship between bullying, malocclusion, and need for orthodontic treatment and an individual's self-esteem and oral health-related quality of life (COHQoL) was conducted in the United Kingdom. 336 participants aged between 10 and 14 years were recruited, 12.8% of which reported being a victim of bullying. Moreover, being bullied was significantly associated with Class II Division 1 incisor relationship, increased overbite, increased

overjet, and a high need for orthodontic treatment assessed using AC IOTN. Bullied adolescents also reported lower levels of social competence, athletic competence, physical and general self-esteem (Seehra, Newton, & DiBiase, 2011).

Statement of the problem

The changes in oral health-related quality life of adolescents and their parents following dental overjet reduction to within normal limits with orthodontics treatment have not been adequately addressed in previous studies with the use of validated measure such as (COHQoL).

Purpose of the study

The purposes of this retrospective (cross sectional study) is to assess changes in oral health-related quality of life of children and their parents after overjet reduction to within limits with orthodontic treatment by utilizing before-and-after design.

Objectives of the study

General objectives

- To assess the impact a malocclusion trait, namely increased overjet ($\geq 6\text{mm}$), on the quality of life of adolescents and their families
- To evaluate the effects of reduction of the overjet to within normal limits (1-4 mm) by orthodontic treatment on OHRQoL of adolescents and their parents.

Specific Objectives:

1. To assess frequency and prevalence of impact on the quality of life of adolescents and their parents before orthodontic treatment of the two study groups, namely Group A and Group B (pre- and post- treatment, respectively).
2. To compare the mean difference of four health domains of quality of life between adolescents and their parents before orthodontic treatment (Group A Child minus Parent at Time 1) and (Group B Child minus Parent at Time 1)
3. To report responses of adolescents and their parents to two single-item global rating questions before orthodontic treatment (Time 1).
4. To assess the change in (OHRQoL) of adolescents and their parents after overjet correction by means of orthodontic treatment (Group B Child T1 minus T2) and (Group B Parent T1 minus T2).
5. To compare the mean difference of four health domains of quality of life between adolescents and their parents after orthodontic treatment (Group B Child minus Parent at T2)
6. To report responses of adolescents and their parents to two single-item global transition rating questions after orthodontic treatment (Time 2)
7. To compare the mean differences of four health domains of quality of life between two groups of adolescents (Group A at T1 vs. Group B at T1).
8. To compare the mean differences of six health domains of quality of life between two groups of parents (Group A at T1 vs. Group B at T1).

Hypothesis

- The orthodontic correction of increased overjet ($\geq 6\text{mm}$) has a significant positive impact on the oral health-related quality of life (OHRQoL) of both children and their parents.
- The degree of perceived change in (OHRQoL) after orthodontic treatment is positive and similar between the children and their parents.
- The degree of perceived impacts on (OHRQoL) before orthodontic treatment is negative and similar between the children and their parents.
- The degree of perceived impacts on (OHRQoL) before orthodontic treatment is negative and similar between the pre- and post- treatment groups.

Chapter 2

Materials and Methods

Research ethics approval

Ethical approval was obtained prior to beginning the study from the University of Manitoba Health Research Ethics Board, Bannatyne Campus, on November 15th, 2010 (Appendix 1). Annual Approval for the study was obtained on December 14, 2011 (Appendix 2). The data collection took place over the next 13 months following the receipt of Ethical Approval (until December 20th, 2011).

Study Sample

The present study aimed to assess a sample of 60 patients aged between 11-18 years and their parents (60 parents) which were allocated to two groups, (Group A) and (Group B), based on predetermined criteria. A similar sample size was utilized in previous quality of life studies conducted by (Jokovic, Locker, Tompson, & Guyatt, 2004) and (Locker, Jokovic, & Tompson, 2005). In addition, the current study is assessing the impact of the dental overjet as a single and very noticeable characteristic. This malocclusion brings high awareness in the patient, parents and friends and for this reason the sample size of 30 subjects per group is sufficient.

Rationale of sample selection

Children and adolescents make up the majority of orthodontic patients; therefore important psychological questions to be answered are related to the timing to initiate treatment and the

psychological and psycho-social effects of correcting protruding teeth and improving facial appearance. Children begin to understand the effects of ill-health on social activities and relationships around 8 years of age (Jokovic et al., 2004). From the teenage period and onwards, psycho-social or aesthetic reasons for orthodontic treatment are dominating. Orthodontic treatment aimed to improve aesthetics should start when the child has reached sufficient maturity for such a decision, and this is normally after 12 years of age (Mohlin & Kuroi, 2003).

Inclusion Criteria:

Patients aged between 11-18 years, who demonstrated the following occlusal traits:

1. Increased overjet ≥ 6 mm of at least two maxillary central incisors before treatment.
2. Dental Overjet based on IOTN Dental Health Component (DHC) grade 4.a or grade 5.a, where 4.a represents increased overjet greater than 6mm but less than or equal to 9mm, and 5.a represents increased overjet greater than 9mm.
3. Intervention with either a functional appliance, headgear, limited 2x4, and full fixed orthodontic appliance with and without extraction.

Exclusion Criteria:

Learning difficulties, physical disability, chronic medical conditions, symptoms of pain or discomfort from any body part, untreated dental caries, severe dental mottling, poor periodontal health status, syndromes and craniofacial anomalies such as cleft lip and palate. This exclusion criterion was in effect to prevent possible confounding effects of these conditions on the participants' quality of life (Agou, Locker, Muirhead, Tompson, & Streiner, 2011).

Sample Selection:

Initial selection of potential participants was based on the screening of the pre-treatment intra- and extra-oral digital photographs, which are saved in the electronic data base of the Graduate Orthodontic Clinic at the University of Manitoba. Patients' records within the previous five years were reviewed by the principal investigator (PI). Subjects' records with increased dental overjet, as evident in their intra- and extra-oral photographs, were further assessed by examining their plaster study models to measure the dental overjet and to assess the subject's occlusion using the IOTN DHC. More than 90 potential participants were identified and contacted for the purpose of recruitment to the study.

Of these 90 potential participants, 53 responded and agreed to participate in the study. Of these individuals, two groups were identified:

- **(Group A)** included 28 patients prior to orthodontic treatment with increased dental overjet ≥ 6 mm of at least two maxillary central incisors. Participants were selected from initial records (A record) of patients who were about to commence their orthodontic treatment at the graduate orthodontic clinic in the University of Manitoba.
- **(Group B)** included 25 patients after orthodontic treatment where the dental overjet had reduced to normal limits and who had previous increased overjet ≥ 6 mm of at least two maxillary central incisors. Participants were selected from final records (B records) and also the end of phase 1 records (A2 records) of patients who had received and finished orthodontic treatment at the graduate orthodontic clinic at the University of Manitoba, within five years period preceding the commence of this study.

Study questionnaires:

The data collection instrument for assessment of oral health-related quality of life was the Child Oral Health Quality of Life (COHQoL) Questionnaire. The questionnaires were developed by Community Dental Health Services Research Unit in Faculty of Dentistry at University of Toronto. The principal investigator had contacted the author, Dr. A. Jokovic, by electronic mail regarding permission to use the (COHQoL) questionnaires.

Because the questionnaire was available in the public domain; the (PI) was permitted to use it as providing its structure was maintained. The questionnaires were found on the following web site: <http://www.cdhsru-uoft.com/cohqol/questionnaires.htm>.

The data were collected through self-completion questionnaire. The Child Oral Health Quality of Life (COHQoL) Questionnaire consists of a Parental-Caregiver Perceptions Questionnaire (P-CPQ), and Child Perceptions Questionnaires (CPQ11-14) for children aged 11 to 14 years. In the present study, the CPQ 11-14 was used for subjects who are up to 18 years of age.

Global rating and Transition rating questions were included in the CPQ and P-CPQ questionnaires at Time 1 and Time 2, respectively, because they aid in assessing both the perceived general oral health and the change in subjects' perception as a result of orthodontic treatment.

Components of child oral health-related quality of life (COHQoL) Questionnaires:

The questionnaire for 11 to 14 year-old children (CPQ11-14) contains 36 items encompassing four health domains: oral symptoms (6 questions), functional limitations (9 questions), emotional

well-being (9 questions), and social well-being (13 questions) which assess peer interaction, schooling, and leisure activities.

The questionnaire is self-administered. All questions ask about the frequency of events in relation to the child's orofacial condition on a 5-point Likert scale ranging from never (scores 1) and everyday or almost everyday (scores 5). Summing the response scores for all items generate an overall CPQ11-14 score and in addition the scores for each domain can be computed. A higher score would reflect a greater impact on one's quality of life.

The CPQ11-14 has demonstrated acceptable reliability and validity in Canada (Jokovic et al., 2002), New Zealand (Foster Page, Thomson, Jokovic, & Locker, 2005), Uganda (Robinson, Nalweyiso, Busingye, & Whitworth, 2005), and the United Kingdom (Marshman et al., 2005).

The (P-CPQ) is a measure of parental-caregiver perceptions of the oral health-related quality of life of children. It is not intended to be a proxy measure but to supplement information obtained from the children. An evaluation of (P-CPQ) in Canada was found to have acceptable psychometric properties (Jokovic et al., 2003). In addition to the aforementioned four health domain as in CPQ 11-14, the P-CPQ contains two more domains, namely family quality of life (8 questions) and child's behaviour (6 questions).

In addition, two single-question measures, called "Global Rating", were used in the pre-treatment (Time 1) questionnaires. Global rating questions are used to assess the relationship between the children's rating of their own oral health and their oral health-related quality of life (Jokovic, Locker, & Guyatt, 2005).

Specifically, the global rating of oral health was worded as: "Would you say that the health of your teeth, lips, jaws and mouth is ...", and a rating of the extent to which oral/orofacial conditions affect one's overall well-being was worded as: "How much does the condition of your teeth, lips, jaws and mouth affect your life overall?". Transition ratings are two single-question

measures that are included in post-treatment (Time 2) questionnaires. Transition rating questions ask the participants to rate the change in oral health related quality of life after orthodontic treatment (Jokovic, Locker, & Guyatt, 2005). The transition rating of change in oral health was worded as: "Compared to before treatment, the health of your teeth, lips, and jaws has... ", and a rating of the extent to which oral/orofacial conditions affect overall well-being was worded as: "Think about how your life overall is affected by your teeth, lips and jaws. Compared to before treatment, has this...". The self-reported responses for rating the change in oral health and change in life overall as a result of orthodontic treatment ranged from stayed the same, changed a little, to changed a lot.

Study methods

Recruitment and obtaining consent from participants

Patients' names and addresses were obtained from the data base of the Orthodontic Graduate Clinic at University of Manitoba. A telephone call to contact the parent/ guardians of potential participants was made by the (PI) to invite them to take part in the study on their next visit to the graduate orthodontic clinic. The script of the telephone call for the recruitment process was approved by the Research Ethics Board (Appendix 3).

If the parents were not reachable at the telephone number provided, an Invitation Letter was sent to parents/ guardians of the potential adolescent participants to seek consent for their cooperation in the study (Appendix 4). This letter also served to inform patients and parents about the study and to assure them of the confidentiality of any information collected and that their child's identity will be treated in accordance with the Personal Health Information Act of Manitoba (PHIA).

Verbal telephone consent from parents was followed by asking them to sign a Research Participant Information and Consent Form before completing the questionnaire (Appendix 5). The signing of informed consent was witnessed by a receptionist or a dental assistant, who was not involved in providing care to the participants. Because the participants in the study were younger than 18 years of age, in accordance with Research Ethic Board guidelines, parents were asked to sign the consent allowing their children to participate in the study. In addition, children were requested to sign a separate Assent for Children 8-18 Years Old Form (Appendix 6). Both consent forms were modified versions of consent templates provided by Research Ethics Board at University of Manitoba.

To avoid bias, personal and potential identifying information were kept separate from the questionnaires and were labelled with a unique identification number. This unique number was transferred onto the participants' questionnaires and was the only link to the source of information. The main administrator of the graduate program kept the personal information as well as the unique number stored securely. This person is responsible for the implementation of PHIA and the Privacy Act for the graduate program. On the completion of data analysis, the link between the unique number and the personal information was terminated

Data collection

The data collection time line was divided into three stages depending on the level of cooperation of the participants.

The first stage was implemented during the first four months following commencement of the study (November 2010 to March 2011) which involved booking an appointment for the participants and their parents to attend at the graduate orthodontic clinic in order to sign consent forms and to complete the appropriate questionnaires.

The second stage was implemented during the next three months (April 2011 to July 2011) which allowed participants to sign the consent forms at University of Manitoba and to take home the questionnaire forms to complete within one week. These questionnaire forms were either mailed back or dropped off at the graduate orthodontic clinic.

The third stage took place during the final five months of the data collection period (August 2011 to December 2011) where consent forms and questionnaire forms were sent to participants and their parents by mail. A return envelope with paid postage was included in each mailed package. Reminder telephone calls were made by the principal investigator in case the questionnaire forms were not returned within two weeks of the mail out date.

Administration of Questionnaires

Each participant, child and parent, in the pre-treatment group (Group A) was shown printed intra-oral and extra-oral sets of photographs from the child's pre-treatment orthodontic record (A record). Participants in the post-treatment group (Group B) were shown two different sets of printed intra- and extra-oral photographs which represent two time points.

Time 1 pertained to the child's pre-treatment (A Record) set of photographs, and Time 2 pertained to the child's post-treatment (A2 record or B Record) set of photographs.

- For Group A, a copy of self-administered questionnaires, (CPQ11-14) and (P-CPQ), were given to each subject and his/her parent-caregiver, respectively, with printed sets of pre-treatment photographs. Participants in Group A were asked to fill in questionnaires marked as (Time 1), in which items pertained to before treatment time point.

- For Group B, each subject and his/her parent-caregiver was asked to complete two separate copies of self-administered questionnaires, (CPQ11-14) and (P-CPQ). One copy was marked as (Time 1) and the second copy was marked as (Time 2), in which items pertained to two different time points, namely before and after treatment, respectively. The children and their parents were shown printed sets of the child's pre- and post-treatment photographs while completing their respective copies of Time 1 and Time 2 questionnaires.

The visual aid offered by displaying before and after treatment images of the child's teeth is beneficial because some subjects finished their orthodontic treatment within the previous five years. The use of printed sets of photographs may help patients and caregivers alike to remember the original malocclusion and facial appearance, and were used as a reference to a fixed time point when completing the questionnaires.

The feedback of both the participants and their parents about the current research was obtained by encouraging them to write any questions or concerns on last page of the questionnaire forms.

Calculation methods of study data, i.e. Item Score, Domain Score, Global Ratings, and Transition Ratings

The Child Perception questionnaire (CPQ 11-14) contained 36 items that composed four health domains: oral symptoms (6 questions), functional limitations (9 questions), emotional well-being (9 questions), and social well-being (13 questions) (Appendix 7). The Parental Perception questionnaire (P-CPQ) contained two additional domains: family quality of life (8 questions) and child's behaviour (6 questions) (Appendix 8).

The Child Oral Health-related Quality of Life questionnaires (COHQoL) asked participants to report the frequency of negative events at specific time points. Each child and parent in the pre-treatment group (Group A) completed one copy of the (COHQoL) questionnaire pertaining to before treatment (Time 1). Each child and parent in the post treatment group (Group B) were asked to complete two separate copies of the (COHQoL) questionnaires, CPQ and C-CPQ respectively, that were referring to before (Time 1) and after (Time 2) orthodontic treatment. In order to guide participants to the respective time points, a composite of images of patients' teeth and face was shown to them while completing the questionnaires.

The questionnaire items had five ordinal responses: never, once or twice, sometimes, often, and everyday or almost everyday. The parental questionnaire (P-CPQ) contained a sixth response of "Don't know" which was scored as "missing" in the frequency calculations.

The responses to each item were scored on a 5-point Likert scale ranging from never (score 1) to almost everyday (score 5) and "**Item Score**" was calculated as ordinal scores from 1 to 5. Thus, a high score would indicate poor quality of life.

The "**Domain Score**" is calculated by summing the response scores of items within each health domain. For example, the oral symptoms domain consisted of six items with maximum possible score of 30 for this domain. A high domain score suggests that the participant reported high impact on their everyday life due to increased dental overjet and reflects a poor quality of life.

Two single-question measures, called "**Global Ratings**", were used in the before treatment (Time 1) questionnaires. The five possible responses for rating overall oral health were: excellent, very good, good, fair, and poor. The five possible responses for rating the degree of which oral health is affecting their lives were: not at all, very little, some, a lot, and very much. Global rating score was calculated as ordinal scores from 1 to 5.

“Transition Ratings” are two single-question measures that were included in the after treatment (Time 2) questionnaires. Transition rating questions asked the participants to rate the change in their oral health related quality of life after orthodontic treatment. The three possible responses for rating the change in oral health were: stayed the same, changed a little, and changed a lot. The three possible responses for rating the extent that the change in oral health is affecting their lives were: stayed the same, changed a little, and changed a lot. The transition rating score was calculated as ordinal scores from 1 to 3.

The range of questions that represent each health domain in the CPQ and C-PCQ (Appendix 9) as well as the key to score responses to questionnaire items are enclosed (Appendix 10).

Statistical Analysis

Descriptive analysis of the data was performed to assess the frequency of events and the extent of the impact of increased dental overjet on the oral health related quality of life of participants and their parents. In addition, inferential analysis of the data was carried out by using paired and unpaired t-test procedures to study the differences within and between groups, respectively. The means of health domain scores were computed for the pre- and post-treatment study groups. The “mean difference” of each health domain was calculated then compared via t-test procedures to assess statistical significance ($p \leq 0.05$).

Chapter 3

Results

Demographic data

Of the 90 potential participants and their parents who were contacted for the purpose of recruitment to the study, 53 adolescents and their parents/guardians completed the questionnaires. This reflects a 59% participation rate.

Pre-treatment (Group A) consisted of 28 participants and their parents/guardians and post-treatment (Group B) consisted of 25 participants and their parents/guardians. The mean age of (Group A) subjects was 14 years old (standard deviation of 1.655), and the mean age of (Group B) subjects was 15.92 years old (St. Dev. of 1.579). Of the total number of the pre-treatment (Group A) children, 16 were females and 12 were males. The post-treatment (Group B) subjects were divided into 13 females and 12 males (Table 1).

Table 1: Summary of children's age and gender (Group A) and (Group B).

Group	N	Females	Males	Mean age	Std Dev	Minimum	Maximum
A	28	16	12	14	1.6555	12	18
B	25	13	12	15.92	1.5790	12	18

About one third of the parental/ caregiver questionnaires were completed by the fathers (35.71%), half of the respondents were the mothers (53.57%), and the rest of the pre-treatment (Group A) questionnaires were completed by "others" (10.71%) within the study sample (n=28) (Table 2).

In the post-treatment group (Group B), the parental/ caregiver questionnaires were predominately completed by the mothers (72%) and the rest of respondents were the fathers (28%) of the study sample (n=25) (Table 3).

Table 2 Parents (Group A) at Time 1.

Respondent	Frequency	Percentage (%)
Mother	10	35.71
Father	15	53.57
Other	3	10.71

Respondent	Frequency	Percentage (%)
Mother	7	28
Father	18	72

Table 3 Parents (Group B) at Time 1 and Time 2.

Descriptive analysis

Descriptive statistical analyses included the frequency and the extent of impacts on the participants' everyday life. The frequency reflects the number of participants reporting a particular response to a questionnaire item, which ranged from never (score 1) to, once or twice (score 2), sometimes (score 3), often (score 4), to everyday or almost everyday (score 5). The extent of the impact is the number of participants reporting one or more items as (often) or (everyday or almost everyday).

The child questionnaire CPQ contains 36 items and the parents' questionnaire P-CPQ contains 49 items. Frequencies for each questionnaire item, percentages of frequency, and extent of item impacts on quality of life of participants before and after treatment are reported in table forms (Appendix 11). For clarification purposes, few selected items' frequency and extent of impact will be highlighted in this section. When asked to report the frequency of pain in their teeth, mouth or jaws, almost one third (32%) of the children in the pre-treatment group (Group A) responded (never), over half reported having pain once or twice or sometimes (28% and 25%, respectively), with only a few reporting having pain often or almost everyday (7.14% and 7.14 %, respectively). The extent of impact of pain due to the children's oral condition was 14%, which was calculated by summing the two responses of (often) and (everyday or almost everyday).

Descriptive analyses also include assessment of responses to global rating questions.

Inferential analysis

Inferential statistical analyses included calculations of the mean, median, and ranges for each of "domain scores". Domain scores are calculated by summing the item scores within a domain.

The "mean difference" of each domain score was calculated by subtracting the mean of domain scores of two comparison groups. The appropriate paired and unpaired t-tests were calculated to determine the statistical significance at the level of 5%.

Oral health-related quality of life of adolescents and their parents after orthodontic treatment

The change in oral health-related quality of life of adolescents and their parents after orthodontic treatment represents the key outcome measure of interest because they demonstrate the perceived effect of orthodontic correction of increased dental overjet.

Each patient and his/her parent in the post-treatment (Group B) completed two separate questionnaires pertaining to before and after orthodontic treatment, that is (Time 1) and (Time 2) respectively. Paired t-tests were utilized to calculate the following "within group" comparisons.

Change in oral health related quality of life of children after dental overjet correction in (Group B)

The "mean difference" of each health domain was calculated by subtracting the post-treatment (Group B) children's mean domain scores at the "before treatment" time point (Time 1) minus their mean domains scores at the "after treatment" time point (Time 2).

The mean differences of oral symptoms, functional limitations, emotional well-being, and social well-being domains were all positive values, which indicate that children perceived poorer quality of life before orthodontic treatment than after finishing it. The improvement in oral health was statistically significant ($p \leq 0.05$) for all health domains except for social well-being domain ($p = 0.0865$). A summary of findings including mean differences, minimum, maximum, standard deviation, and p-values are listed in (Table 4).

Table 4 Change in COHQoL after overjet correction in Children (Group B).

Child T1 – T2, Group B, (N=25)							
Health Domain	Mean T1	Mean T2	Mean Difference T1-T2	St. Dev.	Min.	Max.	p-value
Oral Function	12.80	10.72	2.08	3.807	-2	13	0.0116
Functional Limitation	16.40	12.76	3.64	6.781	-1	30	0.0130
Emotional Well-Being	14.28	9.80	4.48	9.120	-4	36	0.0217
Social Well-Being	19.44	15.68	3.76	10.517	-4	51	0.0865

Children’s global ratings and transition ratings in (Group B)

Before treatment, most respondents (44%) rated their overall oral health as being “very good”, 20% rated it as being “good”, and the rest of children equally rated their oral health as being “excellent”, “fair”, and “poor” with (12%) for each response (Table 5).

After treatment, slightly less than half of children (48%) reported that their overall oral health had “changed a lot”, more than one third of them (36%) said that it had “stayed the same”, and the remainder (16%) said that it had only “changed a little” (Table 6).

Table 5 Responses to 1st global rating question, Children (Group B) at Time 1.

Overall oral health		
Response	Frequency	Percentage (%)
Excellent	3	12
Very Good	11	44
Good	5	20
Fair	3	12
Poor	3	12

Table 6 Responses to 1st transition rating question, Children (Group B) at Time 2.

Overall oral health		
Response	Frequency	Percentage (%)
Changed A Little	4	16
Changed A Lot	12	48
Stayed The Same	9	36

When the post-treatment (Group B) children were asked to report on the effect that increased dental overjet had on their life overall before orthodontic treatment, they reported from most to least, "very little" (40%), "a lot" (28%), "some" (20%), and "not at all" (12%) (Table 7).

When they were asked to rate the change in their life overall after orthodontic correction of the dental overjet, a little more than half (52%) responded that it had "stayed the same" and a little less than one third (28%) responded that it "changed a little". Only five children reported a significant positive change on their social well-being after braces, three of which (12%) reported that it "changed a lot" and two of which (8%) reported the change to be "very much" (Table 8).

Table 7 Responses to 2nd global rating question, Children (Group B) at Time 1.

Social well-being		
Response	Frequency	Percentage (%)
Not At All	3	12
Very Little	10	40
Some	5	20
A Lot	7	28
Very Much	0	0

Table 8 Responses to 2nd transition rating question, Children (Group B) at Time 2.

Social well-being		
Response	Frequency	Percentage (%)
Changed A Little	7	28
Changed A Lot	3	12
Stayed The Same	13	52
Very Much	2	8

Change in oral health related quality of life of parents after dental overjet correction in (Group B)

In the post-treatment group (Group B), the mean difference of each of the six parental health domains was calculated by subtracting the parental mean domain scores pertaining to before treatment (Time 1) minus the after treatment mean domain scores (Time 2).

The positive values of the mean differences of all parental health domains indicated that parents reported poorer quality of life before braces than after it. Moreover, the parental perception of five out of six health domains shows statistically significant improvement after correction of their children's dental overjet as evident by p-values that were less than 0.05. Paired t-tests revealed the following p-values: oral symptoms (0.0007), functional limitations (0.0247), emotional well-being (0.0480), family quality of life (0.0257), and child's behaviour (0.0441). The parents' perceived change in their children's social well-being was not statistically significant after orthodontic treatment ($p=0.0516$) (Table 9).

Table 9 Change in COHQoL after overjet correction in Parents (Group B).

Parent T1 – T2, (Group B), (N=25)							
Health Domain	Mean T1	Mean T2	Mean Difference T1-T2	St.Dev.	Min.	Max.	p-value
Oral Symptom	11.40	9.08	2.32	2.982	-5	11	0.0007
Functional Limitation	12.44	9.88	2.56	5.339	-8	17	0.0247
Emotional Well-Being	6.96	5.32	1.64	3.935	-6	11	0.048
Social Well-Being	8.60	7	1.60	3.905	-3	16	0.0516
Family QoL	10.56	9	1.56	3.279	-4	12	0.0257
Child Behaviour	7.12	6.44	0.68	1.600	-1	5	0.0441

Parents' global ratings and transition ratings in (Group B)

Before orthodontic treatment, eight parents (32%) rated their children's overall oral health as being "very good" and only seven parents (28%) rated it as "good". Five parents (20%) perceived their children's oral health as being "excellent", whereas another five parents (20%) reported "fair" and "poor" as a response to the same item (Table 10).

When asked to rate the effect that increased overjet has on their children's lives overall, only four parents (16%) responded by "not at all" and a little more than half of the parents (56%) rated the effect to be "very little" and "some". Slightly less than one third of the parents (28%) perceived the effects of increased overjet on their children's social well-being as "a lot" and "very much" (Table 11).

Table 10 Responses to 1st global rating question, Parents (Group B) at Time 1.

Overall oral health		
Response	Frequency	Percentage (%)
Excellent	5	20
Very Good	8	32
Good	7	28
Fair	4	16
Poor	1	4

Table 11 Responses to 2nd global rating question, Parents (Group B) at Time 1

Social well-being		
Response	Frequency	Percent
Not At All	4	16
Very Little	7	28
Some	7	28
A Lot	2	8
Very Much	5	20

After orthodontic treatment, when asked to rate the change in their children's overall oral health, most parents (64%) reported "stayed the same", while 28% of them reported "changed a lot", and only 8% reported "changed a little" (Table 12). Similarly, the majority of parents (84%) perceived the change their children's social well-being as "stayed the same". Only three parents (12%) reported "changed a lot", and one parent (4%) reported "changed a little" when asked the same question regarding their children's social life (Table 13).

Table 12 Responses to 1st transition rating question, Parents (Group B) at Time 2.

Overall oral health		
Response	Frequency	Percentage (%)
Changed A little	2	8
Changed A Lot	7	28
Stayed The Same	16	64

Table 13 Responses to 2nd transition rating question, Parents (Group B) at Time 2

Social well-being		
Response	Frequency	Percentage (%)
Changed A Little	1	4
Changed A Lot	3	12
Stayed The Same	21	84

Comparison of oral health-related quality of life of adolescents versus their parents after orthodontic treatment

Comparisons between the perceived oral health-related quality of life of children versus their parents (Child – Parent) across time points pertaining to after orthodontic treatment were made by calculating the “mean difference” of health domain scores as previously described. Because of this calculation order, a positive value would be indicative of children reporting worse quality of life than their parents and a negative value would mean that children perceived better quality of life than their parents. In addition, the paired t-tests were utilized to determine the statistical significance for each health domain comparisons at the level of 5%.

Comparison between the perceived oral-health related quality of life of children versus their parents within (Group B) after orthodontic treatment (Time 2)

For all health domains, namely oral symptoms, functional limitations, emotional well-being, and social well-being, the calculated mean differences were positive values, meaning children recorded poorer quality of life than their parents after orthodontic treatment. That can also demonstrate that parents were more optimistic than their children regarding the change in the quality of life after braces. Moreover, the children's assessments of poor quality of life were statistically significant, as shown in (Table 14).

Table 14 Comparison between COHQoLof Children vs. Parents in (Group B) at T2.

Child – Parent at T2, (Group B), (N=25)							
Health Domain	Mean (Child)	Mean (Parent)	Mean Difference (Child – Parent)	St. Dev.	Min.	Max.	p-value
Oral Symptom	10.72	9.08	1.64	2.841	-3	7	0.0081
Functional Limitation	12.76	9.88	2.88	2.976	-2	12	0.0001
Emotional Well-Being	9.80	5.32	4.48	2.275	1	14	0.0001
Social Well-Being	15.68	7	8.68	3.508	5	22	0.0001

Oral health-related quality of life of adolescents and their parents before orthodontic treatment

Children's global ratings in (Group A)

More than half of the children (53.57%) in pre-treatment group (Group A) rated their overall oral health as being "good" before orthodontic treatment. Five children (17.86%) reported "very

good”, whereas the remaining eight children (28.58%) perceived their oral health as “fair” and “poor” (Table 15).

When asked to rate the extent that increased overjet affects their lives overall, three quarter of the children (75%) reported minor effects as evident selecting the by responses: “not at all”, “very little”, and “some”. The rest of the study group (25%) answered “a lot” and “very much” when asked the same question (Table 16).

Table 15 Responses to 1st global rating question, Children (Group A) at Time 1.

Overall oral health		
Response	Frequency	Percentage (%)
Excellent	0	0
Very Good	5	17.86
Good	15	53.57
Fair	4	14.29
Poor	4	14.29

Table 16 Responses to 2nd global rating question, Children (Group A) at Time 1.

Social well-being		
Response	Frequency	Percentage (%)
Not at all	4	14.29
Very Little	8	28.57
Some	9	32.14
A Lot	6	21.43
Very Much	1	3.57

Parents' global ratings in (Group A)

Before orthodontic treatment, a little less than one third of the parents (28.58%) perceived their children's overall oral health as being "excellent" and "very good". A little over one third (35.71%) reported "good", while another third (35.71%) reported "fair" and "poor" as responses to the same item (Table 17). When asked to rate the effects of increased dental overjet had on their children's social well-being, just over two thirds of the parents (67.86%) indicated "not at all", "very little" and "some". The remaining one third of the parents (32%), answered with "a lot" and "very much" to the same question (Table 18).

Table 17 Responses to 1st global rating question, Parents (Group A) at Time 1.

Overall oral health		
Response	Frequency	Percentage (%)
Excellent	4	14.29
Very Good	4	14.29
Good	10	35.71
Fair	4	14.29
Poor	6	21.43

Table 18 Responses to 2nd global rating question, Parents (Group A) at Time 1.

Social well-being		
Response	Frequency	Percentage (%)
Not At All	4	14.29
Very Little	8	28.57
Some	7	25
A Lot	5	17.86
Very Much	4	14.29

Comparison of oral health-related quality of life of adolescents versus their parents before orthodontic treatment

Comparisons between the perceived oral health-related quality of life of children versus their parents (Child – Parent) across time points pertaining to before orthodontic treatment were made by calculating the "mean difference" of health domain scores as previously described.

A positive value would be indicative of children reporting worse quality of life than their parents and a negative value would mean that children perceived better quality of life than their parents. Paired t-tests were calculated to determine the statistical significance for each health domain comparisons at the level of 5%.

Comparison between the perceived oral-health related quality of life of children versus their parents within (Group A) before orthodontic treatment (Time 1)

The pre-treatment study group (Group A) consists of 28 children and their parents who are seeking orthodontic treatment at University of Manitoba.

The mean difference values of all health domains, namely oral symptoms (2.2857), functional limitations (2.8214), emotional well-being (8.5357), and social well-being (10.5357), were positive vales which reveal that children perceived worse quality of life than their parents. These values were found to be statistically significant for all health domains, as shown in (Table 19).

Table 19 Comparison between COHQoLof Children vs. Parents in (Group A) at T1.

Child – Parent at T1, (Group A), (N=28)							
Health Domain	Mean (Child)	Mean (Parent)	Mean Difference (Child – Parent)	St.Dev.	Min.	Max.	p-value
Oral Symptom	13.21	10.92	2.28	4.135	-4	13	0.0069

Functional Limitation	17.28	14.46	2.82	5.497	-12	12	0.0114
Emotional Well-Being	17.21	8.67	8.53	5.834	-1	22	0.0001
Social Well-Being	19.46	8.92	10.53	5.224	1	27	0.0001

Comparison between the perceived oral-health related quality of life of children versus their parents within (Group B) before orthodontic treatment (Time 1)

The post-treatment study group (Group B) consists of 25 children and their parents who finished orthodontic treatment at University of Manitoba. Each patient and his/her parent completed two separate questionnaires pertaining to before and after orthodontic treatment, that is (Time 1) and (Time 2) respectively.

Before orthodontic treatment, children reported poorer quality of life than their parents across the four health domains as evident by predominately positive values of all the mean difference calculations, i.e. oral symptoms, functional limitations, emotional well-being, and social well-being. In other words, parents' perception of the impact of increased overjet on their children's quality of life is less pronounced (Table 20).

The children's assessments of poor quality of life before treatment were supported by p-values less than 0.05 of three out of four health domains, thus statistically significant. These domains were functional limitations, emotional well-being, and social well-being. However, the reported difference in oral symptoms domain between children and their parents was not significant ($p=0.1359$) (Table 20).

Table 20 Comparison between COHQoLof Children vs. Parents in (Group B) at T1.

Child – Parent at T1, (Group B), (N=25)							
Health Domain	Mean (Child)	Mean (Parent)	Mean Difference (Child – Parent)	St. Dev.	Min.	Max.	p-value
Oral Symptom	12.80	11.40	1.40	4.536	-6	15	0.1359
Functional Limitation	16.40	12.44	3.96	8.99	-11	29	0.0375
Emotional Well-Being	14.28	6.96	7.32	9.017	-3	34	0.0005
Social Well-Being	19.44	8.60	10.84	10.131	-3	53	0.0001

Comparison of oral health-related quality of life between the pre- and post-treatment study groups

The quality of life of children and parents in pre-treatment (Group A) and post-treatment (Group B) groups were separately compared at a common time point, i.e. “before treatment” (Time 1). The mean difference for each health domain was calculated by subtracting the (Group A) mean score of a domain minus (Group B) mean score of the same domain. Unpaired t-tests were calculated to compare the reported oral health related quality of life of between the two study groups and the statistical significance level was 5%.

Comparison between pre- and post-treatment children's quality of life at (Time 1)

The calculated mean difference (A-B) of health domains were (0.4143) for oral symptoms, (0.8857) for functional limitations, (2.9343) for emotional well-being, and (0.0243) for social well. The mean differences of all health domain scores were positive indicating that children in (Group A) had higher mean scores, and therefore, reportedly poorer quality of life than those in

(Group B). However, the perceived differences in quality of life of between children in (Group A) and (Group B) before orthodontic treatments were not statistically significant for all health domains (Table 21).

Table 21 Comparison between COHQoLof Children (Group A) vs. Children (Group B) at T1.

Child (Group A) – Child (Group B) at T1					
Health Domain	Mean (Group A)	Mean (Group B)	Mean Difference (A – B)	St.Dev.	p-value
Oral Symptom	13.21	12.80	0.41	4.127	0.7168
Functional Limitation	17.28	16.40	0.88	6.828	0.6393
Emotional Well-Being	17.21	14.28	2.93	8.099	0.1939
Social Well-Being	19.46	19.44	0.02	8.108	0.9917

Comparison between pre- and post-treatment parents' quality of life at (Time 1)

Parents in (Group A) reported worse quality of their children life before orthodontic treatment than those in (Group B) in four out of six health domains. That was supported by the positive values of the mean differences (A-B) of the following four domains functional limitations, emotional well-being, social well-being, and family members' quality of life. Based on the negative values of the mean difference (A-B) of oral symptoms (-0.4714) and child behaviour (-0.0129) domains, it can be said that (Group A) parents perceived better quality of life than (Group B) parents before orthodontic treatment for those domains (Table 22). However, all the reported differences between parents in (Group A) and (Group B) were not found to be statistically significant (Table 22).

Table 22 Comparison between COHQoLof Parents (Group A) vs. Parents (Group B) at T1.

Parent (Group A) – Parent (Group B) at T1					
Health Domain	Mean (Group A)	Mean (Group B)	Mean Difference (A – B)	St. Dev.	p-value
Oral Symptom	10.92	11.40	-0.47	3.64	0.6399
Functional Limitation	14.46	12.44	2.02	5.87	0.2163
Emotional Well-Being	8.67	6.96	1.71	4.30	0.1529
Social Well-Being	8.92	8.60	0.32	4.19	0.7769
Family QoL	11.89	10.56	1.33	3.71	0.1978
Child Behaviour	7.10	7.12	-0.01	2.10	0.9824

Chapter 4

Discussion

Summary of study protocol

The Child Oral Health-related Quality of Life questionnaires (COHQoL) were administered to examine the changes in oral health-related quality of life of adolescents (aged 12-18) and their parents after orthodontic correction of increased dental overjet of ≥ 6 mm. The (COHQoL) consists of two questionnaire forms, CPQ and P-CPQ. The child perception questionnaire (CPQ) contained 36 items that encompass four health domains: oral symptoms, functional limitations, emotional well-being, and social well-being. The Parental Perception questionnaire (P-CPQ) contained these plus additional domains: family quality of life and the child's behaviour.

The (COHQoL) asked participants to report the frequency of negative events which were caused by the children's increased dental overjet at specific time points. The 53 respondents and their parents were allocated to two study groups, (Group A) which consisted of 28 children and 28 parents, and (Group B) which consisted of 25 adolescents and 25 parents. Each child and parent in the pre-treatment group (Group A) completed one copy of the COHQoL questionnaire pertaining to before treatment (Time 1). Each child and parent in the post treatment group (Group B) were asked to complete two separate copies of the COHQoL questionnaires that were referring to before (Time 1) and after (Time 2) orthodontic treatment. In order to guide participants to the intended time points, a composite of images of patients' teeth and face was shown to them while completing the questionnaires.

Descriptive and inferential statistical analyses were performed to thoroughly assess the study's general objectives, namely the impact that increased overjet (≥ 6 mm) has on the quality of life of

adolescents and their families and the effects of reduction of the overjet to within normal limits by orthodontic treatment on the (COHRQoL) of adolescents and their parents.

The means of health domain scores were computed for the pre- and post-treatment study groups. The "mean difference" of each health domain was calculated by subtracting the child minus the parent mean domain (for within group comparisons), and (Group A) minus (Group B) mean domain (for between groups comparisons). The statistical significance level was set at ($p \leq 0.05$).

Considerations

In order to put the study results into perspective, two points must be emphasized. Although the PPQ and CPQ11–14 are analogous questionnaires with 31 common items, it must be remembered that the CPQ11–14 measures the child's perception of his/her oral health-related quality of life, while the PPQ measures the parent's perception of the oral health-related quality of life of the child. Therefore parental reports were not proxies nor used as alternatives to the children's reports. In fact, valuable information may have been lost by choosing to examine one over the other.

A second important consideration is that the 28 participants in pre-treatment (Group A) were prospective orthodontic patients who did not receive treatment for their markedly prominent front teeth at the time of questionnaire administration, while the 25 adolescents in the post-treatment (Group B) were patients who finished orthodontic treatment within the five years preceding the administration of the study questionnaires in which their previously increased dental overjet of ≥ 6 mm were reduced to within normal limits. Based on the nature of our two study groups, two important factors must be taken into consideration when analysing the study results at (Time 1), (i.e. the "before treatment" time point).

On one hand, the reported pre-treatment oral health-related quality of life (OHQoL) of participants in (Group A) reflects the current impact of increased dental overjet on the subjects' lives, on the other hand, it must be acknowledged that the impacts of increased dental overjet on quality of life were reported retrospectively by participants in (Group B) at the "before treatment" time point and that these findings represent the perceived (OHQoL) based on the participants' memory. However, the participants were aided by a set of printed intra- and extra-oral photographs from the children's pre-treatment orthodontic records (A records).

Oral health-related quality of life of adolescents and their parents after orthodontic treatment

Patients who received treatment were the focal group of interest in the study, thus a thorough assessment of the change in oral health-related quality of life (OHRQoL) of these adolescents and their parents after orthodontic treatment is of great importance to demonstrate the perceived effect of orthodontic correction of increased dental overjet.

For clarification, the discussion of study results pertaining to the change in (OHRQoL) will exclusively examine the post-treatment subjects (Group B). Further, the discussion of these results will be divided into two parts; the first represents the change in (OHRQoL) across time points (T1 - T2) and the second represents a comparison of post-treatment (OHRQoL) between children and their parents (children - parents).

Change in OHRQoL of children after dental overjet correction (Time 1 – Time 2)

The results indicated that children perceived improvement in all oral health-related quality of life domains after finishing orthodontic treatment. The improved oral health domains were found to be statistically significant ($p \leq 0.05$) for all domains, except for the social well-being domain.

This sample of post-treatment children reported significant reductions in negative oral impacts after orthodontic treatment and these results agree with other studies highlighting the positive effect of orthodontic treatment on (OHRQOL). For instance, two cross sectional studies conducted in China (Zhang, McGrath, & Hagg, 2006) and Brazil (de Oliveira & Sheiham, 2004) concluded that quality of life scores improved significantly after orthodontic treatment of children in Hong Kong and Sao Paulo. However, these data showed that the amounts of positive effects of orthodontic treatment on children's quality of life were not significant when viewed in the context of social well-being. The social well-being domain includes items that surround the impacts on various social interactions, such as speaking in class, social and leisure activities, smiling and talking to other children, and teasing by other children (Agou et al., 2011). Consistent with these findings, O'Brien et al assessed (OHRQoL) scales and concluded that the main differences between children with malocclusion vs. acceptable occlusion were found on emotional and social well-being scales, but not on oral symptoms and functional limitation scales (O'Brien et al., 2007).

Several studies using different outcome measures, such as Oral Health Impact Profile OHIP-14, confirmed the core findings in the present study and suggested that adolescents who had orthodontic treatment experienced fewer negative oral health impacts than those who were under treatment or who never had treatment (de Oliveira & Sheiham, 2004). Although the type of malocclusion was not reported in de Oliveira et al's study, significant differences emerged in

three areas related to social well-being, namely smiling, laughing, and showing teeth without embarrassment (de Oliveira & Sheiham, 2004).

In concert with our findings, a recent longitudinal study conducted at the University of Toronto found that the orthodontic treatment effects varied across the four health domains of CPQ11-14 and that social well being was found to be the only domain that closely corresponded to objective treatment needs (Agou et al., 2011).

One study suggested that the association between increased overjet and poor (COHQoL), mainly in the social well-being domain, may be explained by self-image dissatisfaction (Piovesan et al., 2010). Developmental psychologists generally agree that a child's self-concept develops from the "reflected appraisal" that he or she receives from others (Tung & Kiyak, 1998). Thus unaesthetic protruded incisors and high orthodontic treatment need exhibited by children in the present study sample may have caused remarkable detrimental effects on their social well being which may not be amenable to recovery by orthodontic treatment alone. However, the social well being of patients with severe malocclusions and facial impairments were demonstrated to greatly improve after comprehensive interventions that combine orthodontics and orthognathic surgery. For instance, a study conducted to review the literature about psychological aspects of orthognathic surgery indicated that many studies found that patients had improved self-confidence and social skills after treatment (Cunningham, Hunt, & Feinmann, 1995). Similarly, correction of cleft lip or palate resulted in improved school performance and social acceptance (Jones, 1984).

The psychological damage due to increased dental overjet and subsequently adverse effects on children's social skill and acceptability could have occurred well before they presented for treatment. Studies confirm that the high level of self-consciousness about the appearance of teeth is striking even among children as young as age eight or nine (Kiyak, 2008b).

Contrary to the findings of present study, a 20-year follow-up study compared the dental and psychosocial status of individuals who received or did not receive orthodontics as teenagers and found that orthodontics had little positive impact on psychological health and quality of life in adulthood (P. M. Kenealy, Kingdon, Richmond, & Shaw, 2007). Similarly, a 17-year observational cohort study found a limited association between occlusal status at adolescence and quality of life and psycho-social factors at adulthood (Arrow, Brennan, & Spencer, 2011). Kenealy and coworkers suggested that self-esteem in adulthood was instead forecasted by several psychological variables, such as general life satisfaction, levels of depression and social anxiety, and self-perception of attractiveness (P. M. Kenealy et al., 2007).

Another explanation for variation in the amounts of change in quality of life after orthodontic treatment can be drawn from studies that pointed to the importance of personal, social, and environmental factors in modifying the outcomes of patients' quality of life measures (Wilson & Cleary, 1995), which were not accounted for in the administered child perception questionnaire (CPQ). Moreover, children experience major changes in aspects of self-esteem, optimism regarding the future, and social acceptance as they move from early childhood through the teen years (Tung & Kiyak, 1998).

Children's global ratings and transition ratings in (Group B)

The global rating and transition rating questions were descriptive measures that confirmed the findings reported in the inferential analyses of the data. Of the 25 participants in the post-treatment group (Group B), only 7 reported "a lot" (28%) and 18 collectively reported "not at all", "very little", and "some" (72%) when they were asked to report in retrospect on the effects of increased dental overjet on their life overall before treatment. The minor impact of increased overjet on adolescents' lives may be explained by the time gap between the completion of

treatment and the administration of questionnaires and, as mentioned earlier, that responses were reported retrospectively from the participants' memory.

In agreement with the reported statistically insignificant change in their social well being after braces, 20 adolescents (80%) indicated that their overall social well being had "stayed the same" or "changed a little". This finding can be viewed as a logical outcome because the reported impact of increased dental overjet on patients' lives was a small one, thus orthodontic correction of their malocclusion may not cause a significant change in their social well being. Further, Kiyak concluded that orthodontic intervention has been found to enhance the esthetic aspects of children's (OHRQoL) but not necessarily their social acceptance (Kiyak, 2008b). A long term follow up study suggested orthodontic treatment does not appear to be associated with oral health-related quality of life in the adult life, but appears to be negatively associated with psycho-social factors such as life satisfaction and self-esteem (Arrow et al., 2011).

Change in OHRQoL of parents after dental overjet correction in (Time 1 – Time 2)

The results show striking similarities between adolescents' and parents' perception of (OHRQoL) after orthodontic treatment. Like their children, parents generally reported poorer quality of life before braces than after. Moreover, the parental perception shows statistically significant improvement after correction of their children's dental overjet in five out of six of health domains, namely oral symptoms, functional limitations, emotional well-being, family quality of life, and the child's behaviour. It is interesting to note that, in agreement to their children's perception, the parental perceived change in their children's social well being was not statistically significant after orthodontic treatment ($p=0.0516$). These findings are consistent with Jokovic et al's study of health-related quality of life in children that found substantial agreement between 42 mothers and their children (aged 11-14) at the overall PPQ and CPQ11–14 scores.

However, while the agreement was substantial for oral symptoms and functional limitations, it was moderate for both emotional and social well-being domains. It was concluded that mothers should not be used as proxies for their children when the main concern is the child's emotional and social well-being (Jokovic, Locker, Stephens, & Guyatt, 2003).

Given the level of nearly perfect agreement between children and their parents in the present study, it is surprising to note that the majority of respondents of post-treatment parental questionnaires were the fathers of the participants (72%). No reports were found in the dental English literature about the level of agreement between children and their fathers concerning a child's health quality of life.

The findings of agreement between the children and their parents are supported by the work of Johal and colleagues, which demonstrate the point that the malocclusion, in the form of an increased overjet or dental spacing, not only has a direct impact on the child themselves but also has an effect on parents and other family members (Johal et al., 2007). Conversely, Jokovic and coworkers found that some parents of children aged 11- 14 years have limited knowledge concerning their children's (OHRQoL) but concluded that the information provided by parents is useful even if it is incomplete (Jokovic, Locker, & Guyatt, 2004).

Parents' global ratings and transition ratings in (Group B)

When asked to rate the effect that increased overjet has on their children's social well-being, three quarters of the parents reported it to be minor and only one third perceived the effects of social well-being to be detrimental. Similarly, all parents perceived no change to their children's social well-being after orthodontic treatment, except for 3 parents who reported a remarkable change. It is clear that the parental responses to global rating and transition rating questions align very closely with their children's. These findings generally indicate, contrary of common

belief (Jokovic et al., 2003), that parents of older children (up to 18 years of age) may still have a good awareness of the interplay between their children's dental conditions and their social lives.

Comparison of post-treatment OHRQoL between children and their parents in (Group B) (Children - Parents)

Results from present study showed consistency and agreement between the children and their parents' perception regarding the positive change in (OHRQoL) after overjet correction.

However, it is interesting to note that the degree of positive change is not identical between children and their parents. When comparing their responses, children reported worse quality of life than their parents for all health domains after orthodontic treatment. Moreover, the children's assessments of poorer quality of life were statistically significant. Analogous to our results, other studies reported that children rated their quality of life as more compromised by their oral and orofacial conditions than their mothers (Jokovic et al., 2003).

This can demonstrate that the parents in the present study were optimistic regarding the amounts of change in their children's quality of life after braces. This fact had been expressed in previous studies which found that parents consistently expect more improvement than their children for all domains (Tung & Kiyak, 1998).

Oral health-related quality of life of adolescents and their parents before orthodontic treatment

Prospective orthodontic patients with increased dental overjet were recruited to our study and assigned to the pre-treatment group (Group A) in order to assess the oral health-related quality of life (OHRQoL) of these children and their parents before orthodontic treatment

For the purpose of clarification, the discussion of study results pertaining to the (OHRQoL) before treatment will exclusively examine the "before treatment" time point (Time 1) of the two study groups, (Group A) and (Group B). Further, the discussion will focus on comparisons of pre-treatment (OHRQoL) between children and their parents (children - parents).

Comparison of pre-treatment OHRQoL of children versus their parents in (Group A) (Children - Parents)

Results revealed that all the 28 children in (Group A) perceived worse oral health-related quality of life than their parents due to increased dental overjet. Moreover, the children's perception of poorer quality of life was demonstrated to be statistically significant for all health domains.

In other words, parents in (Group A) seem to underestimate the severity of the impact of increased overjet on their children's everyday lives. Similarly, previous studies demonstrated the tendency of mothers to under-report the impact of oral conditions on the quality of life of their children, especially impacts concerning oral symptoms (Jokovic et al., 2003). It is interesting to note that in (Group A), mothers comprised one third (n=10) while fathers consisted a little more than half (n=15) of respondents. Three respondents were identified as "other".

The average age of children in (Group A) is 14 years which potentially coincides with their entry to senior high school. There is evidence of increased psychological and social impacts among

children with visible dental differences just before their transition to secondary school, which can be explained by appearance-related anxiety with meeting new peers in the new school (Rodd, Marshman, Porritt, Bradbury, & Baker, 2011a). However, the impact of various dental conditions appeared worse just before the school move and then subsided once the transition had been made (Rodd, Marshman, Porritt, Bradbury, & Baker, 2011a).

Children's global ratings in (Group A)

Of 28 children, only eight (28.58%) perceived their current oral health as "fair" and "poor" before orthodontic treatment. When asked to rate the extent that increased overjet affects their lives overall, three quarters of the children (75%) reported minor effects whereas the rest of the study group (25%) indicated that it had affected their lives to a large extent.

The reported minor effects of increased overjet on life overall by pre-treatment children in the current study is discordant with Johal et al's study, which found that children who had increased overjet (>6 mm) or anterior spacing greater than 1.5 mm between adjacent teeth reported poorer OHRQoL than children with acceptable or ideal occlusions (Johal et al., 2007). However, studies conducted by Kok et al in the United Kingdom and Birkeland et al in Norway, discredited the importance of asking children directly to rate their dental esthetics and the impact of their malocclusion on their quality of life, because both studies found that children with the worst malocclusion (Grade 5 on the DHC of IOTN) were not always concerned about their condition (Kok et al., 2004) and (Birkeland, Boe, & Wisth, 1996).

Parents' global ratings in (Group A)

Before orthodontic treatment, only 10 parents (35.71%) perceived their children's overall oral health as being "fair" and "poor". When asked to rate the effects of increased dental overjet had on their children's social well-being, 19 parents (67.86%) indicated minor effects while only nine parents (32%) indicated detrimental effects. Thus, the parents' global rating was worse than the children's themselves. Further, our results suggest that there is good agreement between the parent and child global ratings of oral health and overall well being. In contrast, previous studies showed the level of agreement between the mother and child global ratings of oral health was moderate and the global ratings of the effect of the orofacial conditions, such as cleft lip and palate, on the child's overall well-being was much lower (Jokovic et al., 2003).

Comparison of pre-treatment OHRQoL of children versus their parents in (Group B) (Children – Parents)

The post-treatment study group (Group B) was asked to retrospectively report their (OHRQoL) at the "before orthodontic treatment" time point (Time 1).

Results showed that children reported poorer quality of life than their parents across the four health domains. Moreover, the children's assessments of poor quality of life before treatment was statistically significant in three out of four health domains, which were functional limitations, emotional well-being, and social well-being. However, the reported difference in the oral symptoms domain between children and their parents was not significant ($p=0.1359$). The oral symptoms domain included items surround the frequency of the experiences of pain, bleeding gums, mouth sores, bad breath, and food caught in between teeth and in palate.

The present study's finding of patients expressing concerns regarding the oral symptoms domain is supported by a recent study that assessed the relationship between untreated malocclusions and (OHRQOL) in male adolescents that suggested that among the four health domains, only the oral symptoms domain was significantly correlated with high treatment need (Heravi, Farzanegan, Tabatabaee, & Sadeghi, 2011).

Several studies were conducted to assess the agreement between children and their parents concerning a child's health quality of life. However the results from these studies were inconsistent. One found low agreement (Vogels et al., 1998), some reported moderate agreement (Theunissen et al., 1998), while others reported high agreement (Jokovic et al., 2003). Nonetheless, all indicated substantially higher agreement for domains concerning functional limitations than domains concerning emotional and social well-being. Unlike Jokovic et al study, the studies that suggested low and moderate agreement examined health-related quality of life rather than oral health-related quality of life. A suggested source for disagreement was that parents might not have adequate access to information concerning peer relationships and school activities, compared to observational information such as oral symptoms and functional limitations (Sawyer, Antoniou, Toogood, & Rice, 1999).

Oral health-related quality of life in the pre- and post-treatment study groups (Group A – Group B)

For the sake of clarification, the discussion of study results pertaining to the (OHRQoL) of pre- and post-treatment study groups will exclusively examine the “before treatment” time point (Time 1). Further, the discussion will focus on comparisons of (OHRQoL) between the two study groups (Group A – Group B).

It should be emphasized that participants in (Group B) were asked to report retrospectively on the impacts of increased dental overjet on their lives based on their memory, in contrast to participants in (Group A) which reported such impacts based their present life experience with an untreated malocclusion at the time of questionnaire administration.

It is of great interest to examine the impact of increased dental overjet on (OHRQoL) claimed by patients who had finished orthodontic treatment, because that can give insight into understanding how accurately and vividly those subjects could remember the effects which malocclusion had on their young lives. In addition, the present study findings highlighted effects of "time lapse" between administration of the questionnaires and the start and / or finish of orthodontic treatment.

Comparison of pre- and post-treatment OHRQoL between children (Group A – Group B)

Results indicated that before overjet correction, children in (Group A) had poorer quality of life than those in (Group B). However, the perceived differences in quality of life between children in (Group A) and (Group B) before orthodontic treatment was not statistically significant for all health domains.

These findings clearly demonstrate that the "timing" of questionnaire administration in terms of before or after orthodontic treatment is not critical because post-treatment subjects in the present study displayed a similar level of impact on (OHRQoL) as pre-treatment ones, even after a "time lapse" of five years. Interestingly, participants who finished orthodontic treatment five years previously exhibited the ability to recall the negative effects of increased dental overjet on their lives as accurate as the prospective patients who were currently experiencing them.

Comparison of pre- and post-treatment OHRQoL between parents (Group A – Group B)

On one hand, the results show that parents in (Group A) reported worse quality of life before orthodontic treatment than those in (Group B) in four out of six health domains, namely functional limitations, emotional well-being, social well-being, and family members' quality of life. On the other hand, (Group A) parents perceived better quality of life than (Group B) parents before orthodontic treatment in oral symptoms and child behaviour domains.

It can be said that when asked to retrospectively report on the impact of increased overjet on their children's lives, the results suggested that parents in post-treatment (Group B) overestimated the negative effects in oral symptoms and child behaviour domains. The child behaviour domain in the parental questionnaire (P-CPQ) included items that asked participants to report the frequency of adverse behaviours exhibited by their children, such as blaming parents, initiating argument and conflict in the family, interfering with family activities, and requiring more attention than other family members. However, the results confirm that reported differences across all health domains between parents in (Group A) and (Group B) were not found to be statistically significant.

This concurs with the findings, discussed earlier, of the participants' ability to recall events affecting their lives with fairly good accuracy after a few years had passed. Further, these results support the notion that "parents know best" and that inclusion of parental assessment in patients' outcome measures had proven to be a valuable addition that complimented the information which had been obtained.

Study Limitations

Several limitations are recognized in the present study, which can generally be attributed to two main factors: study sample and time restriction.

As for the study sample, the number of participants who completed the questionnaires is undoubtedly small in both study groups, despite the multiple methods of recruitment (invitation letters and phone calls) and the flexibility in methods of questionnaire administration (clinic visits and mailed out questionnaires with prepaid return envelopes). Moreover, the study aimed to selectively recruit participants with a specific malocclusion trait, namely increased dental overjet of 6mm or more. Despite the fact that the data collection period extended for 14 months, great difficulties were encountered with post-treatment (Group B) participants in terms of cooperation on two fronts, attending to the Graduate Orthodontic Clinic to complete copies of the questionnaire and mailing back the completed questionnaires. One explanation could be that these patients are in the retention phase of their orthodontic treatment and that they might not feel bound any longer to cooperate in a study conducted by the Department of Orthodontics at the University of Manitoba. Moreover, the patients who had finished orthodontic treatment during the past five years are in their late teens and so they tend to be busier and less interested in participating in a study that combines their input with their parents and does not compensate them financially for their cooperation and time.

The restrictions of the time factor within a master's thesis study, requires that the project has to be completed within less than 30 months, dictated the study design. Ideally, the before and after design which is suitable to address the study's main objective, namely the change in (OHRQoL) after orthodontic treatment, requires a long term follow-up of a sample from before to after finishing of orthodontic treatment. However, this was not feasible within the setting of a teaching institution because the average treatment time for an orthodontic case ranges between 18 to 24

months and can extend to 30 months if the treatment plan involves two-phase intervention. Therefore, two study groups were selected with a similar age and malocclusion so that one could act as the control group and the other as the treatment group. The use of printed sets of intra- and extra-oral photographs from the patients' orthodontic records aimed to attempt to minimize the inherited error in depending on the participants' memory to recall effects of their original malocclusion on their lives at a previous time point. It is understood that the use of two groups of different individuals, who might come from different backgrounds, to compare their experiences with increased dental overjet and how it affected their oral health and quality of life, might not yield an accurate answer to the question of the present study. Nevertheless, the present study offered an opportunity to closely examine the changes that are brought about by orthodontic treatment to the lives of patients and their families.

Finally, the inclusion of prospective orthodontic patients presenting at the university's clinic in the current study could have introduced a potential element of bias. These patients and their parents may have reported a greater oral health impact in the hope of receiving orthodontic treatment.

Chapter 5

Conclusions and Future recommendations

Conclusions

The study has provided many insights for the dynamic field of oral health-related quality of life:

- Adolescents and their parents exhibited poor oral health-related quality of life before correction of the patients' increased dental overjet of 6mm or more.
- Adolescents and their parents exhibited significant improvement in all oral health domains of oral health-related quality of life, except for the social well being domain after overjet correction.
- Parental reports on oral health-related quality of life are in agreement with their children's in the pre- and post-treatment study groups.
- Adolescents with an increased dental overjet can accurately recall the negative effects of malocclusion on their lives even after a time lapse of five years.
- The timing of administration of Child Oral Health-Related Quality of Life Questionnaires (COHQoL) in orthodontics is not critical and the questionnaires were found to yield comparable outcomes if completed by either the orthodontic patients or their parents, either before or after orthodontic treatment.

Hypotheses Revisited

- The orthodontic correction of increased overjet ($\geq 6\text{mm}$) has a significant positive impact on the oral health-related quality of life (OHRQoL) of both children and their parents.
 - Hypothesis is accepted.
- The degree of perceived change in (OHRQoL) after orthodontic treatment is positive and similar between the children and their parents.
 - Hypothesis is accepted.
- The degree of perceived impacts on (OHRQoL) before orthodontic treatment is negative and similar between children and their parents.
 - Hypothesis is partially accepted.
 - Before orthodontic treatment, the children and their parents perceived negative impacts on (OHRQoL). However, the children reported statistically significant worse quality of life than their parents.
- The degree of perceived impacts on (OHRQoL) before orthodontic treatment is negative and similar between the pre- and post- treatment groups.
 - Hypothesis is accepted.

Future recommendations

Despite the sample size and current homogeneity of the present study in terms of age group and socio-economic status, the present study nonetheless encourages orthodontic clinicians to take the following recommendations into consideration:

- Orthodontists should be aware of the detrimental psycho-social effects of increased dental overjet $\geq 6\text{mm}$ on children and their families' quality of life.
- General dentists and orthodontists should encourage patients with an increased overjet $\geq 6\text{mm}$ to seek orthodontic treatment before 11 years of age to potentially avoid the detrimental psycho-social impacts if it is deemed to be a concern to the child.
- Orthodontists & Graduate Orthodontic Clinics should consider administering (COHQoL) questionnaires as part of their new patients' initial assessment protocol.

As for future research directions, it would be of great interest to assess the effects of different visible malocclusions such as the spaced dentition, anterior tooth crowding, and non-ideal profiles on the oral health related quality of life of adolescents and their families. Further, comparison between such studies in terms of differences and similarities in results would be of interest.

A further recommendation is that future studies should recruit larger samples, more homogeneous age groups, and adopt longitudinal studies designed to assess patients before and after orthodontic treatment of their malocclusion.

The use of the shortened version of the Child Oral Health-Related Quality of Life (COHQoL) questionnaire form (Foster Page, Thomson, Jokovic, & Locker, 2008) may be beneficial, especially as some of the questions in the oral symptoms and functional limitations subscales of the current (COHQoL) questionnaire are not relevant to orthodontic patients (O'Brien et al., 2007).

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Appendices

Appendix 1



UNIVERSITY
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BANNATYNE CAMPUS Research Ethics Boards

P126-770 Bannatyne Avenue
Winnipeg, Manitoba
Canada R3E 0W3
Tel: (204) 789-3255
Fax: (204) 789-3414

APPROVAL FORM

Principal Investigator: Dr. H. Sawan

Ethics Reference Number: H2010:346
Date of REB Meeting: October 25, 2010
Date of Approval: November 15, 2010
Date of Expiry: October 25, 2011

Protocol Title: **Assessing the Change in Oral Health-Related Quality of Life Among Adolescents and Their Families After Orthodontic Treatment**

The following is/are approved for use:

- Protocol, Version dated October 06/10/2010
- Research Participant Information and Consent Form, Version dated Nov 5, 2010
- Assent for Children 8-18 years old, Version dated Nov 5, 2010
- Script for the telephone call recruitment process, Version dated Nov 5, 2010
- Invitation Letter, Version dated Nov 5, 2010
- Child Oral Health Questionnaire (Parental Report) Time 1, Version dated Oct 5, 2010
- Child Oral Health Questionnaire (Parental Report) Time 2, Version dated Oct 5, 2010
- Child Oral Health Questionnaire 8-10 years Time 1, Version dated Oct 5, 2010
- Child Oral Health Questionnaire 8-10 years Time 2, Version dated Oct 5, 2010
- Child Oral Health Questionnaire 11-14 years (up to 18 years) Time 1, Version dated Oct 5, 2010
- Child Oral Health Questionnaire 11-14 years (up to 18 years) Time 2, Version dated Oct 5, 2010

The above was approved by Dr. John Arnett, Ph.D., C. Psych., Chair, Health Research Ethics Board, Bannatyne Campus, University of Manitoba on behalf of the committee per your letter dated November 8, 2010. The Research Ethics Board is organized and operates according to Health Canada/ICH Good Clinical Practices, Tri-Council Policy Statement, and the applicable laws and regulations of Manitoba. The membership of this Research Ethics Board complies with the membership requirements for Research Ethics Boards defined in Division 5 of the *Food and Drug Regulations of Canada*.

This approval is valid for one year from the date of the REB meeting at which the study was reviewed. A study status report must be submitted annually and must accompany your request for re-approval. Any significant changes of the protocol and informed consent form should be reported to the Chair for consideration in advance of implementation of such changes. The REB must be notified regarding discontinuation or study closure.

This approval is for the ethics of human use only. For the logistics of performing the study, approval must be sought from the relevant institution, if required.

Sincerely yours,

John Arnett, Ph.D., C. Psych.
Chair, Health Research Ethics Board
Bannatyne Campus

Please quote the above Ethics Reference Number on all correspondence.

Inquiries should be directed to the REB Secretary Telephone: (204) 789-3255 / Fax: (204) 789-3414

Appendix 2



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BANNATYNE CAMPUS Research Ethics Boards

P126-770 Bannatyne Avenue
Winnipeg, Manitoba
Canada R3E 0W3
Tel: (204) 789-3255
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APPROVAL FORM

Principal Investigator: Dr. H. Sawan

Ethics Reference Number: H2010:346
Date of Approval: December 14, 2011
Date of Expiry: October 25, 2012

Protocol Title: Assessing the Change in Oral Health-Related Quality of Life Among Adolescents and Their Families After Orthodontic Treatment

The following is/are approved for use:

- Annual Approval
- Research Participant Information and Consent Form, Version dated Nov 5, 2010
- Assent for Children 8-18 years old, Version dated Nov 5, 2010

The above was approved by Dr. John Arnett, Ph.D., C: Psych., Chair, Health Research Ethics Board, Bannatyne Campus, University of Manitoba on behalf of the committee per your submission dated December 14, 2011. The Research Ethics Board is organized and operates according to Health Canada/ICH Good Clinical Practices, Tri-Council Policy Statement, and the applicable laws and regulations of Manitoba. The membership of this Research Ethics Board complies with the membership requirements for Research Ethics Boards defined in Division 5 of the *Food and Drug Regulations of Canada*.

This approval is valid until the expiry date only. A study status report must be submitted annually and must accompany your request for re-approval. Any significant changes of the protocol and informed consent form should be reported to the Chair for consideration in advance of implementation of such changes. The REB must be notified regarding discontinuation or study closure.

This approval is for the ethics of human use only. For the logistics of performing the study, approval must be sought from the relevant institution, if required.

Sincerely yours,

John Arnett, PhD., C. Psych.
Chair, Health Research Ethics Board
Bannatyne Campus

Please quote the above Ethics Reference Number on all correspondence.

Inquiries should be directed to the REB Secretary Telephone: (204) 789-3255 / Fax: (204) 789-3414

Appendix # 3

Assessing the Change in Oral Health-Related Quality of Life among Adolescents and Their Families after Orthodontic Treatment

Script for the telephone call recruitment process

1. I will introduce myself as a graduate orthodontic student at The University of Manitoba and I will ask if I can speak with the parent of the participant.
2. I will state that “the reason for my call is to ask you if you could kindly consider participating in our research by completing a simple Questionnaire”
3. I will inform the parent of the study title: Assessing the Change in Oral Health-Related Quality of Life among Adolescents and Their Families after Orthodontic Treatment
4. I will let the parent know that this research project is in partial fulfillment of the requirements of my graduate orthodontic training.
5. I will briefly explain that we aim to study the effects of prominent front teeth on children’s wellbeing and everyday life. I will define dental overjet as a measure of how far the top incisor teeth are ahead of the bottom incisors.
6. I will mention that our objectives are to gain an insight on changes in quality of life of children and their parents before and after orthodontic treatment.
7. I will highlight that their participation will provide very important information that may help future patients and their parents to better understand what to expect from this type of treatment.
8. I will state that “If you kindly agree to participate in our study, on your son/ daughter’s next appointment in Graduate Orthodontic Clinic at University of Manitoba, each of you and your son/daughter will be invited to complete a Questionnaire that will take 15 minutes to complete”.

Appendix # 3

Assessing the Change in Oral Health-Related Quality of Life among Adolescents and Their Families after Orthodontic Treatment

9. I will further explain by stating:
 - “To help you remember, we will show you set of photographs of your child’s teeth before orthodontic treatment”.
 - “If your child already had braces, we will show you another set of photographs of your child’s teeth after orthodontic treatment”.
10. I will make the parent aware that after he/she fully understands what the study is about and after answering any questions that he/she may have, we will ask him/her to sign a consent form. In addition, there will be a separate assent form for children under the age of 18 for the participant child to sign.
11. I will assure the parent that everything that they (parent & child) will indicate in the questionnaire will be held in confidence.
12. I will mention that records that contain his/her child’s identity will be treated as confidential in accordance with the Personal Health Information Act of Manitoba (PHIA).
13. I will ask the parent to kindly discuss the study with his/her child and I will provide them with my contact information should they have any questions or concerns.
14. Finally, I will thank the parent for his/her time. If the parent agrees to participate in our study, I will inform him/her that he/she will be contacted shortly by our receptionist to arrange for an appointment on the nearest chance.

Appendix #4



UNIVERSITY
OF MANITOBA

Orthodontic Clinic

780 Bannatyne Avenue
Winnipeg, Manitoba
Canada R3E 0W2
Telephone (204) 789-3545
Fax (204) 977-5699

Invitation Letter

Dear Sir or Madam,

At the University of Manitoba, we are conducting a survey to study the effects of prominent front teeth on children's wellbeing and everyday life. This research project is in partial fulfillment of the requirements of my graduate orthodontic training.

Our objectives are to gain an insight on changes in quality of life of children and their parents before and after orthodontic treatment.

We invite you to participate in our research by completing a simple Questionnaire!

On your son/ daughter's next appointment in Graduate Orthodontic Clinic at University of Manitoba, each of you and your son/daughter will be invited to complete a Questionnaire that will take 15 minutes to complete. Remember everything you will indicate in the questionnaire is to be held in confidence. Records that contain your child's identity will be treated as confidential in accordance with the Personal Health Information Act of Manitoba (PHIA).

We sincerely hope that you will find a few minutes to complete the Questionnaire as our project depends on your participation. We greatly appreciate your help.

Sincerely,

Dr. Huda Sawan, B.D.S.
Graduate Resident
Department of Orthodontics

Dr. Charles Lekic, D.D.M., M.Sc., Ph.D., F.R.C.D. (C)
Professor
Division Head of Pediatric Dentistry

Version date: Nov 5, 2010

<http://umanitoba.ca/dentistry>



Traditions of Excellence, Horizons of Change

Appendix # 5



UNIVERSITY
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Orthodontic Clinic

780 Bannatyne Avenue
Winnipeg, Manitoba
Canada R3E 0W2
Telephone (204) 789-3545
Fax (204) 977-5699

RESEARCH PARTICIPANT INFORMATION AND CONSENT FORM

Title of Study: "Assessing the Change in Oral Health-Related Quality of Life among Adolescents and Their Families after Orthodontic Treatment"

Principal Investigator:

Dr. Huda Sawan
780 Bannatyne Ave, Winnipeg, MB R3E 0W2
Phone: (204)789-3699

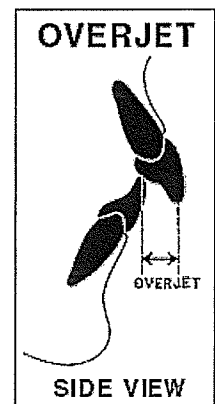
You are being asked to participate in a research study. Please take your time to review this consent form and discuss any questions you may have with the study staff. This consent form may contain words that you do not understand. Please ask the study staff to explain any words or information that you do not clearly understand.

Purpose of Study

- This research study is being conducted to study the effects of increased dental overjet* on children's wellbeing and everyday life, and the effects on their families. Also it will study the effects of reduction of the dental overjet to within normal limits by orthodontic treatment.
 - *Overjet is also known as "protrusion" of teeth (see the diagram)
 - It's a measure of how far the top incisor teeth are ahead of the bottom incisors
- A total of 60 participants (and 60 parents) will participate in this study

Study procedures

- The study contains two groups of participants and their parents.
- (Group 1) 30 participants with increased dental overjet before starting orthodontic treatment and (Group 2) 30 participants after orthodontic treatment who used to have increased dental overjet.



Appendix # 5

If you take part in this study, you will have the following procedures:

You will complete the questionnaires in the Graduate Orthodontic Clinic at University of Manitoba. A copy of the parent Questionnaire takes 15 minutes to complete and a copy of the child Questionnaire takes 10 minutes to complete.

*If your son/ daughter had **not started** orthodontic treatment yet:*

- A participant and his/her parent will be asked to complete two separate Questionnaires which are Parental-Caregiver Perceptions Questionnaire (P-CPQ) and Child Perceptions Questionnaires (CPQ).
- You will also be shown set of photographs of your child's teeth.

*If your son/ daughter had **finished** orthodontic treatment:*

- **First:** A participant and his/her parent will be asked to complete two separate Questionnaires which are Parental-Caregiver Perceptions Questionnaire (P-CPQ) and Child Perceptions Questionnaires (CPQ).
- Please think back and remember how you felt before treatment.
- To help you remember the original malocclusion, you will be shown set of photographs of your child's teeth before orthodontic treatment.
- **Second:** A participant and his/her parent will be asked to complete another copy of the Questionnaires regarding how you feel after treatment.
- You will be shown a new set of photographs of your child's teeth after orthodontic treatment.

Participation in the study

- Will be ONCE for 20-30 minutes (after your child's regular orthodontic appointment).
- However, to test how good this questionnaire is at giving us the information we need, we would like a group of participants and parents to complete it again.
- Please indicate if you are willing to help and we would mail you the questionnaire in the next 2 weeks.

You can stop participating at any time. However, if you decide to stop participating in the study, we encourage you to talk to the study staff first.

Risks and Discomforts

- This is a survey study that generally poses minimal risks to the participants.

Appendix # 5

- Risks may include potential mild embarrassment or anxiety related to the sensitive nature of the questions.

Benefits

- There may not be direct benefit to you from participating in this study.
- We hope that the information learned from this study will benefit other people with increased dental overjet who seek orthodontic treatment in the future.

Costs

- All the procedures, which will be performed as part of this study, are provided at no cost to you.

Payment for participation

- You will not receive payment or reimbursement for any expenses related to taking part in this study.

Alternatives

- You do not have to participate in this study to receive treatment for your child's teeth. Please talk to your regular doctor about all your treatment options.

Confidentiality

- Information gathered in this research study may be published or presented in public forums; however your name and other identifying information will not be used or revealed. Despite efforts to keep your personal information confidential, absolute confidentiality cannot be guaranteed. Your personal information may be disclosed if required by law.
- All study related documents will only bear a unique number linking them to your personal information. The main administrator of this study will keep this unique number stored safely. This person is already in charge of the implementation the Privacy Act for the graduate program. On the completion of data analysis, the link between the unique number and the personal information will be terminated.
- Remember everything you indicate in the questionnaire is to be held in confidence. Dental records that contain your child's identity will be treated as confidential in accordance with the Personal Health Information Act of Manitoba.
- The University of Manitoba Health Research Ethics Board may review records related to the study for quality assurance purposes.
- All records will be kept in a locked secure area and only those persons identified will have access to these records. If any of your research records need to be copied to any of the above, your name and all identifying information will be removed. No information revealing any personal information such as your name, address or telephone number will leave The University of Manitoba.

Appendix # 5

Voluntary Participation/Withdrawal from the Study

- Your decision to take part in this study is voluntary. You may refuse to participate or you may withdraw from the study at any time.
- Your decision not to participate or to withdraw from the study will not affect your care at this centre.

Questions

- You are free to ask any questions that you may have about your rights as a research participant.
- If any questions come up during or after the study, contact the study doctor: Dr. Huda Sawan at (204)789-3699
- For questions about your rights as a research participant, you may contact The University of Manitoba, Bannatyne Campus Research Ethics Board Office at (204) 789-3389
- Do not sign this consent form unless you have had a chance to ask questions and have received satisfactory answers to all of your questions.

Statement of Consent

- **I have read this consent form. I have had the opportunity to discuss this research study with Dr. Huda Sawan. I have had my questions answered by them in language I understand. The risks and benefits have been explained to me. I believe that I have not been unduly influenced by any study team member to participate in the research study by any statements or implied statements. Any relationship (such as employer, supervisor or family member) I may have with the study team has not affected my decision to participate. I understand that I will be given a copy of this consent form after signing it. I understand that my participation in this study is voluntary and that I may choose to withdraw at any time. I freely agree to participate in this research study.**
- **I understand that information regarding my personal identity will be kept confidential, but that confidentiality is not guaranteed. I authorize the inspection of any of my records that relate to this study by The University of Manitoba Research Ethics Board for quality assurance purposes.**
- **By signing this consent form, I have not waived any of the legal rights that I have as a participant in a research study.**
- **I agree to be contacted for future follow-up in relation to this study:**
Yes No

Appendix # 5

- **Participant signature** _____

Date _____
(day/ month/ year)

Participant printed name: _____

For studies with participants under 18 year of age, consent should be obtained from the parent or legal guardian to allow participation:

- **Parent/legal guardian's signature** _____

Date _____
(day/ month/ year)

Parent/legal guardian's printed name: _____

- **Child's signature** _____

Date _____
(day/ month/ year)

Child's printed name: _____

- **I, the undersigned, have fully explained the relevant details of this research study to the participant named above and believe that the participant has understood and has knowingly given their consent**

Printed Name: _____ **Date** _____
(day/ month/ year)

Signature: _____

Role in the study: WITNESS



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Orthodontic Clinic

780 Bannatyne Avenue
Winnipeg, Manitoba
Canada R3E 0W2
Telephone (204) 789-3545
Fax (204) 977-5699

ASSENT FOR CHILDREN (8-18) years old

Study title: "Assessing the Change in Oral Health-Related Quality of Life Among Adolescents and Their Families After Orthodontic Treatment".

Investigators: Dr. Huda Sawan.

Why you are here?

The doctors want to tell you about a study about children who want to have braces. They want to see if you would like to be in this study. This form tells you about the study. If there is anything you do not understand, please ask your parent, your guardian or the study staff.

Why are they doing this study?

They want to learn more about problems children may have because of their prominent front teeth. By answering the questions, you will help us learn more about young people's experience.

What will happen to you?

If you want to be in the study these things will happen:

1. The study will last about 10 minutes. You will be asked to come into the orthodontic clinic at University of Manitoba for one visit.
2. You will be asked to answer a Questionnaire and look at photos of your teeth before braces.
3. If you had braces before, then you will be asked to answer another copy of Questionnaire and look at photos of your teeth after braces.
4. To see how good these questions are we need a group of children to answer questions again. Please let us know if you would you like to help. We would mail you the questions in the next 2 weeks.



Appendix # 6

Will the study hurt?

- No!
- The questions are about how you feel about your teeth, lips, mouth and jaws and how you act with your family and friends on everyday in school and home.
- This is not a test and there are no right or wrong answers!
- The study questionnaire can make you feel a bit anxious or embarrassed, but remember that your answers are private; no one you know will see them.

Will you be getting braces if you are in the study?

- If you're invited for this study, it means that you're either going to get braces soon or that you had finished braces and being seen regularly for adjusting your retainers.
- This study won't make any difference in your treatment. But with your help, the doctors might find out something that will help other children who want to get braces in the future.

What if you have any questions?

- You can ask questions any time, now or later. You can talk to the doctors, your family or someone else.
- Contact the study doctor: Dr. Huda Sawan at phone: (204)789-3699

Who will know what I did in the study?

- Any information you give to the study staff will be kept private. Your name will not be on any study paper and no one but the study staff and your doctor will know that it was you who was in the study.

Do you have to be in the study?

- You do not have to be in the study. No one will be mad at you if you don't want to do this. If you don't want to be in this study, just say so.
- We will also ask your parents if they would like you to be in the study. Even if your parents want you to be in the study you can still say no. The doctor will still take care of your teeth.
- Even if you say yes now you can change your mind later. It's up to you.

Do you have any questions?

What questions do you have?

Appendix # 6

Assent

- **I want to take part in this study. I know I can change my mind at any time.**

_____ Verbal assent given: Yes
Print name of child

_____ **Signature of Child** _____ **Age** _____ **Date**

- **I confirm that I have explained the study to the participant to the extent compatible with the participants understanding, and that the participant has agreed to be in the study.**

_____ **Printed name of** _____ **Signature of** _____ **Date**
Person obtaining assent **Person obtaining assent**

Appendix # 7

<p style="text-align: center;">CHILD ORAL HEALTH QUESTIONNAIRE 11-14 years (up to 18 years)</p>

Hello,

Thanks for agreeing to help us with our study!

This study is being done so that there will be more understanding about problems children may have because of their **teeth, mouth, lips and jaws**. By answering the questions, you will help us learn more about young people's experiences.

PLEASE REMEMBER:

- Don't write your name on the questionnaire
- This is **not a test** and there are no right or wrong answers
- Answer as **honestly** as you can.
- Don't talk to anyone about the questions when you are answering them.
- Your answers are **private**; no one you know will see them
- **Look at the photos of your teeth before you start!**
- Read each question **carefully** and think about your experiences in the **past 3 months**.
- Before you answer, ask yourself: **"Does this happen to me because of problems with my teeth, lips, mouth or jaws?"**
- Put an in the box for the answer that is best for you

Appendix # 7

Today's date: _____ / _____ / _____

DAY MONTH YEAR

FIRST, A FEW QUESTIONS ABOUT YOU

1. Are you a boy or a girl?

- Boy
- Girl

2. When were you born? _____ / _____ / _____

DAY MONTH YEAR

3. Would you say the health of your teeth, lips, jaws and mouth is:

- Excellent
- Very good
- Good
- Fair
- Poor

4. How much does the condition of your teeth, lips, jaws or mouth affect your life overall?

- Not at all
- Very little
- Some
- A lot

Appendix # 7

- Very much

QUESTIONS ABOUT ORAL PROBLEMS

In the past 3 months, how often have you had:

5. Pain in your teeth, lips, jaws or mouth?

- Never
- Once or twice
- Sometimes
- Often
- Everyday or almost every day

6. Bleeding gums?

- Never
- Once or twice
- Sometimes
- Often
- Everyday or almost every day

7. Sores in your mouth?

- Never
- Once or twice
- Sometimes
- Often
- Everyday or almost every day

8. Bad breath?

- Never

Appendix # 7

- Once or twice
- Sometimes
- Often
- Everyday or almost every day

9. Food stuck in or between your teeth?

- Never
- Once or twice
- Sometimes
- Often
- Everyday or almost every day

10. Food stuck in the top of your mouth?

- Never
- Once or twice
- Sometimes
- Often
- Everyday or almost every day

➤ *For the next questions... Has this happened because of your teeth, lips, jaws or mouth?*

In the past 3 months, how often have you:

11. Breathed through your mouth?

- Never
- Once or twice
- Sometimes
- Often
- Everyday or almost every day

12. Taken longer than others to eat a meal?

- Never

Appendix # 7

- Once or twice
- Sometimes
- Often
- Everyday or almost every day

13. Had trouble sleeping?

- Never
- Once or twice
- Sometimes
- Often
- Everyday or almost every day

In the past 3 months, because of your teeth, lips, mouth or jaws, how often has it been:

14. Difficult to bite or chew food like apples, corn on the cob or steak?

- Never
- Once or twice
- Sometimes
- Often
- Everyday or almost every day

15. Difficult to open your mouth wide?

- Never
- Once or twice
- Sometimes
- Often
- Everyday or almost every day

16. Difficult to say any words?

- Never

Appendix # 7

- Once or twice
- Sometimes
- Often
- Everyday or almost every day

17. Difficult to eat foods you would like to eat?

- Never
- Once or twice
- Sometimes
- Often
- Everyday or almost every day

18. Difficult to drink with a straw?

- Never
- Once or twice
- Sometimes
- Often
- Everyday or almost every day

19. Difficult to drink or eat hot or cold foods?

- Never
- Once or twice
- Sometimes
- Often
- Everyday or almost every day

Appendix # 7

QUESTIONS ABOUT FEELINGS

*Have you had the feeling because of your teeth, lips, jaws or mouth?
If you felt this way for another reason, answer 'Never'.*

In the past 3 months, how often have you:

20. Felt irritable or frustrated?

- Never
- Once or twice
- Sometimes
- Often
- Everyday or almost every day

21. Felt unsure of yourself?

- Never
- Once or twice
- Sometimes
- Often
- Everyday or almost every day

22. Felt shy or embarrassed?

- Never
- Once or twice
- Sometimes
- Often

Appendix # 7

Everyday or almost every day

23. Been concerned what other people think about your teeth, lips, mouth or jaws?

Never

Once or twice

Sometimes

Often

Everyday or almost every day

24. Worried that you are not as good-looking as others?

Never

Once or twice

Sometimes

Often

Everyday or almost every day

In the past 3 months, because of your teeth, lips, mouth or jaws, how often have you:

25. Been upset?

Never

Once or twice

Sometimes

Often

Everyday or almost every day

26. Felt nervous or afraid?

Never

Once or twice

Sometimes

Often

Everyday or almost every day

27. Worried that you are not as healthy as others?

Never

Once or twice

Sometimes

Appendix # 7

- Often
- Everyday or almost every day

28. Worried that you are different than other people?

- Never
- Once or twice
- Sometimes
- Often
- Everyday or almost every day

QUESTIONS ABOUT SCHOOL

*Have you had these experiences because of your teeth, lips, jaws or mouth?
If it was for another reason, answer 'Never'.*

In the past 3 months, how often have you:

29. Missed school because of pain, appointments, or surgery?

- Never
- Once or twice
- Sometimes
- Often
- Everyday or almost every day

30. Had a hard time paying attention in school?

- Never
- Once or twice
- Sometimes
- Often
- Everyday or almost every day

31. Had difficulty doing your homework?

- Never
- Once or twice
- Sometimes

Appendix # 7

- Often
- Everyday or almost every day

32. Not wanted to speak or read out loud in class?

- Never
- Once or twice
- Sometimes
- Often
- Everyday or almost every day

<p style="text-align: center;">QUESTIONS ABOUT YOUR SPARE-TIME ACTIVITIES & BEING WITH OTHER PEOPLE</p>
--

*Have you had these experiences because of your teeth, lips, jaws or mouth?
If it was for another reason, answer 'Never'.*

In the past 3 months, how often have you:

33. Avoided taking part in activities like sports, clubs, drama, music, school trips?

- Never
- Once or twice
- Sometimes
- Often
- Everyday or almost every day

34. Not wanted to talk to other children?

- Never
- Once or twice
- Sometimes
- Often
- Everyday or almost every day

Appendix # 7

35. Avoided smiling or laughing when around other children?

- Never
- Once or twice
- Sometimes
- Often
- Everyday or almost every day

36. Had difficulty playing a musical instrument such as a recorder, flute, clarinet, trumpet?

- Never
- Once or twice
- Sometimes
- Often
- Everyday or almost every day

37. Not wanted to spend time with other children?

- Never
- Once or twice
- Sometimes
- Often
- Everyday or almost every day

38. Argued with other children or your family?

- Never
- Once or twice
- Sometimes
- Often
- Everyday or almost every day

Appendix # 7

In the past 3 months, because of your teeth, lips, mouth or jaws, how often have:

39. Other children teased you or called you names?

- Never
- Once or twice
- Sometimes
- Often
- Everyday or almost every day

40. Other children made you feel left out?

- Never
- Once or twice
- Sometimes
- Often
- Everyday or almost every day

41. Other children asked you questions about your teeth, lips, jaws or mouth?

- Never
- Once or twice
- Sometimes
- Often
- Everyday or almost every day

THERE, IT'S FINISHED!

Just one more thing. To test how good this questionnaire is at giving us the information we need, we would like a group of children to complete it again.

Would you be willing to help us by completing another copy of the questionnaire soon?

Appendix # 7

We would mail it to you in the next 2 weeks.

YES

THANK YOU FOR HELPING US

We would like to hear from you.

Do you have any questions or concerns? _____

Appendix# 7

CHILD ORAL HEALTH QUESTIONNAIRE
11-14 years (up to 18 years)

Hello,

Thanks for agreeing to be in our study again.

PLEASE REMEMBER:

- Don't write your name on the questionnaire
- This is **not a test** and there are no right or wrong answers
- Answer as **honestly** as you can.
- Don't talk to anyone about the questions when you are answering them.
- Your answers are **private**; no one you know will see them
- **Look at the photos of your teeth before you start!**
- Read each question **carefully** and think about your experiences in the **past 3 months**
- Before you answer, ask yourself: **"Does this happen to me because of problems with my teeth, lips, mouth or jaws?"**
- Put an in the box for the answer that is best for you

Appendix# 7

Today's date: / /
 DAY MONTH YEAR

A FEW QUESTIONS ABOUT YOU

1. Are you a boy or a girl?

- Boy
- Girl

2. When were you born? / /
 DAY MONTH YEAR

FIRST, TWO NEW QUESTIONS

3. Think about the health of your teeth, lips, jaws and mouth. Compared to the first time you answered the questionnaire, has it:

- Stayed the same
- Changed a little
- Changed a lot

4. Think about how your life overall is affected by your teeth, lips, jaws or mouth.

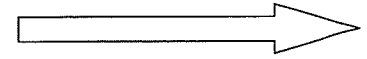
Compared to the first time you answered the questionnaire, has this:

- Stayed the same
- Changed a little
- Changed a lot

Appendix# 7

- Very much

Now, the questions we asked before...



QUESTIONS ABOUT ORAL PROBLEMS

In the past 3 months, how often have you had:

5. Pain in your teeth, lips, jaws or mouth?

- Never
 Once or twice
 Sometimes
 Often
 Everyday or almost every day

6. Bleeding gums?

- Never
 Once or twice
 Sometimes
 Often
 Everyday or almost every day

7. Sores in your mouth?

- Never
 Once or twice
 Sometimes
 Often
 Everyday or almost every day

8. Bad breath?

- Never

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- Once or twice
- Sometimes
- Often
- Everyday or almost every day

9. Food stuck in or between your teeth?

- Never
- Once or twice
- Sometimes
- Often
- Everyday or almost every day

10. Food stuck in the top of your mouth?

- Never
- Once or twice
- Sometimes
- Often
- Everyday or almost every day

➤ *For the next question...*

Has this happened because of your teeth, lips, jaws or mouth?

In the past 3 months, how often have you:

11. Breathed through your mouth?

- Never
- Once or twice
- Sometimes
- Often
- Everyday or almost every day

12. Taken longer than others to eat a meal?

Appendix# 7

- Never
- Once or twice
- Sometimes
- Often
- Everyday or almost every day

13. Had trouble sleeping?

- Never
- Once or twice
- Sometimes
- Often
- Everyday or almost every day

In the past 3 months, because of your teeth, lips, mouth or jaws, how often has it been:

14. Difficult to bite or chew food like apples, corn on the cob or steak?

- Never
- Once or twice
- Sometimes
- Often
- Everyday or almost every day

15. Difficult to open your mouth wide?

- Never
- Once or twice
- Sometimes
- Often
- Everyday or almost every day

16. Difficult to say any words?

- Never
- Once or twice

Appendix# 7

- Sometimes
- Often
- Everyday or almost every day

17. Difficult to eat foods you would like to eat?

- Never
- Once or twice
- Sometimes
- Often
- Everyday or almost every day

18. Difficult to drink with a straw?

- Never
- Once or twice
- Sometimes
- Often
- Everyday or almost every day

19. Difficult to drink or eat hot or cold foods?

- Never
- Once or twice
- Sometimes
- Often
- Everyday or almost every day

QUESTIONS ABOUT FEELINGS

*Have you had the feeling because of your teeth, lips, jaws or mouth?
If you felt this way for another reason, answer 'Never'.*

In the past 3 months, how often have you:

Appendix# 7

20. Felt irritable or frustrated?

- Never
- Once or twice
- Sometimes
- Often
- Everyday or almost every day

21. Felt unsure of yourself?

- Never
- Once or twice
- Sometimes
- Often
- Everyday or almost every day

22. Felt shy or embarrassed?

- Never
- Once or twice
- Sometimes
- Often
- Everyday or almost every day

23. Been concerned what other people think about your teeth, lips, mouth or jaws?

- Never
- Once or twice
- Sometimes
- Often
- Everyday or almost every day

24. Worried that you are not as good-looking as others?

- Never
- Once or twice
- Sometimes
- Often

Appendix# 7

- Everyday or almost every day

In the past 3 months, because of your teeth, lips, mouth or jaws, how often have you:

25. Been upset?

- Never
- Once or twice
- Sometimes
- Often
- Everyday or almost every day

26. Felt nervous or afraid?

- Never
- Once or twice
- Sometimes
- Often
- Everyday or almost every day

27. Worried that you are not as healthy as others?

- Never
- Once or twice
- Sometimes
- Often
- Everyday or almost every day

28. Worried that you are different than other people?

- Never
- Once or twice
- Sometimes
- Often
- Everyday or almost every day

QUESTIONS ABOUT SCHOOL

*Have you had these experiences because of your teeth, lips, jaws or mouth?
If it was for another reason, answer 'Never'.*

Appendix# 7

In the past 3 months, how often have you:

29. Missed school because of pain, appointments, or surgery?

- Never
- Once or twice
- Sometimes
- Often
- Everyday or almost every day

30. Had a hard time paying attention in school?

- Never
- Once or twice
- Sometimes
- Often
- Everyday or almost every day

31. Had difficulty doing your homework?

- Never
- Once or twice
- Sometimes
- Often
- Everyday or almost every day

32. Not wanted to speak or read out loud in class?

- Never
- Once or twice
- Sometimes
- Often
- Everyday or almost every day

**QUESTIONS ABOUT YOUR SPARE-TIME ACTIVITIES
& BEING WITH OTHER PEOPLE**

Appendix# 7

Have you had these experiences because of your teeth, lips, jaws or mouth?

If it was for another reason, answer 'Never'.

In the past 3 months, how often have you:

33. Avoided taking part in activities like sports, clubs, drama, music, school trips?

- Never
- Once or twice
- Sometimes
- Often
- Everyday or almost every day

34. Not wanted to talk to other children?

- Never
- Once or twice
- Sometimes
- Often
- Everyday or almost every day

35. Avoided smiling or laughing when around other children?

- Never
- Once or twice
- Sometimes
- Often
- Everyday or almost every day

36. Had difficulty playing a musical instrument such as a recorder, flute, clarinet, trumpet?

- Never
- Once or twice
- Sometimes
- Often
- Everyday or almost every day

37. Not wanted to spend time with other children?

- Never

Appendix# 7

- Once or twice
- Sometimes
- Often
- Everyday or almost every day

38. Argued with other children or your family?

- Never
- Once or twice
- Sometimes
- Often
- Everyday or almost every day

In the past 3 months, because of your teeth, lips, mouth or jaws, how often have:

39. Other children teased you or called you names?

- Never
- Once or twice
- Sometimes
- Often
- Everyday or almost every day

40. Other children made you feel left out?

- Never
- Once or twice
- Sometimes
- Often
- Everyday or almost every day

41. Other children asked you questions about your teeth, lips, jaws or mouth?

- Never
- Once or twice
- Sometimes
- Often

Appendix# 7

Everyday or almost every day

THERE, IT'S FINISHED!

THANK YOU FOR HELPING US

We would like to hear from you.

Do you have any questions or concerns? _____

<p style="text-align: center;">CHILD ORAL HEALTH QUESTIONNAIRE Parental report</p>
--

INSTRUCTIONS TO PARENTS

1. This questionnaire is about the effects of oral conditions on children's wellbeing and everyday life, and the effects on their families. We are interested in any condition that involves teeth, lips, mouth or jaws. **Please answer each question.**
2. **Please look at the photos of your child's teeth before starting!**
3. To answer the question please put an in the box by the response.
4. Please give the response that **best describes your child's experience**. If the question does not apply to your child, please answer with "Never".

Example: How often has your child had a hard time paying attention in school?

If your child has had a hard time paying attention in school because of problems with his/her teeth, lips, mouth or jaws, choose the appropriate response. If it has happened for other reasons, choose "Never".

- Never
- Once or twice
- Sometimes
- Often
- Everyday or almost everyday
- Don't know

5. Please **do not discuss the questions with your child**, as we are interested only in the parents' perspective in this questionnaire.

Appendix #8

SECTION 1: Child's oral health and wellbeing**1. How would you rate the health of your child's teeth, lips, jaws and mouth?**

- Excellent
- Very good
- Good
- Fair
- Poor

2. How much is your child's overall wellbeing affected by the condition of his/her teeth, lips, jaws or mouth?

- Not at all
- Very little
- Some
- A lot
- Very much

SECTION 2: The following questions ask about symptoms and discomfort that children may experience due to the condition of their teeth, lips, mouth and jaws

During the last 3 months, how often has your child had:

3. Pain in the teeth, lips, jaws or mouth?

- Never
- Once or twice
- Sometimes
- Often
- Everyday or almost everyday
- Don't know

4. Bleeding gums?

- Never
- Once or twice
- Sometimes
- Often
- Everyday or almost everyday
- Don't know

Appendix #8

5. Sores in the mouth?

- Never
- Once or twice
- Sometimes
- Often
- Everyday or almost everyday
- Don't know

6. Bad breath?

- Never
- Once or twice
- Sometimes
- Often
- Everyday or almost everyday
- Don't know

7. Food stuck in the roof of the mouth?

- Never
- Once or twice
- Sometimes
- Often
- Everyday or almost everyday
- Don't know

8. Food caught in or between the teeth?

- Never
- Once or twice
- Sometimes
- Often
- Everyday or almost everyday
- Don't know

9. Difficulty biting or chewing foods such as fresh apple, corn on the cob or firm meat?

- Never
- Once or twice
- Sometimes
- Often
- Everyday or almost everyday
- Don't know

Appendix #8

*During the last 3 months, because of his/her teeth, lips, mouth, or jaws,
How often has your child:*

10. Breathed through the mouth?

- Never
- Once or twice
- Sometimes
- Often
- Everyday or almost everyday
- Don't know

11. Had trouble sleeping?

- Never
- Once or twice
- Sometimes
- Often
- Everyday or almost everyday
- Don't know

12. Had difficulty saying any words?

- Never
- Once or twice
- Sometimes
- Often
- Everyday or almost everyday
- Don't know

13. Taken longer than others to eat a meal?

- Never
- Once or twice
- Sometimes
- Often
- Everyday or almost everyday
- Don't know

14. Had difficulty drinking or eating hot or cold foods?

- Never
- Once or twice
- Sometimes
- Often

Appendix #8

- Everyday or almost everyday
- Don't know

15. Had difficulty eating foods he/she would like to eat?

- Never
- Once or twice
- Sometimes
- Often
- Everyday or almost everyday
- Don't know

16. Had diet restricted to certain types of food (e.g. soft food)?

- Never
- Once or twice
- Sometimes
- Often
- Everyday or almost everyday
- Don't know

SECTION 3: The following questions ask about the effects that the condition of children's teeth, lips, mouth and jaws may have on their feelings and everyday activities

*During the last 3 months, because of his/her teeth, lips, mouth or jaws,
How often has your child been:*

17. Upset?

- Never
- Once or twice
- Sometimes
- Often
- Everyday or almost everyday
- Don't know

18. Irritable or frustrated?

- Never
- Once or twice
- Sometimes
- Often
- Everyday or almost everyday
- Don't know

Appendix #8**19. Anxious or fearful?**

- Never
- Once or twice
- Sometimes
- Often
- Everyday or almost everyday
- Don't know

20. Missed school (e.g. pain, appointments, surgery)?

- Never
- Once or twice
- Sometimes
- Often
- Everyday or almost everyday
- Don't know

21. Had a hard time paying attention in school?

- Never
- Once or twice
- Sometimes
- Often
- Everyday or almost everyday
- Don't know

22. Not wanted to speak or read out loud in class?

- Never
- Once or twice
- Sometimes
- Often
- Everyday or almost everyday
- Don't know

23. Not wanted to talk to other children?

- Never
- Once or twice
- Sometimes
- Often
- Everyday or almost everyday
- Don't know

Appendix #8

24. Avoided smiling or laughing when around other children?

- Never
- Once or twice
- Sometimes
- Often
- Everyday or almost everyday
- Don't know

25. Worried that he/she is not as healthy as other people?

- Never
- Once or twice
- Sometimes
- Often
- Everyday or almost everyday
- Don't know

26. Worried that he/she is different than other people?

- Never
- Once or twice
- Sometimes
- Often
- Everyday or almost everyday
- Don't know

27. Worried that he/she is not as good-looking as other people?

- Never
- Once or twice
- Sometimes
- Often
- Everyday or almost everyday
- Don't know

28. Acted shy or embarrassed?

- Never
- Once or twice
- Sometimes
- Often
- Everyday or almost everyday
- Don't know

Appendix #8

29. Been teased or called names by other children?

- Never
- Once or twice
- Sometimes
- Often
- Everyday or almost everyday
- Don't know

30. Been left out by other children?

- Never
- Once or twice
- Sometimes
- Often
- Everyday or almost everyday
- Don't know

31. Not wanted or been unable to spend time with other children?

- Never
- Once or twice
- Sometimes
- Often
- Everyday or almost everyday
- Don't know

32. Not wanted or been unable to participate in activities such as sports, clubs, drama, music, school trips?

- Never
- Once or twice
- Sometimes
- Often
- Everyday or almost everyday
- Don't know

33. Worried that he/she has fewer friends?

- Never
- Once or twice
- Sometimes
- Often
- Everyday or almost everyday
- Don't know

Appendix #8

During the last 3 months, how often has your child been:

34. Concerned what other people think about his/her teeth, lips, mouth or jaws?

- Never
- Once or twice
- Sometimes
- Often
- Everyday or almost everyday
- Don't know

35. Asked questions by other children about his/her teeth, lips, mouth or jaws?

- Never
- Once or twice
- Sometimes
- Often
- Everyday or almost everyday
- Don't know

SECTION 4: The following questions ask about effects that a child's oral condition may have on PARENTS AND OTHER FAMILY MEMBERS

During the last 3 months, because of your child's teeth, lips, mouth or jaws, How often have you or another family member:

36. Been upset?

- Never
- Once or twice
- Sometimes
- Often
- Everyday or almost everyday
- Don't know

37. Had sleep disrupted?

- Never
- Once or twice
- Sometimes

Appendix #8

- Often
- Everyday or almost everyday
- Don't know

38. Felt guilty?

- Never
- Once or twice
- Sometimes
- Often
- Everyday or almost everyday
- Don't know

39. Taken time off work (e.g. pain, appointments, surgery)?

- Never
- Once or twice
- Sometimes
- Often
- Everyday or almost everyday
- Don't know

40. Had less time for yourself or the family?

- Never
- Once or twice
- Sometimes
- Often
- Everyday or almost everyday
- Don't know

41. Worried that your child will have fewer life opportunities (e.g. for dating, getting married, having children, getting a job he/she will like)?

- Never
- Once or twice
- Sometimes
- Often
- Everyday or almost everyday
- Don't know

42. Felt uncomfortable in public places (e.g. stores, restaurants) with your child?

- Never
- Once or twice

Appendix #8

- Sometimes
- Often
- Everyday or almost everyday
- Don't know

43. Been jealous of you or others in the family?

- Never
- Once or twice
- Sometimes
- Often
- Everyday or almost everyday
- Don't know

44. Blamed you or another person in the family?

- Never
- Once or twice
- Sometimes
- Often
- Everyday or almost everyday
- Don't know

45. Argued with you or others in the family?

- Never
- Once or twice
- Sometimes
- Often
- Everyday or almost everyday
- Don't know

46. Required more attention from you or others in the family?

- Never
- Once or twice
- Sometimes
- Often
- Everyday or almost everyday
- Don't know

During the last 3 months, how often has the condition of your child's teeth, lips, mouth or jaws:

47. Interfered with family activities at home or elsewhere?

- Never

Appendix #8

- Once or twice
- Sometimes
- Often
- Everyday or almost everyday
- Don't know

48. Caused disagreement or conflict in your family?

- Never
- Once or twice
- Sometimes
- Often
- Everyday or almost everyday
- Don't know

49. Caused financial difficulties for your family?

- Never
- Once or twice
- Sometimes
- Often
- Everyday or almost everyday
- Don't know

SECTION 5: Child's gender and age

a. Your child is:

- MALE
- FEMALE

b. Your child's age is: _____ YEARS

Questionnaire completed by:

- MOTHER
- FATHER
- OTHER _____

Appendix #8

Date completed: _____ / _____ / _____
DAY MONTH YEAR

To test how good this questionnaire is at giving us the information we need, we would like a group of parents to complete it again.

Would you be willing to complete another copy of the questionnaire in the next 2 weeks?

Yes

THANK YOU FOR YOUR PARTICIPATION !

We would like to hear from you.

Do you have any questions or concerns? _____

<p style="text-align: center;">CHILD ORAL HEALTH QUESTIONNAIRE Parental report</p>
--

INSTRUCTIONS TO PARENTS

1. This questionnaire is about the effects of oral conditions on children's wellbeing and everyday life, and the effects on their families. We are interested in any condition that involves teeth, lips, mouth or jaws. **Please answer each question.**
2. **Please look at the photos of your child's teeth before starting!**
3. To answer the question please put an in the box by the response.
4. Please give the response that **best describes your child's experience**. If the question does not apply to your child, please answer with "Never".

Example: How often has your child had a hard time paying attention in school?

If your child has had a hard time paying attention in school because of problems with his/her teeth, lips, mouth or jaws, choose the appropriate response. If it has happened for other reasons, choose "Never".

- Never
- Once or twice
- Sometimes
- Often
- Everyday or almost everyday
- Don't know

5. Please **do not discuss the questions with your child**, as we are interested only in the parents' perspective in this questionnaire.

Appendix #8

SECTION 1: Child's oral health and wellbeing

1. Compared to two weeks ago, the health of my child's teeth, lips, jaws and mouth has...

- 1 STAYED THE SAME
- 2 CHANGED A LITTLE
- 3 CHANGED A LOT

2. Compared to two weeks ago, the effect of my child's oral condition on his/her overall wellbeing has...

- 1 STAYED THE SAME
- 2 CHANGED A LITTLE
- 3 CHANGED A LOT

SECTION 2: The following questions ask about symptoms and discomfort that children may experience due to the condition of their teeth, lips, mouth and jaws
--

During the last 3 months, how often has your child had:

3. Pain in the teeth, lips, jaws or mouth?

- Never
- Once or twice
- Sometimes
- Often
- Everyday or almost everyday
- Don't know

4. Bleeding gums?

- Never
- Once or twice
- Sometimes
- Often

Appendix #8

- Everyday or almost everyday
- Don't know

5. Sores in the mouth?

- Never
- Once or twice
- Sometimes
- Often
- Everyday or almost everyday
- Don't know

6. Bad breath?

- Never
- Once or twice
- Sometimes
- Often
- Everyday or almost everyday
- Don't know

7. Food stuck in the roof of the mouth?

- Never
- Once or twice
- Sometimes
- Often
- Everyday or almost everyday
- Don't know

8. Food caught in or between the teeth?

- Never
- Once or twice
- Sometimes
- Often
- Everyday or almost everyday
- Don't know

9. Difficulty biting or chewing foods such as fresh apple, corn on the cob or firm meat?

- Never
- Once or twice
- Sometimes
- Often
- Everyday or almost everyday

Appendix #8

- Don't know

*During the last 3 months, because of his/her teeth, lips, mouth, or jaws,
How often has your child:*

10. Breathed through the mouth?

- Never
 Once or twice
 Sometimes
 Often
 Everyday or almost everyday
 Don't know

11. Had trouble sleeping?

- Never
 Once or twice
 Sometimes
 Often
 Everyday or almost everyday
 Don't know

12. Had difficulty saying any words?

- Never
 Once or twice
 Sometimes
 Often
 Everyday or almost everyday
 Don't know

13. Taken longer than others to eat a meal?

- Never
 Once or twice
 Sometimes
 Often
 Everyday or almost everyday
 Don't know

14. Had difficulty drinking or eating hot or cold foods?

- Never
 Once or twice

Appendix #8

- Sometimes
- Often
- Everyday or almost everyday
- Don't know

15. Had difficulty eating foods he/she would like to eat?

- Never
- Once or twice
- Sometimes
- Often
- Everyday or almost everyday
- Don't know

16. Had diet restricted to certain types of food (e.g. soft food)?

- Never
- Once or twice
- Sometimes
- Often
- Everyday or almost everyday
- Don't know

SECTION 3: The following questions ask about the effects that the condition of children's teeth, lips, mouth and jaws may have on their feelings and everyday activities

*During the last 3 months, because of his/her teeth, lips, mouth or jaws,
How often has your child been:*

17. Upset?

- Never
- Once or twice
- Sometimes
- Often
- Everyday or almost everyday
- Don't know

18. Irritable or frustrated?

- Never
- Once or twice
- Sometimes

Appendix #8

- Often
- Everyday or almost everyday
- Don't know

19. Anxious or fearful?

- Never
- Once or twice
- Sometimes
- Often
- Everyday or almost everyday
- Don't know

20. Missed school (e.g. pain, appointments, surgery)?

- Never
- Once or twice
- Sometimes
- Often
- Everyday or almost everyday
- Don't know

21. Had a hard time paying attention in school?

- Never
- Once or twice
- Sometimes
- Often
- Everyday or almost everyday
- Don't know

22. Not wanted to speak or read out loud in class?

- Never
- Once or twice
- Sometimes
- Often
- Everyday or almost everyday
- Don't know

23. Not wanted to talk to other children?

- Never
- Once or twice
- Sometimes
- Often

Appendix #8

- Everyday or almost everyday
- Don't know

24. Avoided smiling or laughing when around other children?

- Never
- Once or twice
- Sometimes
- Often
- Everyday or almost everyday
- Don't know

25. Worried that he/she is not as healthy as other people?

- Never
- Once or twice
- Sometimes
- Often
- Everyday or almost everyday
- Don't know

26. Worried that he/she is different than other people?

- Never
- Once or twice
- Sometimes
- Often
- Everyday or almost everyday
- Don't know

27. Worried that he/she is not as good-looking as other people?

- Never
- Once or twice
- Sometimes
- Often
- Everyday or almost everyday
- Don't know

28. Acted shy or embarrassed?

- Never
- Once or twice
- Sometimes
- Often

Appendix #8

- Everyday or almost everyday
- Don't know

29. Been teased or called names by other children?

- Never
- Once or twice
- Sometimes
- Often
- Everyday or almost everyday
- Don't know

30. Been left out by other children?

- Never
- Once or twice
- Sometimes
- Often
- Everyday or almost everyday
- Don't know

31. Not wanted or been unable to spend time with other children?

- Never
- Once or twice
- Sometimes
- Often
- Everyday or almost everyday
- Don't know

32. Not wanted or been unable to participate in activities such as sports, clubs, drama, music, school trips?

- Never
- Once or twice
- Sometimes
- Often
- Everyday or almost everyday
- Don't know

33. Worried that he/she has fewer friends?

- Never
- Once or twice
- Sometimes

Appendix #8

- Often
- Everyday or almost everyday
- Don't know

During the last 3 months, how often has your child been:

34. Concerned what other people think about his/her teeth, lips, mouth or jaws?

- Never
- Once or twice
- Sometimes
- Often
- Everyday or almost everyday
- Don't know

35. Asked questions by other children about his/her teeth, lips, mouth or jaws?

- Never
- Once or twice
- Sometimes
- Often
- Everyday or almost everyday
- Don't know

SECTION 4: The following questions ask about effects that a child's oral condition may have on PARENTS AND OTHER FAMILY MEMBERS

During the last 3 months, because of your child's teeth, lips, mouth or jaws, How often have you or another family member:

36. Been upset?

- Never
- Once or twice
- Sometimes
- Often
- Everyday or almost everyday
- Don't know

Appendix #8**37. Had sleep disrupted?**

- Never
- Once or twice
- Sometimes
- Often
- Everyday or almost everyday
- Don't know

38. Felt guilty?

- Never
- Once or twice
- Sometimes
- Often
- Everyday or almost everyday
- Don't know

39. Taken time off work (e.g. pain, appointments, surgery)?

- Never
- Once or twice
- Sometimes
- Often
- Everyday or almost everyday
- Don't know

40. Had less time for yourself or the family?

- Never
- Once or twice
- Sometimes
- Often
- Everyday or almost everyday
- Don't know

41. Worried that your child will have fewer life opportunities (e.g. for dating, getting married, having children, getting a job he/she will like)?

- Never
- Once or twice
- Sometimes
- Often
- Everyday or almost everyday
- Don't know

42. Felt uncomfortable in public places (e.g. stores, restaurants) with your

Appendix #8

child?

- Never
- Once or twice
- Sometimes
- Often
- Everyday or almost everyday
- Don't know

43. Been jealous of you or others in the family?

- Never
- Once or twice
- Sometimes
- Often
- Everyday or almost everyday
- Don't know

44. Blamed you or another person in the family?

- Never
- Once or twice
- Sometimes
- Often
- Everyday or almost everyday
- Don't know

45. Argued with you or others in the family?

- Never
- Once or twice
- Sometimes
- Often
- Everyday or almost everyday
- Don't know

46. Required more attention from you or others in the family?

- Never
- Once or twice
- Sometimes
- Often
- Everyday or almost everyday
- Don't know

During the last 3 months, how often has the condition of your child's teeth, lips, mouth or jaws:

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47. Interfered with family activities at home or elsewhere?

- Never
- Once or twice
- Sometimes
- Often
- Everyday or almost everyday
- Don't know

48. Caused disagreement or conflict in your family?

- Never
- Once or twice
- Sometimes
- Often
- Everyday or almost everyday
- Don't know

49. Caused financial difficulties for your family?

- Never
- Once or twice
- Sometimes
- Often
- Everyday or almost everyday
- Don't know

SECTION 5: Child's gender and age

a. Your child is:

- MALE
- FEMALE

b. Your child's age is: _____ YEARS

Questionnaire completed by:

- MOTHER
- FATHER
- OTHER _____

Date completed: _____ / _____ / _____

Appendix #8

DAY MONTH YEAR

THANK YOU FOR YOUR PARTICIPATION!

We would like to hear from you.

Do you have any questions or concerns? _____

Appendix # 9

Question Numbers and Domain Range

Group A- Child Time 1

Q1 – Q2 = Demographic questions

Q3 – Q4 = Global rating questions

Q5 – Q10 = Oral symptoms domain

Q11– Q19 = Functional limitations domain

Q20 – Q28 = Emotional well-being domain

Q29 – Q41= Social well-being domain

Group A- Parent Time 1

Q1– Q2 = Global rating questions

Q3 – Q8 = Oral symptoms domain

Q9– Q16 = Functional limitations domain

Q17 – Q19 and Q25 – Q28 and Q33 – Q34 = Emotional well-being domain

Q20 – Q24 and Q29 – Q32 and Q35 = Social well-being domain

Q36 – Q42 and Q49 = Parents & family members quality of life

Q43 – Q48 = Child's behaviour

Q50 – Q52 = Demographic questions

Appendix # 9

Group B- Child Time 1

Q1 – Q2 = Demographic questions

Q3 – Q4 = Global rating questions

Q5 – Q10 = Oral symptoms domain

Q11 – Q19 = Functional limitations domain

Q20 – Q28 = Emotional well-being domain

Q29 – Q41 = Social well-being domain

Group B- Parent Time 1

Q1– Q2 = Global rating questions

Q3 – Q8 = Oral symptoms domain

Q9– Q16 = Functional limitations domain

Q17 – Q19 and Q25 – Q28 and Q33 – Q34 = Emotional well-being domain

Q20 – Q24 and Q29 – Q32 and Q35 = Social well-being domain

Q36 – Q42 and Q49 = Parents & family members quality of life

Q43 – Q48 = Child's behaviour

Q50 – Q52 = Demographic questions

Appendix # 9

Group B- Child Time 2

Q1 – Q2 = Demographic questions

Q3 – Q4 = Transition rating questions

Q5 – Q10 = Oral symptoms domain

Q11 – Q19 = Functional limitations domain

Q20 – Q28 = Emotional well-being domain

Q29 – Q41 = Social well-being domain

Group B- Parent Time 2

Q1– Q2 = Transition rating questions

Q3 – Q8 = Oral symptoms domain

Q9– Q16 = Functional limitations domain

Q17 – Q19 and Q25 – Q28 and Q33 – Q34 = Emotional well-being domain

Q20 – Q24 and Q29 – Q32 and Q35 = Social well-being domain

Q36 – Q42 and Q49 = Parents & family members quality of life

Q43 – Q48 = Child's behaviour

Q50 – Q52 = Demographic questions

Appendix 10

Group A- Child- Time 1

Q1. Gender	1 Boy; 2 Girl
Q2. DOB	Month; Date; Year
Global Rating	
Q3. Global Rating of Oral Health	1 Excellent; 2 Very Good; 3 Good; 4 Fair; 5 Poor
Q4. Global Rating OH as it affects Life Overall	1 Not At All; 2 Very Little; 3 Some; 4 A Lot; 5 Very Much
Oral symptoms	
Q5. Pain	1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday
Q6. Bleeding gums	1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday
Q7. Mouth sores	1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday
Q8. Bad breath	1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday
Q9. Food stuck in/ between teeth	1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday
Q10. Food stuck in palate	1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday
Functional limitations	
Q11. Mouth breathing	1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday
Q12. Slow completing meal	1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday
Q13. Sleep disturbance	1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday
Q14. Difficulty biting/ incising hard food (apple/ corn/ meat)	1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday
Q15. Difficulty opening mouth wide	1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday
Q16. Speech difficulty	1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday
Q17. Difficulty eating food he/she likes	1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday
Q18. Difficulty drinking with a straw	1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday
Q19. Difficulty eating, drinking hot/ cold foods	1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday
Emotional well-being	
Q20. Irritable /frustrated	1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday
Q21. Feel unsure of self	1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday
Q22. Shy /embarrassed	1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday
Q23. Concerned what other people think	1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday
Q24. Worried about appearance (not good-looking)	1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday
Q25. Upset	1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday
Q26. Nervous /afraid	1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday
Q27. Worried that is less healthy than other people	1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday
Q28. Worried that is different than other people	1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday
Social well-being	
Q29. Missed school (pain, appointment, surgery)	1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday
Q30. Low concentration in school	1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday
Q31. Difficulty doing homework	1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday
Q32. Not wanted to speak / read out loud in class	1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday
Q33. Avoided school or leisure activities	1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday
Q34. Not wanted to talk to children	1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday
Q35. Avoided smiling / laughing when with children	1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday
Q36. Difficulty playing musical instrument	1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday
Q37. Not wanted to spend time with children	1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday
Q38. Argue with family / other children	1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday
Q39. Been teased and called names by children	1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday
Q40. Left out by children	1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday
Q41. Asked questions by other children	1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday

Group A- Parent- Time 1

Case # (A - 0)

A means Group A (before treatment); Number means case number (1 to 28)

Global Rating

Q1. Global Rating of Oral Health

1 Excellent; 2 Very Good; 3 Good; 4 Fair; 5 Poor

Q2. Global Rating OH as it affects Life Overall

1 Not At All; 2 Very Little; 3 Some; 4 A Lot; 5 Very Much

Oral symptoms

Q3. Pain

1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday

Q4. Bleeding gums

1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday

Q5. Mouth sores

1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday

Q6. Bad breath

1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday

Q7. Food stuck in palate

1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday

Q8. Food stuck in / between teeth

1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday

Functional limitations

Q9. Difficulty biting/ incising food (apple/ corn/ meat)

1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday

Q10. Mouth breathing

1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday

Q11. Sleep disturbance

1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday

Q12. Speech difficulty

1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday

Q13. Slow competing meal

1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday

Q14. Difficulty eating, drinking hot / cold foods

1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday

Q15. Difficulty eating foods child likes

1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday

Q16. Diet restriction (soft food)

1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday

Emotional well-being

Q17. Upset

1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday

Q18. Irritable / frustrated

1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday

Q19. Anxious / fearful

1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday

Social Well-being

Q20. Missed school (pain, appointment, surgery)

1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday

Q21. Low concentration in school

1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday

Q22. Not wanted to speak / read out loud in class

1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday

Q23. Not wanted to talk to children

1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday

Q24. Avoided smiling / laughing when with children

1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday

Emotional well-being

Q25. Worried that is less healthy than other people

1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday

Q26. Worried that is different than other people

1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday

Q27. Worried about appearance (not good-looking)

1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday

Q28. Shy / embarrassed

1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday

Social Well-being

Q29. Been teased and called names by children

1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday

Q30. Left out by children

1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday

Q31. Not wanted to spend time with children

1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday

Q32. Not wanted to participate in leisure activities

1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday

Emotional well-being

Q33. Worried that had fewer friends

1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday

Q34. Concerned what other people think

1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday

Social Well-being

Q35. Asked questions by other children

1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday

Parents & Family Members Quality of Life

Q36. Upset

1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday

Q37. Sleep disturbance

1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday

Q38. Felt guilty

1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday

Q39. Taken time off work (paim, appointment, surgery)	1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday
Q40. Had less time for self or family	1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday
Q41. Worried about child future oportunities (marriage, job)	1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday
Q42. Uncomfortable with child in public places	1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday
Child's Behaviour	
Q43. Child jealous of parent/ family	1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday
Q44. Child blamed parent/ family	1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday
Q45. Child argued with others	1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday
Q46. Child required more attention	1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday
Q47. Child interfered with family activities	1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday
Q48. Child caused conflict in family	1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday
Parents & Family Members Quality of Life	
Q49. Child caused financial difficulty	1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday
Demographics	
Q50. Child gender	1 Boy; 2 Girl
Q51. Child age (DOB)	month, day, year (DOB)
Q52. Completed by	1 Mother; 2 Father; 3 Other

Group B- Child- Time 1

Case # (B- 0)

Q1. Gender

Q2. DOB

Global Rating

Q3. Global Rating of Oral Health

Q4. Global Rating OH as it affects Life Overall

Oral symptoms

Q5. Pain

Q6. Bleeding gums

Q7. Mouth sores

Q8. Bad breath

Q9. Food stuck in /between teeth

Q10. Food stuck in palate

Functional limitations

Q11. Mouth breathing

Q12. Slow completing meal

Q13. Sleep disturbance

Q14. Difficulty biting/ incising hard food (apple/ corn/ meat)

Q15. Difficulty opening mouth wide

Q16. Speech difficulty

Q17. Difficulty eating food he/she likes

Q18. Difficulty drinking with a straw

Q19. Difficulty eating, drinking hot /cold foods

Emotional well-being

Q20. Irritable /frustrated

Q21. Feel unsure of self

Q22. Shy /embarrassed

Q23. Concerned what other people think

Q24. Worried about appearance (not good-looking)

Q25. Upset

Q26. Nervous /afraid

Q27. Worried that is less healthy than other people

Q28. Worried that is different than other people

Social well-being

Q29. Missed school (pain, appointment, surgery)

Q30. Low concentration in school

Q31. Difficulty doing homework

Q32. Not wanted to speak /read out loud in class

Q33. Avoided school or leisure activities

Q34. Not wanted to talk to children

Q35. Avoided smiling /laughing when with children

Q36. Difficulty playing musical instrument

Q37. Not wanted to spend time with children

Q38. Argue with family /other children

Q39. Been teased and called names by children

Q40. Left out by children

Q41. Asked questions by other children

B means Group B (after treatment); Number means case number (1 to 25)

1 Boy; 2 Girl

Month; Date; Year

1 Excellent; 2 Very Good; 3 Good; 4 Fair; 5 Poor

1 Not At All; 2 Very Little; 3 Some; 4 A Lot; 5 Very Much

1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday

1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday

1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday

1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday

1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday

1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday

1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday

1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday

1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday

1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday

1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday

1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday

1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday

1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday

1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday

1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday

1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday

1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday

1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday

1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday

1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday

1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday

1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday

1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday

1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday

1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday

1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday

1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday

1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday

1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday

1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday

1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday

1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday

1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday

1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday

1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday

1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday

1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday

1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday

Group B- Child- Time 2

Q1. Gender	1 Boy; 2 Girl
Q2. DOB	Month; Date; Year
Change Rating	
Q3. Rating Change of Oral Health	1 Stayed the same; 2 Changed A Little; 3 Changed A Lot
Q4. Rating Change of OH as it affects Life Overall	1 Stayed the Same; 2 Changed A Little; 3 Changed A Lot; 4 Very Much
Oral symptoms	
Q5. Pain	1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday
Q6. Bleeding gums	1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday
Q7. Mouth sores	1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday
Q8. Bad breath	1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday
Q9. Food stuck in /between teeth	1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday
Q10. Food stuck in palate	1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday
Functional limitations	
Q11. Mouth breathing	1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday
Q12. Slow completing meal	1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday
Q13. Sleep disturbance	1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday
Q14. Difficulty biting/ incising hard food (apple, corn, meat)	1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday
Q15. Difficulty opening mouth wide	1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday
Q16. Speech difficulty	1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday
Q17. Difficulty eating foods he/she likes	1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday
Q18. Difficulty drinking with a straw	1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday
Q19. Difficulty eating hot / cold foods	1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday
Emotional well-being	
Q20. Irritable /frustrated	1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday
Q21. Feel unsure of self	1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday
Q22. Shy /embarrassed	1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday
Q23. Concerned what other people think	1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday
Q24. Worried about appearance (not good-looking)	1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday
Q25. Upset	1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday
Q26. Nervous / afraid	1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday
Q27. Worried that is less healthy than other people	1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday
Q28. Worried that is different than other people	1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday
Social well-being	
Q29. Missed school (pain, appointment, surgery)	1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday
Q30. Low concentration in school	1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday
Q31. Difficulty doing homework	1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday
Q32. Not wanted to speak /read out loud in class	1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday
Q33. Avoided school or leisure activities	1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday
Q34. Not wanted to talk to children	1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday
Q35. Avoided smiling /laughing when with children	1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday
Q36. Difficulty playing musical instrument	1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday
Q37. Not wanted to spend time with children	1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday
Q38. Argue with family /other children	1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday
Q39. Been teased and called names by children	1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday
Q40. Left out by children	1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday
Q41. Asked questions by other children	1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday

Group B- Parent- Time 1

Case # (B - 0)

Global Rating

Q1. Global Rating of Oral Health

Q2. Global Rating OH as it affects Life Overall

Oral symptoms

Q3. Pain

Q4. Bleeding gums

Q5. Mouth sores

Q6. Bad breath

Q7. Food stuck in palate

Q8. Food stuck in / between teeth

Functional limitations

Q9. Difficulty biting/ incising food (apple/ corn/ meat)

Q10. Mouth breathing

Q11. Sleep disturbance

Q12. Speech difficulty

Q13. Slow competing meal

Q14. Difficulty eating, drinking hot/ cold foods

Q15. Difficulty eating foods child likes

Q16. Diet restriction (soft food)

Emotional well-being

Q17. Upset

Q18. Irritable/ frustrated

Q19. Anxious/ fearful

Social Well-being

Q20. Missed school (pain, appointment, surgery)

Q21. Low concentration in school

Q22. Not wanted to speak/ read out loud in class

Q23. Not wanted to talk to children

Q24. Avoided smiling/ laughing when with children

Emotional well-being

Q25. Worried that is less healthy than other people

Q26. Worried that is different than other people

Q27. Worried about appearance (not good-looking)

Q28. Shy/ embarrassed

Social Well-being

Q29. Been teased and called names by children

Q30. Left out by children

Q31. Not wanted to spend time with children

Q32. Not wanted to participate in leisure activities

Emotional well-being

Q33. Worried that had fewer friends

Q34. Concerned what other people think

Social Well-being

Q35. Asked questions by other children

Parents & Family Members Quality of Life

Q36. Upset

Q37. Sleep disturbance

Q38. Felt guilty

B means Group B (after treatment); Number means case number (1 to 25)

1 Excellent; 2 Very Good; 3 Good; 4 Fair; 5 Poor

1 Not At All; 2 Very Little; 3 Some; 4 A Lot; 5 Very Much

1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday

1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday

1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday

1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday

1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday

1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday

1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday

1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday

1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday

1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday

1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday

1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday

1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday

1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday

1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday

1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday

1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday

1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday

1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday

1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday

1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday

1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday

1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday

1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday

1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday

1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday

1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday

1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday

1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday

1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday

1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday

1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday

1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday

1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday

1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday

1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday

1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday

1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday

1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday

Q39. Taken time off work (paim, appointment, surgery)	1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday
Q40. Had less time for self or family	1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday
Q41. Worried about child future oportunities (marriage, job)	1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday
Q42. Uncomfortable with child in public places	1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday
Child's Behaviour	
Q43. Child jealous of parent/ family	1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday
Q44. Child blamed parent/ family	1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday
Q45. Child argued with others	1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday
Q46. Child required more attention	1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday
Q47. Child interfered with family activities	1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday
Q48. Child caused conflict in family	1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday
Parents & Family Members Quality of Life	
Q49. Child caused financial difficulty	1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday
Demographics	
Q50. Child gender	1 Boy; 2 Girl
Q51. Child age (DOB)	month, day, year
Q52. Completed by	1 Mother; 2 Father; 3 Other

Group B- Parent- Time 2

Case # (B - 0)

B means Group B (after treatment); Number means case number (1 to 25)

Change Rating

Q1. Rating change of Oral Health

1 Stayed the same; 2 Changed A Little; 3 Changed A Lot

Q2. Rating Change of OH as it affects Life Overall

1 Stayed the Same; 2 Changed A Little; 3 Changed A Lot

Oral symptoms

Q3. Pain

1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday

Q4. Bleeding gums

1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday

Q5. Mouth sores

1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday

Q6. Bad breath

1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday

Q7. Food stuck in palate

1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday

Q8. Food stuck in / between teeth

1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday

Functional limitations

Q9. Difficulty biting/ incising food (apple/ corn on cub/ meat)

1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday

Q10. Mouth breathing

1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday

Q11. Sleep disturbance

1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday

Q12. Speech difficulty

1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday

Q13. Slow completing meal

1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday

Q14. Difficulty eating hot / cold foods

1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday

Q15. Difficulty eating foods child likes

1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday

Q16. Diet restriction (soft food)

1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday

Emotional well-being

Q17. Upset

1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday

Q18. Irritable / frustrated

1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday

Q19. Anxious / fearful

1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday

Social Well-being

Q20. Missed school (pain, appointment, surgery)

1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday

Q21. Low concentration in school

1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday

Q22. Not wanted to speak / read out loud in class

1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday

Q23. Not wanted to talk to children

1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday

Q24. Avoided smiling / laughing when with children

1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday

Emotional well-being

Q25. Worried that is less healthy than other people

1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday

Q26. Worried that is different than other people

1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday

Q27. Worried about appearance (not good-looking)

1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday

Q28. Shy / embarrassed

1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday

Social Well-being

Q29. Been teased and called names by children

1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday

Q30. Left out by children

1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday

Q31. Not wanted to spend time with children

1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday

Q32. Not wanted to participate in leisure activities

1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday

Emotional well-being

Q33. Worried that had fewer friends

1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday

Q34. Concerned what other people think

1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday

Social Well-being

Q35. Asked questions by other children

1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday

Parents & Family Members Quality of Life

Q36. Upset

1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday

Q37. Sleep disturbance

1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday

Q38. Felt guilty

1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday

Q39. Taken time off work (pain, appointment, surgery)	1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday
Q40. Had less time for self or family	1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday
Q41. Worried about child future opportunities (marriage, job)	1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday
Q42. Uncomfortable with child in public places	1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday
Child's Behaviour	
Q43. Child jealous of parent/ family	1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday
Q44. Child blamed parent/ family	1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday
Q45. Child argued with others	1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday
Q46. Child required more attention	1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday
Q47. Child interfered with family activities	1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday
Q48. Child caused conflict in family	1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday
Parents & Family Members Quality of Life	
Q49. Child caused financial difficulty	1 Never; 2 Once or Twice; 3 Sometimes; 4 Often; 5 Everyday or Almost Everyday
Demographics	
Q50. Child gender	1 Boy; 2 Girl
Q51. Child age (DOB)	month, day, year
Q52. Completed by	1 Mother; 2 Father; 3 Other

Responses to Individual Questions by Group-A Children at Time 1

The FREQ Procedure

Gender	Frequency	Percent
Female	16	57.14
Male	12	42.86

Q3	Frequency	Percent
2	5	17.86
3	15	53.57
4	4	14.29
5	4	14.29

Q4	Frequency	Percent
1	4	14.29
2	8	28.57
3	9	32.14
4	6	21.43
5	1	3.57

Q5	Frequency	Percent
1	9	32.14
2	8	28.57
3	7	25.00
4	2	7.14
5	2	7.14

Q6	Frequency	Percent
1	11	39.29
2	7	25.00
3	8	28.57
4	2	7.14

Responses to Individual Questions by Group-A Children at Time 1

The FREQ Procedure

Q7	Frequency	Percent
1	15	53.57
2	10	35.71
3	1	3.57
4	2	7.14

Q8	Frequency	Percent
1	3	10.71
2	14	50.00
3	7	25.00
4	2	7.14
5	2	7.14

Q9	Frequency	Percent
1	1	3.57
2	9	32.14
3	8	28.57
4	7	25.00
5	3	10.71

Q10	Frequency	Percent
1	19	67.86
2	4	14.29
3	1	3.57
4	3	10.71
5	1	3.57

Q11	Frequency	Percent
1	8	28.57
2	4	14.29
3	2	7.14
4	6	21.43
5	8	28.57

Responses to Individual Questions by Group-A Children at Time 1

The FREQ Procedure

Q12	Frequency	Percent
1	11	39.29
2	6	21.43
3	6	21.43
4	5	17.86

Q13	Frequency	Percent
1	19	67.86
2	4	14.29
3	1	3.57
4	3	10.71
5	1	3.57

Q14	Frequency	Percent
1	17	60.71
2	2	7.14
3	4	14.29
4	4	14.29
5	1	3.57

Q15	Frequency	Percent
1	16	57.14
2	6	21.43
3	4	14.29
4	2	7.14

Q16	Frequency	Percent
1	13	46.43
2	9	32.14
3	2	7.14
4	3	10.71
5	1	3.57

Responses to Individual Questions by Group-A Children at Time 1

The FREQ Procedure

Q17	Frequency	Percent
1	19	67.86
2	3	10.71
3	4	14.29
4	2	7.14

Q18	Frequency	Percent
1	27	96.43
3	1	3.57

Q19	Frequency	Percent
1	13	46.43
2	5	17.86
3	5	17.86
4	4	14.29
5	1	3.57

Q20	Frequency	Percent
1	14	50.00
2	9	32.14
3	3	10.71
4	2	7.14

Q21	Frequency	Percent
1	11	39.29
2	9	32.14
3	5	17.86
4	3	10.71

Responses to Individual Questions by Group-A Children at Time 1

The FREQ Procedure

Q22	Frequency	Percent
1	11	39.29
2	4	14.29
3	9	32.14
4	3	10.71
5	1	3.57

Q23	Frequency	Percent
1	10	35.71
2	3	10.71
3	4	14.29
4	6	21.43
5	5	17.86

Q24	Frequency	Percent
1	12	42.86
2	6	21.43
3	5	17.86
4	3	10.71
5	2	7.14

Q25	Frequency	Percent
1	19	67.86
2	5	17.86
3	4	14.29

Q26	Frequency	Percent
1	16	57.14
2	7	25.00
3	4	14.29
4	1	3.57

Responses to Individual Questions by Group-A Children at Time 1

The FREQ Procedure

Q27	Frequency	Percent
1	17	60.71
2	8	28.57
3	3	10.71

Q28	Frequency	Percent
1	17	60.71
2	6	21.43
3	3	10.71
4	1	3.57
5	1	3.57

Q29	Frequency	Percent
1	8	28.57
2	11	39.29
3	6	21.43
4	3	10.71

Q30	Frequency	Percent
1	22	78.57
2	6	21.43

Q31	Frequency	Percent
1	21	75.00
2	6	21.43
3	1	3.57

Q32	Frequency	Percent
1	16	57.14
2	6	21.43
3	5	17.86
4	1	3.57

Responses to Individual Questions by Group-A Children at Time 1

The FREQ Procedure

Q33	Frequency	Percent
1	27	96.43
2	1	3.57

Q34	Frequency	Percent
1	23	82.14
2	2	7.14
3	2	7.14
4	1	3.57

Q35	Frequency	Percent
1	17	60.71
2	5	17.86
3	1	3.57
4	3	10.71
5	2	7.14

Q36	Frequency	Percent
1	22	78.57
2	4	14.29
4	2	7.14

Q37	Frequency	Percent
1	22	78.57
2	5	17.86
3	1	3.57

Q38	Frequency	Percent
1	19	67.86
2	5	17.86
3	3	10.71
4	1	3.57

Responses to Individual Questions by Group-A Children at Time 1

The FREQ Procedure

Q39	Frequency	Percent
1	20	71.43
2	4	14.29
3	1	3.57
4	3	10.71

Q40	Frequency	Percent
1	23	82.14
2	2	7.14
3	1	3.57
4	1	3.57
5	1	3.57

Q41	Frequency	Percent
1	13	46.43
2	8	28.57
3	5	17.86
4	1	3.57
5	1	3.57

The MEANS Procedure

Variable	Mean	Median	Minimum	Maximum	Std Dev
Global_Rating	5.9642857	6.0000000	3.0000000	9.0000000	1.4777897
Oral_Symptoms	13.2142857	13.0000000	7.0000000	24.0000000	4.1842486
Functional_limitations	17.2857143	16.0000000	9.0000000	31.0000000	6.2054763
Emotional	17.2142857	17.0000000	9.0000000	36.0000000	7.1042874
Social	19.4642857	18.0000000	13.0000000	31.0000000	5.3850420

Responses to Individual Questions by Group-B Children at Time 1

The FREQ Procedure

Gender	Frequency	Percent
Female	13	52.00
Male	12	48.00

Q3	Frequency	Percent
1	3	12.00
2	11	44.00
3	5	20.00
4	3	12.00
5	3	12.00

Q4	Frequency	Percent
1	3	12.00
2	10	40.00
3	5	20.00
4	7	28.00

Q5	Frequency	Percent
1	9	36.00
2	10	40.00
3	3	12.00
4	1	4.00
5	2	8.00

Q6	Frequency	Percent
1	7	29.17
2	9	37.50
3	7	29.17
4	1	4.17

Frequency Missing = 1

Responses to Individual Questions by Group-B Children at Time 1

The FREQ Procedure

Q7	Frequency	Percent
1	10	40.00
2	8	32.00
3	5	20.00
4	1	4.00
5	1	4.00

Q8	Frequency	Percent
1	5	20.00
2	9	36.00
3	5	20.00
4	4	16.00
5	2	8.00

Q9	Frequency	Percent
1	3	12.00
2	7	28.00
3	9	36.00
4	4	16.00
5	2	8.00

Q10	Frequency	Percent
1	20	80.00
2	3	12.00
3	1	4.00
5	1	4.00

Q11	Frequency	Percent
1	7	28.00
2	4	16.00
3	2	8.00
4	4	16.00
5	8	32.00

Responses to Individual Questions by Group-B Children at Time 1

The FREQ Procedure

Q12	Frequency	Percent
1	16	64.00
2	4	16.00
3	1	4.00
4	2	8.00
5	2	8.00

Q13	Frequency	Percent
1	14	56.00
2	4	16.00
3	4	16.00
4	2	8.00
5	1	4.00

Q14	Frequency	Percent
1	11	44.00
2	6	24.00
3	5	20.00
4	1	4.00
5	2	8.00

Q15	Frequency	Percent
1	20	80.00
2	1	4.00
3	2	8.00
5	2	8.00

Q16	Frequency	Percent
1	15	60.00
2	4	16.00
3	4	16.00
4	1	4.00
5	1	4.00

Responses to Individual Questions by Group-B Children at Time 1

The FREQ Procedure

Q17	Frequency	Percent
1	20	80.00
2	4	16.00
5	1	4.00

Q18	Frequency	Percent
1	24	96.00
5	1	4.00

Q19	Frequency	Percent
1	14	56.00
2	7	28.00
3	1	4.00
4	1	4.00
5	2	8.00

Q20	Frequency	Percent
1	17	68.00
2	6	24.00
5	2	8.00

Q21	Frequency	Percent
1	19	76.00
2	1	4.00
3	2	8.00
4	1	4.00
5	2	8.00

Responses to Individual Questions by Group-B Children at Time 1

The FREQ Procedure

Q22	Frequency	Percent
1	16	64.00
2	2	8.00
3	2	8.00
4	4	16.00
5	1	4.00

Q23	Frequency	Percent
1	17	68.00
2	2	8.00
3	1	4.00
4	2	8.00
5	3	12.00

Q24	Frequency	Percent
1	13	52.00
2	8	32.00
3	1	4.00
5	3	12.00

Q25	Frequency	Percent
1	19	76.00
2	3	12.00
3	2	8.00
5	1	4.00

Q26	Frequency	Percent
1	21	84.00
2	3	12.00
5	1	4.00

Responses to Individual Questions by Group-B Children at Time 1

The FREQ Procedure

Q27	Frequency	Percent
1	19	76.00
2	4	16.00
4	1	4.00
5	1	4.00

Q28	Frequency	Percent
1	22	88.00
2	1	4.00
3	1	4.00
5	1	4.00

Q29	Frequency	Percent
1	9	36.00
2	7	28.00
3	7	28.00
4	1	4.00
5	1	4.00

Q30	Frequency	Percent
1	23	92.00
5	2	8.00

Q31	Frequency	Percent
1	23	92.00
2	1	4.00
5	1	4.00

Q32	Frequency	Percent
1	16	64.00
2	6	24.00
3	1	4.00
5	2	8.00

Responses to Individual Questions by Group-B Children at Time 1

The FREQ Procedure

Q33	Frequency	Percent
1	22	88.00
2	1	4.00
3	1	4.00
5	1	4.00

Q34	Frequency	Percent
1	22	88.00
2	1	4.00
3	1	4.00
5	1	4.00

Q35	Frequency	Percent
1	17	68.00
2	2	8.00
3	3	12.00
4	2	8.00
5	1	4.00

Q36	Frequency	Percent
1	20	80.00
2	3	12.00
3	1	4.00
5	1	4.00

Q37	Frequency	Percent
1	22	88.00
2	1	4.00
3	1	4.00
5	1	4.00

Responses to Individual Questions by Group-B Children at Time 1

The FREQ Procedure

Q38	Frequency	Percent
1	17	68.00
2	4	16.00
3	3	12.00
5	1	4.00

Q39	Frequency	Percent
1	21	84.00
2	2	8.00
4	1	4.00
5	1	4.00

Q40	Frequency	Percent
1	20	80.00
2	1	4.00
3	2	8.00
5	2	8.00

Q41	Frequency	Percent
1	11	44.00
2	10	40.00
3	3	12.00
5	1	4.00

The MEANS Procedure

Variable	Mean	Median	Minimum	Maximum	Std Dev
Global_Rating	5.3200000	5.0000000	3.0000000	9.0000000	1.4352700
Oral_Symptoms	12.8000000	12.0000000	6.0000000	25.0000000	4.0620192
Functional_limitations	16.4000000	14.0000000	9.0000000	45.0000000	7.4665923
Emotional	14.2800000	11.0000000	9.0000000	45.0000000	9.0899212
Social	19.4400000	16.0000000	13.0000000	65.0000000	10.3484298

Responses to Individual Questions by Group-A Parents at Time 1

The FREQ Procedure

Gender	Frequency	Percent
Female	16	57.14
Male	12	42.86

Q1	Frequency	Percent
1	4	14.29
2	4	14.29
3	10	35.71
4	4	14.29
5	6	21.43

Q2	Frequency	Percent
1	4	14.29
2	8	28.57
3	7	25.00
4	5	17.86
5	4	14.29

Q3	Frequency	Percent
1	13	52.00
2	3	12.00
3	6	24.00
4	2	8.00
5	1	4.00

Frequency Missing = 3

Q4	Frequency	Percent
1	15	57.69
2	5	19.23
3	5	19.23
5	1	3.85

Frequency Missing = 2

Responses to Individual Questions by Group-A Parents at Time 1

The FREQ Procedure

Q5	Frequency	Percent
1	14	50.00
2	7	25.00
3	5	17.86
4	2	7.14

Q6	Frequency	Percent
1	6	23.08
2	4	15.38
3	12	46.15
4	4	15.38

Frequency Missing = 2

Q7	Frequency	Percent
1	17	77.27
2	1	4.55
3	4	18.18

Frequency Missing = 6

Q8	Frequency	Percent
1	5	20.00
2	5	20.00
3	12	48.00
4	3	12.00

Frequency Missing = 3

Q9	Frequency	Percent
1	11	42.31
2	4	15.38
3	6	23.08
4	3	11.54
5	2	7.69

Frequency Missing = 2

Responses to Individual Questions by Group-A Parents at Time 1

The FREQ Procedure

Q10	Frequency	Percent
1	6	26.09
2	2	8.70
3	7	30.43
4	3	13.04
5	5	21.74

Frequency Missing = 5

Q11	Frequency	Percent
1	14	58.33
2	3	12.50
3	5	20.83
4	2	8.33

Frequency Missing = 4

Q12	Frequency	Percent
1	14	51.85
2	6	22.22
3	3	11.11
4	3	11.11
5	1	3.70

Frequency Missing = 1

Q13	Frequency	Percent
1	14	50.00
2	2	7.14
3	6	21.43
4	5	17.86
5	1	3.57

Responses to Individual Questions by Group-A Parents at Time 1

The FREQ Procedure

Q14	Frequency	Percent
1	19	73.08
2	2	7.69
3	3	11.54
4	1	3.85
5	1	3.85

Frequency Missing = 2

Q15	Frequency	Percent
1	17	60.71
2	3	10.71
3	6	21.43
4	2	7.14

Q16	Frequency	Percent
1	26	92.86
3	2	7.14

Q17	Frequency	Percent
1	12	42.86
2	4	14.29
3	7	25.00
4	2	7.14
5	3	10.71

Q18	Frequency	Percent
1	12	46.15
2	5	19.23
3	5	19.23
4	2	7.69
5	2	7.69

Frequency Missing = 2

Responses to Individual Questions by Group-A Parents at Time 1

The FREQ Procedure

Q19	Frequency	Percent
1	13	52.00
2	4	16.00
3	6	24.00
4	1	4.00
5	1	4.00

Frequency Missing = 3

Q20	Frequency	Percent
1	15	53.57
2	7	25.00
3	5	17.86
4	1	3.57

Q21	Frequency	Percent
1	17	73.91
2	4	17.39
3	1	4.35
4	1	4.35

Frequency Missing = 5

Q22	Frequency	Percent
1	16	69.57
2	3	13.04
3	3	13.04
4	1	4.35

Frequency Missing = 5

Responses to Individual Questions by Group-A Parents at Time 1

The FREQ Procedure

Q23	Frequency	Percent
1	17	73.91
2	3	13.04
3	2	8.70
4	1	4.35

Frequency Missing = 5

Q24	Frequency	Percent
1	14	53.85
2	2	7.69
3	4	15.38
4	3	11.54
5	3	11.54

Frequency Missing = 2

Q25	Frequency	Percent
1	16	64.00
2	4	16.00
3	2	8.00
4	3	12.00

Frequency Missing = 3

Q26	Frequency	Percent
1	13	52.00
2	3	12.00
3	6	24.00
4	1	4.00
5	2	8.00

Frequency Missing = 3

Responses to Individual Questions by Group-A Parents at Time 1

The FREQ Procedure

Q27	Frequency	Percent
1	11	42.31
2	3	11.54
3	4	15.38
4	6	23.08
5	2	7.69

Frequency Missing = 2

Q28	Frequency	Percent
1	10	37.04
2	5	18.52
3	7	25.93
4	3	11.11
5	2	7.41

Frequency Missing = 1

Q29	Frequency	Percent
1	14	66.67
2	2	9.52
3	4	19.05
4	1	4.76

Frequency Missing = 7

Q30	Frequency	Percent
1	16	72.73
2	3	13.64
3	2	9.09
4	1	4.55

Frequency Missing = 6

Responses to Individual Questions by Group-A Parents at Time 1

The FREQ Procedure

Q31	Frequency	Percent
1	21	87.50
2	1	4.17
3	1	4.17
4	1	4.17

Frequency Missing = 4

Q32	Frequency	Percent
1	25	89.29
3	3	10.71

Q33	Frequency	Percent
1	17	68.00
2	5	20.00
3	2	8.00
4	1	4.00

Frequency Missing = 3

Q34	Frequency	Percent
1	8	33.33
2	6	25.00
3	6	25.00
4	3	12.50
5	1	4.17

Frequency Missing = 4

Q35	Frequency	Percent
1	11	52.38
2	4	19.05
3	5	23.81
4	1	4.76

Frequency Missing = 7

Responses to Individual Questions by Group-A Parents at Time 1

The FREQ Procedure

Q36	Frequency	Percent
1	15	53.57
2	7	25.00
3	6	21.43

Q37	Frequency	Percent
1	26	92.86
3	1	3.57
4	1	3.57

Q38	Frequency	Percent
1	16	59.26
2	5	18.52
3	3	11.11
4	2	7.41
5	1	3.70

Frequency Missing = 1

Q39	Frequency	Percent
1	15	53.57
2	6	21.43
3	6	21.43
4	1	3.57

Q40	Frequency	Percent
1	23	82.14
2	2	7.14
3	3	10.71

Q41	Frequency	Percent
1	21	75.00
2	5	17.86
3	2	7.14

Responses to Individual Questions by Group-A Parents at Time 1

The FREQ Procedure

Q42	Frequency	Percent
1	25	92.59
2	1	3.70
3	1	3.70

Frequency Missing = 1

Q43	Frequency	Percent
1	25	96.15
2	1	3.85

Frequency Missing = 2

Q44	Frequency	Percent
1	24	88.89
2	3	11.11

Frequency Missing = 1

Q45	Frequency	Percent
1	23	82.14
2	1	3.57
3	4	14.29

Q46	Frequency	Percent
1	22	78.57
2	2	7.14
3	2	7.14
4	2	7.14

Q47	Frequency	Percent
1	26	92.86
2	1	3.57
4	1	3.57

Responses to Individual Questions by Group-A Parents at Time 1

The FREQ Procedure

Q48	Frequency	Percent
1	24	85.71
2	3	10.71
3	1	3.57

Q49	Frequency	Percent
1	13	46.43
2	8	28.57
3	5	17.86
4	1	3.57
5	1	3.57

The MEANS Procedure

Variable	Mean	Median	Minimum	Maximum	Std Dev
Global_Rating	6.0357143	6.0000000	2.0000000	10.0000000	2.2191447
Oral_Symptoms	10.9285714	11.0000000	3.0000000	18.0000000	3.6608901
Functional_limitations	14.4642857	13.0000000	7.0000000	31.0000000	6.2744759
Emotional	8.6785714	6.5000000	3.0000000	20.0000000	4.7691413
Social	8.9285714	8.0000000	1.0000000	19.0000000	4.3625389
Family_QOL	11.8928571	10.5000000	7.0000000	22.0000000	4.1574501
Child_Behaviour	7.1071429	6.0000000	4.0000000	15.0000000	2.1315841

Responses to Individual Questions by Group-B Parents at Time 1

The FREQ Procedure

Gender	Frequency	Percent
Female	13	52.00
Male	12	48.00

Q1	Frequency	Percent
1	5	20.00
2	8	32.00
3	7	28.00
4	4	16.00
5	1	4.00

Q2	Frequency	Percent
1	4	16.00
2	7	28.00
3	7	28.00
4	2	8.00
5	5	20.00

Q3	Frequency	Percent
1	11	47.83
2	7	30.43
3	5	21.74

Frequency Missing = 2

Q4	Frequency	Percent
1	13	52.00
2	7	28.00
3	3	12.00
4	2	8.00

Responses to Individual Questions by Group-B Parents at Time 1

The FREQ Procedure

Q5	Frequency	Percent
1	10	40.00
2	9	36.00
3	5	20.00
4	1	4.00

Q6	Frequency	Percent
1	8	32.00
2	8	32.00
3	7	28.00
4	2	8.00

Q7	Frequency	Percent
1	11	57.89
2	5	26.32
3	2	10.53
4	1	5.26

Frequency Missing = 6

Q8	Frequency	Percent
1	2	8.00
2	6	24.00
3	13	52.00
4	3	12.00
5	1	4.00

Q9	Frequency	Percent
1	12	48.00
2	5	20.00
3	4	16.00
4	3	12.00
5	1	4.00

Responses to Individual Questions by Group-B Parents at Time 1

The FREQ Procedure

Q10	Frequency	Percent
1	8	40.00
2	2	10.00
3	6	30.00
4	2	10.00
5	2	10.00

Frequency Missing = 5

Q11	Frequency	Percent
1	18	75.00
2	4	16.67
3	1	4.17
4	1	4.17

Frequency Missing = 1

Q12	Frequency	Percent
1	17	70.83
2	2	8.33
3	2	8.33
4	2	8.33
5	1	4.17

Frequency Missing = 1

Q13	Frequency	Percent
1	15	60.00
2	3	12.00
3	6	24.00
4	1	4.00

Q14	Frequency	Percent
1	19	76.00
2	5	20.00
3	1	4.00

Responses to Individual Questions by Group-B Parents at Time 1

The FREQ Procedure

Q15	Frequency	Percent
1	15	62.50
2	5	20.83
3	3	12.50
4	1	4.17

Frequency Missing = 1

Q16	Frequency	Percent
1	24	96.00
2	1	4.00

Q17	Frequency	Percent
1	16	64.00
2	3	12.00
3	4	16.00
4	1	4.00
5	1	4.00

Q18	Frequency	Percent
1	14	60.87
2	4	17.39
3	4	17.39
5	1	4.35

Frequency Missing = 2

Q19	Frequency	Percent
1	19	82.61
2	1	4.35
3	2	8.70
4	1	4.35

Frequency Missing = 2

Responses to Individual Questions by Group-B Parents at Time 1

The FREQ Procedure

Q20	Frequency	Percent
1	12	48.00
2	10	40.00
3	3	12.00

Q21	Frequency	Percent
1	21	87.50
2	2	8.33
3	1	4.17

Frequency Missing = 1

Q22	Frequency	Percent
1	20	83.33
2	1	4.17
3	1	4.17
4	1	4.17
5	1	4.17

Frequency Missing = 1

Q23	Frequency	Percent
1	22	88.00
2	2	8.00
5	1	4.00

Q24	Frequency	Percent
1	17	68.00
2	3	12.00
3	4	16.00
5	1	4.00

Responses to Individual Questions by Group-B Parents at Time 1

The FREQ Procedure

Q25	Frequency	Percent
1	23	95.83
2	1	4.17

Frequency Missing = 1

Q26	Frequency	Percent
1	20	80.00
2	1	4.00
3	3	12.00
5	1	4.00

Q27	Frequency	Percent
1	14	56.00
2	6	24.00
3	3	12.00
4	1	4.00
5	1	4.00

Q28	Frequency	Percent
1	16	64.00
2	4	16.00
3	2	8.00
4	1	4.00
5	2	8.00

Q29	Frequency	Percent
1	19	79.17
2	2	8.33
3	2	8.33
5	1	4.17

Frequency Missing = 1

Responses to Individual Questions by Group-B Parents at Time 1

The FREQ Procedure

Q30	Frequency	Percent
1	20	86.96
2	2	8.70
5	1	4.35

Frequency Missing = 2

Q31	Frequency	Percent
1	21	87.50
2	2	8.33
5	1	4.17

Frequency Missing = 1

Q32	Frequency	Percent
1	22	91.67
2	1	4.17
3	1	4.17

Frequency Missing = 1

Q33	Frequency	Percent
1	22	88.00
2	2	8.00
3	1	4.00

Q34	Frequency	Percent
1	14	56.00
2	4	16.00
3	4	16.00
4	2	8.00
5	1	4.00

Responses to Individual Questions by Group-B Parents at Time 1

The FREQ Procedure

Q35	Frequency	Percent
1	17	70.83
2	5	20.83
3	1	4.17
4	1	4.17

Frequency Missing = 1

Q36	Frequency	Percent
1	17	68.00
2	3	12.00
3	3	12.00
4	1	4.00
5	1	4.00

Q37	Frequency	Percent
1	23	92.00
2	2	8.00

Q38	Frequency	Percent
1	19	79.17
2	4	16.67
5	1	4.17

Frequency Missing = 1

Q39	Frequency	Percent
1	13	52.00
2	10	40.00
3	2	8.00

Q40	Frequency	Percent
1	24	96.00
2	1	4.00

Responses to Individual Questions by Group-B Parents at Time 1

The FREQ Procedure

Q41	Frequency	Percent
1	19	76.00
2	1	4.00
3	3	12.00
4	1	4.00
5	1	4.00

Q42	Frequency	Percent
1	25	100.00

Q43	Frequency	Percent
1	23	92.00
2	2	8.00

Q44	Frequency	Percent
1	22	88.00
2	1	4.00
3	2	8.00

Q45	Frequency	Percent
1	19	79.17
2	2	8.33
3	3	12.50

Frequency Missing = 1

Q46	Frequency	Percent
1	21	84.00
2	1	4.00
3	3	12.00

Q47	Frequency	Percent
1	23	92.00
2	2	8.00

Responses to Individual Questions by Group-B Parents at Time 1

The FREQ Procedure

Q48	Frequency	Percent
1	21	84.00
2	3	12.00
3	1	4.00

Q49	Frequency	Percent
1	18	72.00
2	4	16.00
3	3	12.00

The MEANS Procedure

Variable	Mean	Median	Minimum	Maximum	Std Dev
Global_Rating	5.4000000	6.0000000	2.0000000	10.0000000	1.8257419
Oral_Symptoms	11.4000000	12.0000000	6.0000000	21.0000000	3.6170891
Functional_limitations	12.4400000	10.0000000	5.0000000	27.0000000	5.3935146
Emotional	6.9600000	5.0000000	2.0000000	16.0000000	3.7134889
Social	8.6000000	7.0000000	5.0000000	24.0000000	3.9895697
Family_QOL	10.5600000	9.0000000	8.0000000	22.0000000	3.1368774
Child_Behaviour	7.1200000	6.0000000	5.0000000	13.0000000	2.0680103

Responses to Individual Questions by Group-B Children at Time 2

The FREQ Procedure

Gender	Frequency	Percent
Female	13	52.00
Male	12	48.00

Q3	Frequency	Percent
Changed a little	4	16.00
Changed a lot	12	48.00
Stayed the Same	9	36.00

Q4	Frequency	Percent
Changed a little	7	28.00
Changed a lot	3	12.00
Stayed the Same	13	52.00
Very much	2	8.00

Q5	Frequency	Percent
1	6	24.00
2	15	60.00
3	3	12.00
4	1	4.00

Q6	Frequency	Percent
1	12	48.00
2	8	32.00
3	5	20.00

Q7	Frequency	Percent
1	13	52.00
2	10	40.00
3	2	8.00

Responses to Individual Questions by Group-B Children at Time 2

The FREQ Procedure

Q8	Frequency	Percent
1	8	32.00
2	10	40.00
3	4	16.00
4	2	8.00
5	1	4.00

Q9	Frequency	Percent
1	3	12.00
2	16	64.00
3	5	20.00
4	1	4.00

Q10	Frequency	Percent
1	21	84.00
2	3	12.00
3	1	4.00

Q11	Frequency	Percent
1	11	44.00
2	4	16.00
3	2	8.00
4	3	12.00
5	5	20.00

Q12	Frequency	Percent
1	18	72.00
2	5	20.00
3	2	8.00

Responses to Individual Questions by Group-B Children at Time 2

The FREQ Procedure

Q13	Frequency	Percent
1	17	68.00
2	6	24.00
3	2	8.00

Q14	Frequency	Percent
1	12	48.00
2	12	48.00
3	1	4.00

Q15	Frequency	Percent
1	23	92.00
2	1	4.00
3	1	4.00

Q16	Frequency	Percent
1	19	76.00
2	6	24.00

Q17	Frequency	Percent
1	22	88.00
2	2	8.00
3	1	4.00

Q18	Frequency	Percent
1	25	100.00

Q19	Frequency	Percent
1	17	68.00
2	6	24.00
3	1	4.00
4	1	4.00

Responses to Individual Questions by Group-B Children at Time 2

The FREQ Procedure

Q20	Frequency	Percent
1	21	84.00
2	4	16.00

Q21	Frequency	Percent
1	24	96.00
2	1	4.00

Q22	Frequency	Percent
1	24	96.00
2	1	4.00

Q23	Frequency	Percent
1	21	84.00
2	4	16.00

Q24	Frequency	Percent
1	22	88.00
2	3	12.00

Q25	Frequency	Percent
1	24	96.00
2	1	4.00

Q26	Frequency	Percent
1	22	88.00
2	3	12.00

Q27	Frequency	Percent
1	23	92.00
2	2	8.00

Responses to Individual Questions by Group-B Children at Time 2

The FREQ Procedure

Q28	Frequency	Percent
1	24	96.00
2	1	4.00

Q29	Frequency	Percent
1	8	32.00
2	13	52.00
3	4	16.00

Q30	Frequency	Percent
1	24	96.00
5	1	4.00

Q31	Frequency	Percent
1	24	96.00
3	1	4.00

Q32	Frequency	Percent
1	19	76.00
2	4	16.00
4	2	8.00

Q33	Frequency	Percent
1	24	96.00
2	1	4.00

Q34	Frequency	Percent
1	24	96.00
2	1	4.00

Responses to Individual Questions by Group-B Children at Time 2

The FREQ Procedure

Q35	Frequency	Percent
1	23	92.00
2	1	4.00
3	1	4.00

Q36	Frequency	Percent
1	22	88.00
2	3	12.00

Q37	Frequency	Percent
1	25	100.00

Q38	Frequency	Percent
1	22	88.00
2	1	4.00
3	2	8.00

Q39	Frequency	Percent
1	23	92.00
2	2	8.00

Q40	Frequency	Percent
1	25	100.00

Q41	Frequency	Percent
1	14	56.00
2	9	36.00
3	1	4.00
5	1	4.00

Item Scores for Group-B Children at Time 2

The MEANS Procedure

Variable	Mean	Median	Minimum	Maximum	Std Dev
Global_Rating	5.320000	5.000000	3.000000	9.000000	1.435270
Oral_Symptoms	12.800000	12.000000	6.000000	25.000000	4.062019
Functional_limitations	16.400000	14.000000	9.000000	45.000000	7.466592
Emotional	14.280000	11.000000	9.000000	45.000000	9.089921
Social	19.440000	16.000000	13.000000	65.000000	10.348429

Responses to Individual Questions by Group-B Parents at Time 2

The FREQ Procedure

Gender	Frequency	Percent
Female	13	52.00
Male	12	48.00

Q1	Frequency	Percent
Changed a little	2	8.00
Changed a lot	7	28.00
Stayed the Same	16	64.00

Q2	Frequency	Percent
Changed a little	1	4.00
Changed a lot	3	12.00
Stayed the Same	21	84.00

Q3	Frequency	Percent
1	13	56.52
2	7	30.43
3	3	13.04

Frequency Missing = 2

Q4	Frequency	Percent
1	10	47.62
2	8	38.10
3	2	9.52
4	1	4.76

Frequency Missing = 4

Q5	Frequency	Percent
1	11	47.83
2	9	39.13
3	3	13.04

Frequency Missing = 2

Responses to Individual Questions by Group-B Parents at Time 2

The FREQ Procedure

Q6	Frequency	Percent
1	9	40.91
2	5	22.73
3	6	27.27
4	2	9.09

Frequency Missing = 3

Q7	Frequency	Percent
1	14	73.68
2	4	21.05
3	1	5.26

Frequency Missing = 6

Q8	Frequency	Percent
1	4	16.67
2	17	70.83
3	3	12.50

Frequency Missing = 1

Q9	Frequency	Percent
1	20	83.33
2	2	8.33
3	2	8.33

Frequency Missing = 1

Q10	Frequency	Percent
1	11	52.38
2	2	9.52
3	4	19.05
4	3	14.29
5	1	4.76

Frequency Missing = 4

Responses to Individual Questions by Group-B Parents at Time 2

The FREQ Procedure

Q11	Frequency	Percent
1	18	75.00
2	4	16.67
3	2	8.33

Frequency Missing = 1

Q12	Frequency	Percent
1	23	92.00
2	1	4.00
4	1	4.00

Q13	Frequency	Percent
1	22	88.00
2	2	8.00
3	1	4.00

Q14	Frequency	Percent
1	21	87.50
2	3	12.50

Frequency Missing = 1

Q15	Frequency	Percent
1	22	91.67
2	1	4.17
3	1	4.17

Frequency Missing = 1

Q16	Frequency	Percent
1	22	88.00
2	2	8.00
3	1	4.00

Responses to Individual Questions by Group-B Parents at Time 2

The FREQ Procedure

Q17	Frequency	Percent
1	21	87.50
2	3	12.50

Frequency Missing = 1

Q18	Frequency	Percent
1	21	87.50
2	3	12.50

Frequency Missing = 1

Q19	Frequency	Percent
1	22	95.65
5	1	4.35

Frequency Missing = 2

Q20	Frequency	Percent
1	10	40.00
2	9	36.00
3	6	24.00

Q21	Frequency	Percent
1	20	86.96
2	2	8.70
3	1	4.35

Frequency Missing = 2

Q22	Frequency	Percent
1	24	100.00

Frequency Missing = 1

Q23	Frequency	Percent
1	25	100.00

Responses to Individual Questions by Group-B Parents at Time 2

The FREQ Procedure

Q24	Frequency	Percent
1	24	100.00

Frequency Missing = 1

Q25	Frequency	Percent
1	25	100.00

Q26	Frequency	Percent
1	24	100.00

Frequency Missing = 1

Q27	Frequency	Percent
1	23	95.83
2	1	4.17

Frequency Missing = 1

Q28	Frequency	Percent
1	22	95.65
2	1	4.35

Frequency Missing = 2

Q29	Frequency	Percent
1	23	100.00

Frequency Missing = 2

Q30	Frequency	Percent
1	24	100.00

Frequency Missing = 1

Q31	Frequency	Percent
1	24	100.00

Frequency Missing = 1

Q32	Frequency	Percent
1	24	96.00
2	1	4.00

Responses to Individual Questions by Group-B Parents at Time 2

The FREQ Procedure

Q33	Frequency	Percent
1	25	100.00

Q34	Frequency	Percent
1	21	87.50
2	2	8.33
3	1	4.17

Frequency Missing = 1

Q35	Frequency	Percent
1	20	80.00
2	5	20.00

Q36	Frequency	Percent
1	23	92.00
2	1	4.00
3	1	4.00

Q37	Frequency	Percent
1	25	100.00

Q38	Frequency	Percent
1	23	95.83
2	1	4.17

Frequency Missing = 1

Q39	Frequency	Percent
1	17	68.00
2	5	20.00
3	3	12.00

Responses to Individual Questions by Group-B Parents at Time 2

The FREQ Procedure

Q40	Frequency	Percent
1	25	100.00

Q41	Frequency	Percent
1	25	100.00

Q42	Frequency	Percent
1	25	100.00

Q43	Frequency	Percent
1	23	95.83
2	1	4.17

Frequency Missing = 1

Q44	Frequency	Percent
1	23	92.00
2	2	8.00

Q45	Frequency	Percent
1	23	95.83
2	1	4.17

Frequency Missing = 1

Q46	Frequency	Percent
1	21	84.00
2	3	12.00
5	1	4.00

Q47	Frequency	Percent
1	24	96.00
3	1	4.00

Responses to Individual Questions by Group-B Parents at Time 2

The FREQ Procedure

Q48	Frequency	Percent
1	25	100.00

Q49	Frequency	Percent
1	18	72.00
2	3	12.00
3	4	16.00

The MEANS Procedure

Variable	Mean	Median	Minimum	Maximum	Std Dev
Oral_Symptoms	9.0800000	8.0000000	6.0000000	15.0000000	2.7221315
Functional_limitations	9.8800000	9.0000000	7.0000000	18.0000000	2.6032032
Emotional	5.3200000	5.0000000	2.0000000	9.0000000	1.3453624
Social	7.0000000	7.0000000	5.0000000	10.0000000	1.1902381
Family_QOL	9.0000000	8.0000000	8.0000000	13.0000000	1.2909944
Child_Behaviour	6.4400000	6.0000000	5.0000000	11.0000000	1.4165686

Article

ARTICLE

Perceived Change in Oral Health-Related Quality of Life among Adolescents and their Families after Orthodontic Treatment

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Key Words: oral health-related quality of life questionnaire, orthodontic treatment, overjet, adolescents, parents.

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ARTICLE

Perceived Change in Oral Health-Related Quality of Life among Adolescents and their Families after Orthodontic Treatment

Abstract

Objective: Assess the changes in oral health-related quality of life (OHRQoL) of adolescents and their parents after overjet reduction.

Materials and Methods: 53 patients between the ages of 11-18 years with increased dental overjet ($\geq 6\text{mm}$) and their parents were selected, of which 28 were pre- and 25 were post-treatment with dental overjet reduced to within normal limits. The data collection instrument was the Child Oral Health Quality of Life (COHQoL) Questionnaire.

Results: Adolescents and their parents reported poorer quality of life before orthodontic treatment than after. The improvement in oral health-related quality of life was statistically significant for all health domains except for the social well-being domain. Parental reports on (OHRQoL) were in agreement with their children's. No statistically significant differences were evident in (OHRQoL) between pre- and post-treatment groups.

Conclusions: Adolescents with increased dental overjet $\geq 6\text{mm}$ experienced substantial psychosocial impacts. Adolescents with increased overjet can accurately recall the initial negative effects of the original malocclusion on their lives, even after a time lapse of five years. Orthodontic treatment significantly improves the perceived quality of life of orthodontic patients and their parents.

Key Words: oral health-related quality of life questionnaire, orthodontic treatment, overjet, adolescents, parents.

Introduction

Physical appearance can significantly influence an individual's personal life and social acceptance. Oral and dental structures draw the most attention because they are the source of vocal and emotional communication ¹. Physical, social, and psychological effects of untreated malocclusions have been demonstrated ² and may negatively impact on the evolving personalities and social skills of children and adolescents. Peer teasing and negative psychosocial impacts were reported by 38% in an 11 to 13 year old sample, as a consequence of their dental appearance which included dental crowding, incisor protrusion, and spacing ³.

Among the most prevalent malocclusion is increased dental overjet as verified by The Third National Health and Nutrition Examination Survey (NHANES III), which reported that dental overjets of 5 mm or more occurred in 23% of children (age 8 to 11), 15% in youths (age 12 to 17), and 13% in adults (age 18 to 50) in the US population ⁴. Visible dental differences, such as crowding, spacing, and increased overjet are usually associated with high levels of dissatisfaction with appearance and negatively impact children's overall oral health related quality of life ⁵. The physical, social and psychological aspects of oral health encompass what is referred to as "oral health-related quality of life" (OHRQoL), and these provide an insight into how an individual's oral health status affects life quality and how oral health care and orthodontic treatment bring about improvements to quality of life ⁶.

Several measures have been developed to assess oral health-related quality of life using measures relevant to children and their families, the majority of which are generic, for example: Michigan Oral Health-Related Quality of Life Scale-Child Version ⁷, Child-Oral Impacts of Daily Performance (Child-OIDP) ⁸, and Child Oral Health Quality of Life (COHQoL) Questionnaire ⁹. Although these measures are population-specific, when focusing on subgroups of subjects such

as children, the (COHQoL) has the unique advantage of being domain-specific, thereby focusing in detail on four significant dimensions, such as the social well being domain.

A review of the literature revealed that only four studies were conducted to investigate the impact of increased dental overjet on the quality of life of children and their families using the (COHQoL) questionnaire, all of which were cross-sectional observational studies that assessed subjects before orthodontic treatment ^{10, 11, 12, 13}. However, the difference in the patients' quality of life that is brought about by orthodontic treatment was not adequately assessed in previous studies with the use of validated measures such as the Child Oral Health Quality of Life (COHQoL) Questionnaire ⁹. Accordingly, the aim of our study was to assess the change in oral health-related quality of life of adolescents and their parents after orthodontic correction of increased dental overjet ($\geq 6\text{mm}$) to within normal limits.

Materials and Methods

Ethical approval was obtained from the relevant Health Research Ethics Board (HREB). The present cross sectional survey study aimed to assess a sample of 60 patients aged between 11-18 years and their parents which were allocated to two groups, Group A (pre-treatment) and Group B (post-treatment), based on predetermined criteria. A similar sample size was utilized in previous oral health-related quality of life studies^{14, 15}. Inclusion criteria were increased dental overjet ≥ 6 mm of at least two maxillary central incisors before treatment with a functional appliance, headgear, and / or full fixed orthodontic appliance with or without extraction. Dental Overjet was based on the Index of Orthodontic Treatment Need (IOTN) Dental Health Component (DHC) with a Grade 4.a or Grade 5.a. Patients with Learning difficulties, physical disability, chronic medical conditions, symptoms of pain or discomfort, untreated dental caries, severe dental mottling, poor periodontal health status, syndromes and craniofacial anomalies were excluded from the study. These exclusion criteria were to prevent possible confounding effects of those conditions on the participants' quality of life¹⁶.

The subjects' pre-treatment intra- and extra-oral photographs within the five year period preceding the commencement of our study, were used in addition to their plaster study models to measure the overjet and to assess the subjects' occlusion using the IOTN DHC. Over 60 potential participants were identified and recruited to the study.

The data collection instrument for assessment of oral health-related quality of life was the Child Oral Health Quality of Life (COHQoL) Questionnaire. The questionnaire is available in the public domain and was developed by the Community Dental Health unit at University of Toronto⁹. The (COHQoL) Questionnaire has been used in a number of previous studies and demonstrated acceptable reliability and validity in different countries^{9, 17, 18, 19}.

The data were collected through a self-completion questionnaire. Parents signed consent forms while adolescents signed assent forms. The Child Oral Health Quality of Life (COHQoL) Questionnaire consists of a Parental-Caregiver Perceptions Questionnaire (P-CPQ), and Child Perceptions Questionnaire (CPQ₁₁₋₁₄) for children aged 11 to 14 years. In our study the (CPQ₁₁₋₁₄) was used for subjects who pre- 18 years of age, and contains 36 items which encompass four health domains: oral symptoms, functional limitations, emotional well-being, and social well-being and which assess peer interaction, schooling, and leisure activities. The (P-CPQ) contains 50 items and encompass six health domains, including family quality of life and child's behaviour.

Each participant in the pre-treatment group (Group A) was shown printed intra-oral and extra-oral sets of photographs from the child's pre-treatment orthodontic record. Children and their parents in the post-treatment group (Group B) were shown two different sets of printed intra- and extra-oral photographs which represent (Time 1) and (Time 2) i.e. pre- and post-treatment time points respectively. The visual aid offered by displaying the before and after treatment images of the children's teeth was beneficial to refresh their memories, because some subjects had completed their orthodontic treatment within the previous five years.

Participants were asked to report the frequency of negative events in relation to the child's orofacial condition on a 5-point Likert scale ranging from never (scores 1) to everyday (scores 5). The parental questionnaire (P-CPQ) contained a sixth response of "don't know". The "domain score" is generated by summing the response scores of items within each health domain. Thus, a high domain score would indicate poor quality of life.

Statistical Analysis

Descriptive and inferential analyses of the data were carried out by using paired and unpaired t-test procedures to study the differences within and between groups, respectively. The means of

health domain scores were computed for the pre- and post-treatment study groups. The "mean difference" of each health domain was calculated by subtracting the child minus the parent mean domain (for within group comparisons), and (Group A) minus (Group B) mean domain (for between groups comparisons). The statistical significance level was set at ($p < 0.05$).

Results

A total of 53 adolescents and their parents/guardians finally completed the questionnaires, an 88% participation rate. The pre-treatment group (Group A) consisted of 28 participants and their parents/guardians and the post-treatment group (Group B) consisted of 25 participants and their parents/guardians. The respondents' demographic data is shown in (Table 1).

Before treatment, 28.6% of adolescents rated their overall oral health as being fair/ poor and 25% reported that their increased overjet affected their social well-being negatively. The most prevalent negative impacts were food stuck between teeth (oral symptoms), mouth breathing (functional limitation), concerned what other people think (emotional well-being), and avoidance of smiling / laughing (social well-being). After treatment, 48% of adolescents indicated that their overall oral health improved. However, when they were asked to rate the change in their social well-being after orthodontic correction of their overjet, 52% responded that it had "stayed the same".

The change in oral health-related quality of life (OHRQoL) represents a key outcome measure because it demonstrates the perceived effect of orthodontic correction of increased overjet.

Paired t-tests were utilized to calculate "within group" comparisons. Children in the post-treatment group (Group B) perceived poorer (OHRQoL) before orthodontic treatment than after. The improvement in oral health was statistically significant for all health domains except for the social well-being domain ($p= 0.0865$) (Table 2). The positive values of the mean differences of all parental health domains indicated that parents reported poorer quality of life before braces than after. However, the perceived change in their children's social well-being was not statistically significant after orthodontic treatment ($p=0.0516$) (Table 3).

For all health domains, namely oral symptoms, functional limitations, emotional well-being, and social well-being, the calculated mean differences were positive values, indicating that children

recorded poorer quality of life than their parents after orthodontic treatment. Moreover, the children's assessments of poor quality of life were statistically significant (Table 4).

The oral health-related quality of life of children and their parents in pre- and post-treatment groups were separately compared at a common time point, i.e. before treatment (Time 1).

Children in the pre-treatment group (Group A) had poorer (OHRQoL) than those in the post-treatment group (Group B). However, the perceived differences between groups were not

statistically significant for all health domains (Table 5). Parents in (Group A) reported that their

children had worse (OHRQoL) before orthodontic treatment than those in (Group B) in four out

of six health domains. However, all the reported differences between parents in (Group A) and

(Group B) were not found to be statistically significant (Table 6).

Discussion

In order to put our study results into perspective, two points must be emphasized. Although the (PPQ) and (CPQ₁₁₋₁₄) are analogous questionnaires with 31 common items, it must be remembered that the (CPQ₁₁₋₁₄) measures the child's perception of his/her oral health-related quality of life, while the (PPQ) measures the parent's perception of the oral health-related quality of life of the child. Therefore parental reports were not proxies nor used as alternatives to the children's reports. In fact, valuable information may have been lost by choosing to examine one over the other. Another important consideration is that participants in the post-treatment group (Group B) were asked to report retrospectively on the impacts of increased dental overjet on their lives based on their memory, in contrast to participants in the pre-treatment group (Group A) which reported such impacts based their present life experience with an untreated malocclusion at the time of questionnaire administration.

Our sample of post-treatment Canadian children reported significant reductions in negative oral impacts after orthodontic treatment. These results concur with similar studies conducted in Brazil and China highlighting the positive effects of orthodontic treatment on (OHRQoL)^{20, 21}. However, our data showed that the amounts of positive effects of orthodontic treatment on children's quality of life were not significant when viewed in the context of social well-being, which is consistent with the findings of O'Brien et al (2007) in the United Kingdom¹⁰.

The association between increased overjet and poor (COHQoL), mainly in the social well-being domain, may be explained by self-image dissatisfaction¹¹. Moreover, children experience major changes in aspects of self-esteem and social acceptance, as they move from early childhood through the teen years²². Developmental psychologists generally agree that a child's self-concept develops from the "reflected appraisal" that he/she receives from others²². Thus the

unaesthetic protruded incisors exhibited by children in our study may have caused remarkable detrimental effects on their social well being which may not be amenable to recovery by orthodontic treatment alone.

Contrary to our findings, a 20-year follow-up study which compared the dental and psychosocial status of individuals who received, or did not receive orthodontics as teenagers, found that orthodontics had little positive impact on psychological health and quality of life in adulthood²³. However, the final follow up study had a 77% attrition rate of the original sample and only two of the 24 different measures utilized to assess health-related quality of life were specific to assess the effects of malocclusion.

Our results show striking similarities between adolescents' and parents' perceptions of (OHRQoL) after orthodontic treatment. These findings are consistent with Jokovic *et al*²⁴ which found substantial agreement for the oral symptom and functional limitation domains between 42 mothers and their children (aged 11-14) at the overall (P-CPQ) & (CPQ₁₁₋₁₄) scores. However, this agreement was moderate for both emotional and social well-being domains²⁴. It must be emphasized that Jokovic *et al* assessed children with a variety of dental and orofacial conditions, and not exclusively subjects with increased dental overjet. In addition, fathers constituted about 17% of the parental respondents and they were excluded from the analysis of parent-child agreement. It is interesting to note that in our study the majority of respondents of post-treatment parental questionnaires were the fathers of the participants (72%) and that their reports on (OHRQoL) were in close agreement with their children's. Similarly, Johal *et al*¹³ showed that malocclusion, in the form of an increased overjet or dental spacing, not only has a direct impact on the child themselves but also has an effect on their parents and other family members.

Children reported worse quality of life than their parents for all health domains after orthodontic treatment, which could demonstrate that parents in our study were more optimistic regarding the amounts of change in their children's (OHRQoL) after braces. This fact has been expressed in previous studies which found that parents consistently expect more improvement than their children in all domains ²². In other words, parents seem to underestimate the severity of the impact of increased overjet on their children's everyday lives. Similarly, previous studies demonstrated the tendency of mothers to under-report the impact of oral conditions on the quality of life of their children, especially impacts concerning oral symptoms ²⁵.

Before overjet correction, children in the pre-treatment group had poorer quality of life than those in the post-treatment group. However, the perceived difference between groups was not statistically significant for all health domains. Interestingly, participants who had finished orthodontic treatment five years prior exhibited the ability to recall the negative effects of increased dental overjet on their lives as accurately as the prospective patients who were currently experiencing them.

Conclusions

Our study has provided three important insights in the dynamic field of oral health-related quality of life:

- Adolescents and their parents perceived poorer oral health-related quality of life before orthodontic treatment of a dental overjet of 6mm or larger.
- After overjet correction, adolescents and their parents perceived significant improvement in all oral health domains of oral health-related quality of life, except for the social well being domain.
- Adolescents with an increased dental overjet of 6mm or larger can accurately recall the negative effects of malocclusion on their lives even after a time lapse of five years.

Orthodontists should consider two recommendations:

1. Orthodontists must be cognisant of the detrimental psycho-social effects of increased dental overjet $\geq 6\text{mm}$ on children and their families' quality of life.
2. General dentists and orthodontists should encourage patients with an increased overjet $\geq 6\text{mm}$ to seek orthodontic treatment before 11 years of age to potentially avoid the detrimental psycho-social impacts, if the enlarged overjet is deemed to be a concern to the child.

Finally, the use of the shortened version of the Child Oral Health-Related Quality of Life (COHQoL) questionnaire form ²⁶ may be beneficial for use in the orthodontic office, especially as some of the questions in the oral symptoms and functional limitations subscales of the current (COHQoL) questionnaire are not relevant to the orthodontic patient ¹⁰.

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TABLE LEGENDS

Table 1: Summary of demographic data

Table 2: Change in OHRQoL after overjet correction - Children (Group B)

Table 3: Change in OHRQoL after overjet correction - Parents (Group B)

Table 4: Comparison between COHQoL of Children vs. Parents - (Group B)

Table 5: Comparison between OHRQoL of (Group A) vs. (Group B) - Children

Table 6: Comparison between oHRQoL of (Group A) vs. (Group B) - Parents

Table 1 Summary of demographic data

Respondents													
Group	N ⁵	Children						Mothers		Fathers		Other	
		Females	Males	Mean age	Std. Dev. ⁶	Min ⁷	Max ⁸	Freq ⁹	Percent ¹⁰ (%)	Freq.	Percent. (%)	Freq.	Percent. (%)
A ¹¹	28	16	12	14	1.655	12	18	10	35.71	15	53.57	3	10.71
B ¹²	25	13	12	15.92	1.579	12	18	7	28	18	72	0	0

⁵ Sample Size

⁶ Standard Deviation

⁷ Minimum

⁸ Maximum

⁹ Frequency

¹⁰ Percentage (%)

¹¹ Pre-treatment group

¹² Post-treatment group

Table 2 Change in OHRQoL after overjet correction - Children (Group B)

Child T1 – T2 , post-treatment group (Group B), (N=25)							
Health Domain	Mean T1 ¹³	Mean T2 ¹⁴	Mean Difference T1-T2	St. Dev ¹⁵	Min ¹⁶	Max ¹⁷	p-value ¹⁸
Oral Function	12.80	10.72	2.08	3.807	-2	13	0.0116
Functional Limitation	16.40	12.76	3.64	6.781	-1	30	0.0130
Emotional Well-Being	14.28	9.80	4.48	9.120	-4	36	0.0217
Social Well-Being	19.44	15.68	3.76	10.517	-4	51	0.0865

¹³ Time 1: pre-treatment time point

¹⁴ Time 2: post-treatment time point

¹⁵ Standard Deviation

¹⁶ Minimum

¹⁷ Maximum

¹⁸ $P=0.05$ (paired t-test)

Table 3 Change in OHRQoL after overjet correction - Parents (Group B)

Parent T1 – T2 , post-treatment group (Group B), (N=25)							
Health Domain	Mean T1 ¹⁹	Mean T2 ²⁰	Mean Difference T1-T2	St. Dev ²¹	Min ²²	Max ²³	p-value ²⁴
Oral Symptom	11.40	9.08	2.32	2.982	-5	11	0.0007
Functional Limitation	12.44	9.88	2.56	5.339	-8	17	0.0247
Emotional Well-Being	6.96	5.32	1.64	3.935	-6	11	0.048
Social Well-Being	8.60	7	1.60	3.905	-3	16	0.0516
Family Quality of life	10.56	9	1.56	3.279	-4	12	0.0257
Child Behaviour	7.12	6.44	0.68	1.600	-1	5	0.0441

¹⁹ T1: pre-treatment time point

²⁰ T2: post-treatment time point

²¹ Standard Deviation

²² Minimum

²³ Maximum

²⁴ $P = 0.05$ (paired t-test)

Table 4 Comparison between COHQoL of Children vs. Parents - (Group B)

Child – Parent at T2, post-treatment group (Group B), (N=25)							
Health Domain	Mean (Child)	Mean (Parent)	Mean Difference (Child – Parent)	St. Dev ²⁵	Min ²⁶	Max ²⁷	p-value ²⁸
Oral Symptom	10.72	9.08	1.64	2.841	-3	7	0.0081
Functional Limitation	12.76	9.88	2.88	2.976	-2	12	0.0001
Emotional Well-Being	9.80	5.32	4.48	2.275	1	14	0.0001
Social Well-Being	15.68	7	8.68	3.508	5	22	0.0001

²⁵ Standard Deviation

²⁶ Minimum

²⁷ Maximum

²⁸ $P = 0.05$ (unpaired t-test)

Table 5 Comparison between OHRQoL of (Group A) vs. (Group B) - Children

Child (Group A) – Child (Group B) at pre-treatment time point (T1)					
Health Domain	Mean (Group A)	Mean (Group B)	Mean Difference (A – B)	St.Dev ²⁹	p-value ³⁰
Oral Symptom	13.21	12.80	0.41	4.127	0.7168
Functional Limitation	17.28	16.40	0.88	6.828	0.6393
Emotional Well-Being	17.21	14.28	2.93	8.099	0.1939
Social Well-Being	19.46	19.44	0.02	8.108	0.9917

²⁹ Standard Deviation

³⁰ $P = 0.05$ (unpaired t-test)

Table 6 Comparison between oHRQoL of (Group A) vs. (Group B) - Parents

Parent (Group A) – Parent (Group B) at pre-treatment time point (T1)					
Health Domain	Mean (Group A)	Mean (Group B)	Mean Difference (A – B)	St. Dev ³¹	p-value ³²
Oral Symptom	10.92	11.40	-0.47	3.64	0.6399
Functional Limitation	14.46	12.44	2.02	5.87	0.2163
Emotional Well-Being	8.67	6.96	1.71	4.30	0.1529
Social Well-Being	8.92	8.60	0.32	4.19	0.7769
Family Quality of life	11.89	10.56	1.33	3.71	0.1978
Child Behaviour	7.10	7.12	-0.01	2.10	0.9824

³¹ Standard Deviation

³² $P = 0.05$ (unpaired t-test)

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Detailed Status Information

Manuscript #	072312-603
Current Revision #	0
Submission Date	2012-07-23 12:22:46
Current Stage	Initial QC Started
Title	Perceived Change in Oral Health-Related Quality of Life among Adolescents and their Families after Orthodontic Treatment
Running Title	Quality of Life after Orthodontic Treatment
Manuscript Type	Original Article
Special Section	N/A
Corresponding Author	charles Lekic (University of Manitoba)
Contributing Authors	Huda Sawan , William Wiltshire , Joanna Asadoorian
Financial Disclosure	I have no relevant financial interests in this manuscript.
Abstract	Objective: Assess the changes in oral health-related quality of life (OHRQoL) of adolescents and their parents after overjet reduction. Materials and Methods: 53 patients between the ages of 11-18 years with increased dental overjet (≥ 6 mm) and their parents were selected, of which 28 were pre- and 25 were post-treatment with dental overjet reduced to within normal limits. The data collection instrument was the Child Oral Health Quality of Life (COHQoL) Questionnaire. Results: Adolescents and their parents reported poorer quality of life before orthodontic treatment than after. The improvement in oral health-related quality of life was statistically significant for all health domains except for the social well-being domain. Parental reports on (OHRQoL) were in agreement with their children's. No statistically significant differences were evident in (OHRQoL) between pre- and post-treatment groups. Conclusions: Adolescents with increased dental overjet ≥ 6 mm experienced substantial psycho-social impacts. Adolescents with increased overjet can accurately recall the initial negative effects of the original malocclusion on their lives, even after a time lapse of five years. Orthodontic treatment significantly improves the perceived quality of life of orthodontic patients and their parents.
Assistant Editor	Not Assigned
Key Words	oral health-related quality of life questionnaire, orthodontic treatment, overjet, adolescents, parents
Conflict of Interest	I have no conflict of interest that I should disclose.

Stage	Start Date	End Date	Approximate Duration
Initial QC Started	2012-07-23 13:19:06		
Author Approved Converted Files	2012-07-23 13:19:06		
Waiting for Author Approval of Converted Files	2012-07-23 12:31:38		
File Conversion Complete	2012-07-23 12:31:38		
Waiting for File Conversion	2012-07-23 12:31:14		
	2012-07-23 12:24:21		
Manuscript Submitted	2012-07-23 12:24:21		
Manuscript Files Submitted	2012-07-23 12:24:21		
Preliminary Manuscript Data Submitted	2012-07-23 12:22:48		

For assistance, please contact the editorial office. E-mail: rjisaacson@aol.com

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Data

Appendix 12 (Data)

Summary Statistics for Age Overall Sample (groups A and B combined)

N	Mean	Std Dev	Minimum	Maximum
53	14.9056604	1.8735420	12.0000000	18.0000000

Summary Statistics for age Group A and Group B separate

Group	N		Mean	Std Dev	Minimum	Maximum
	Obs	N				
A	28	28	14.0000000	1.6555183	12.0000000	18.0000000
B	25	25	15.9200000	1.5790292	12.0000000	18.0000000

Parent A Time 1 Respondents

Respondent	Frequency	Percent
Father	10	35.71
Mother	15	53.57
Other	3	10.71

Parent B Time 1 Respondents

Respondent	Frequency	Percent
Father	7	28.00
Mother	18	72.00

Parent B Time 2 Respondents

Respondent	Frequency	Percent
Father	7	28.00
Mother	18	72.00

Group-A Parents at Time 1 VS Group-A Children at Time 1
Item: Oral Symptoms

Appendix 12 (Data)

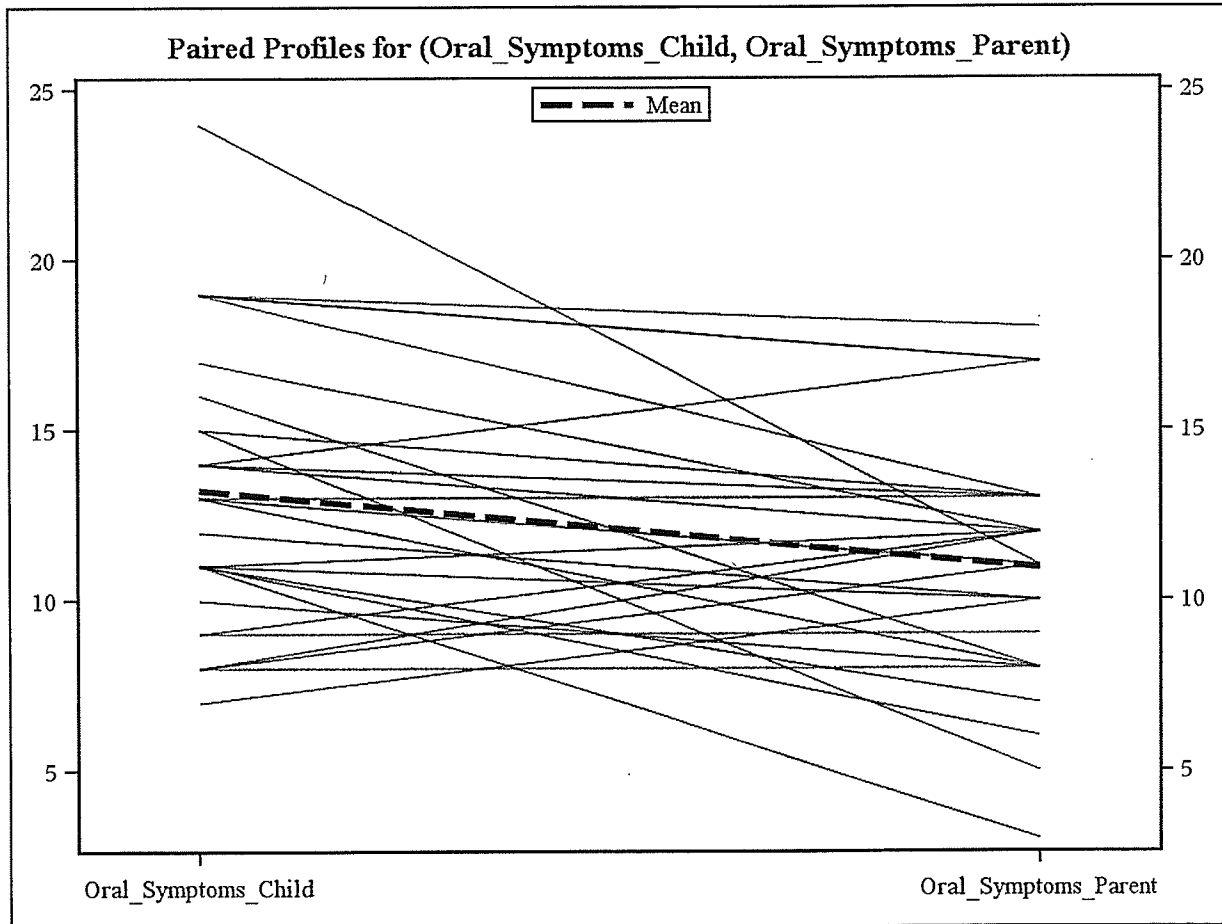
The TTEST Procedure

Difference: Oral_Symptoms_Child - Oral_Symptoms_Parent

N	Mean	Std Dev	Std Err	Minimum	Maximum
28	2.2857	4.1353	0.7815	-4.0000	13.0000

Mean	95% CI Mean		Std Dev	95% CI Std Dev	
2.2857	0.6822	3.8892	4.1353	3.2694	5.6287

DF	t Value	Pr > t
27	2.92	0.0069



Group-A Parents at Time 1 VS Group-A Children at Time 1
Item: Functional Limitations

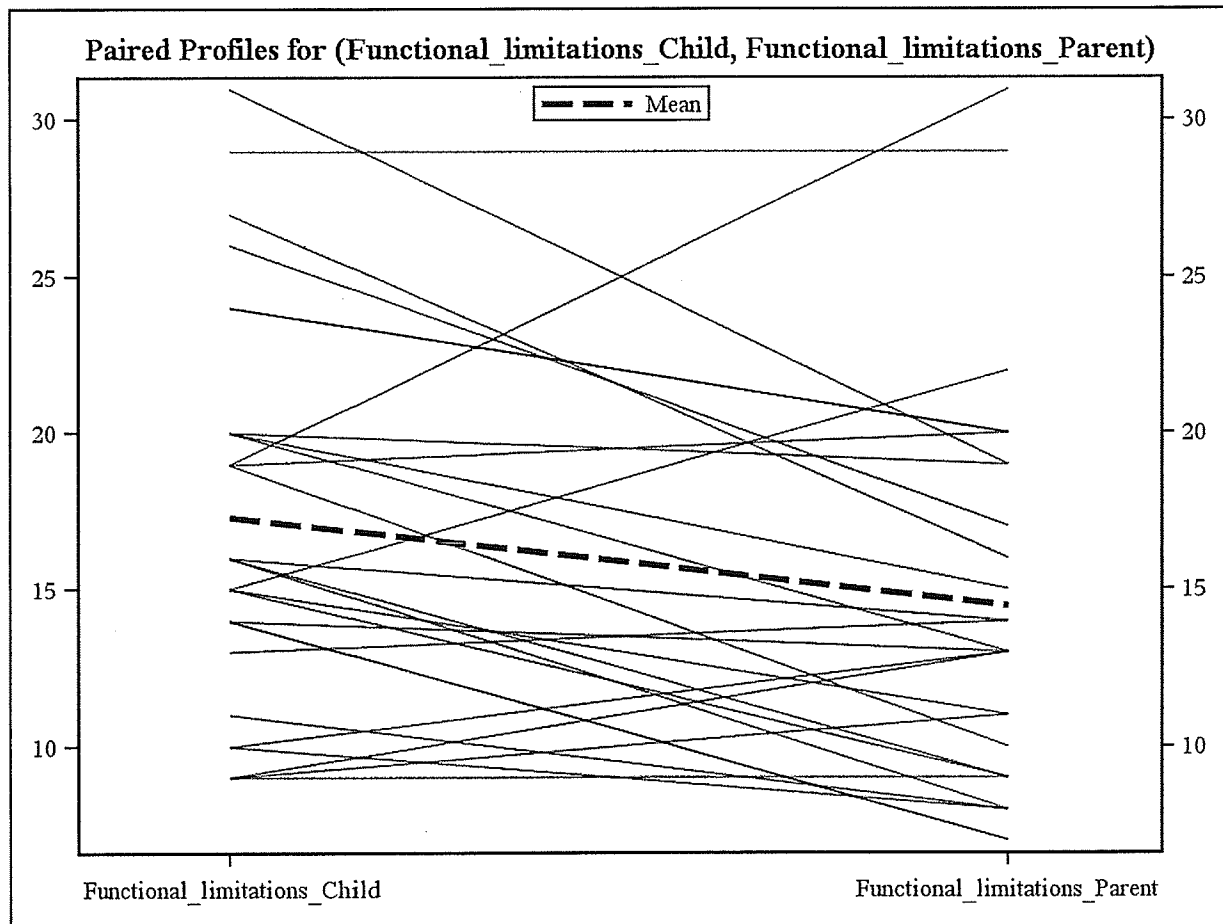
The TTEST Procedure

Difference: Functional_limitations_Child - Functional_limitations_Parent

N	Mean	Std Dev	Std Err	Minimum	Maximum
28	2.8214	5.4978	1.0390	-12.0000	12.0000

Mean	95% CL Mean		Std Dev	95% CL Std Dev	
2.8214	0.6896	4.9533	5.4978	4.3467	7.4833

DF	t Value	Pr > t
27	2.72	0.0114



*Group-A Parents at Time 1 VS Group-A Children at Time 1
Item: Emotional*

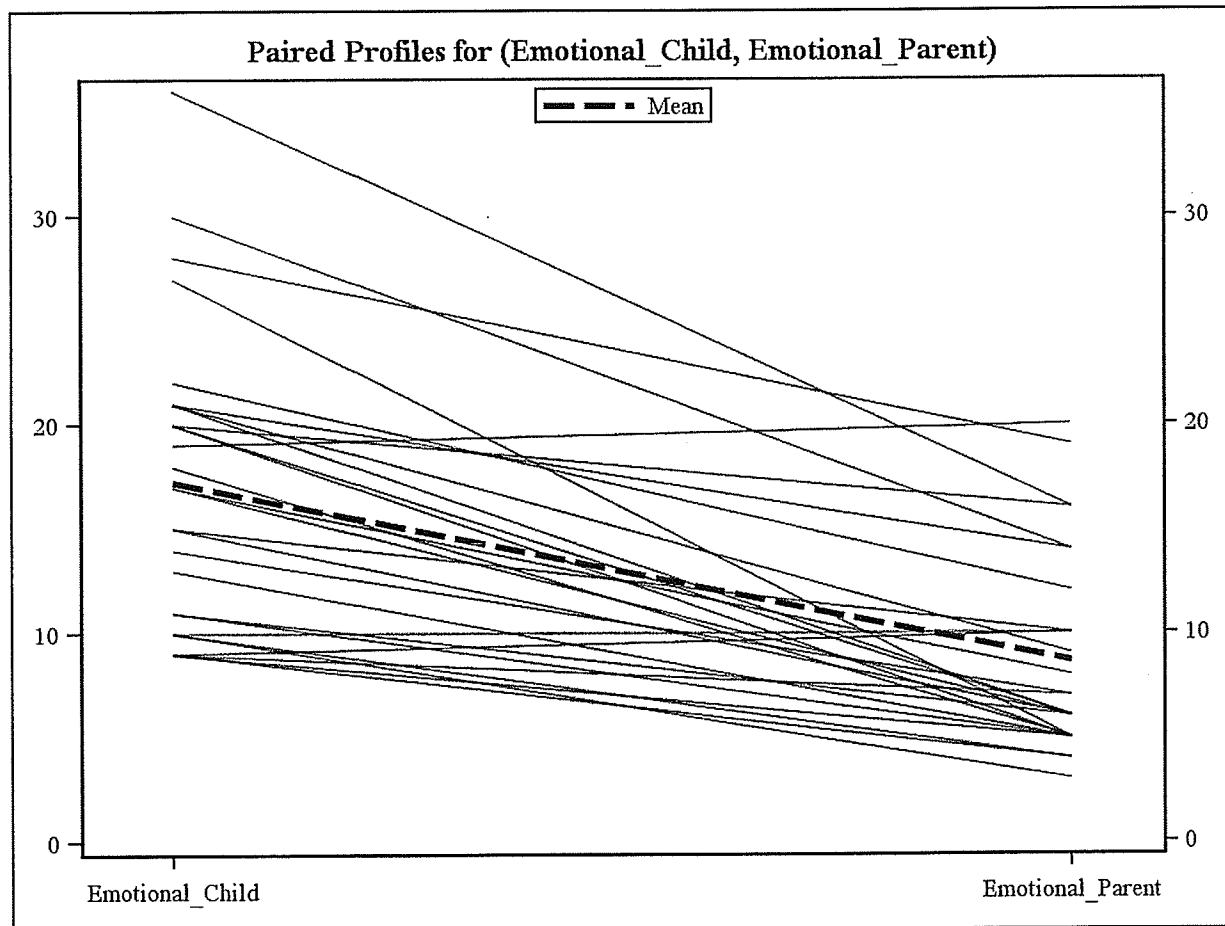
The TTEST Procedure

Difference: Emotional_Child - Emotional_Parent

N	Mean	Std Dev	Std Err	Minimum	Maximum
28	8.5357	5.8340	1.1025	-1.0000	22.0000

Mean	95% CL Mean		Std Dev	95% CL Std Dev	
	Lower	Upper		Lower	Upper
8.5357	6.2735	10.7979	5.8340	4.6125	7.9409

DF	t Value	Pr > t
27	7.74	<.0001



Group-A Parents at Time 1 VS Group-A Children at Time 1
 Item: Social

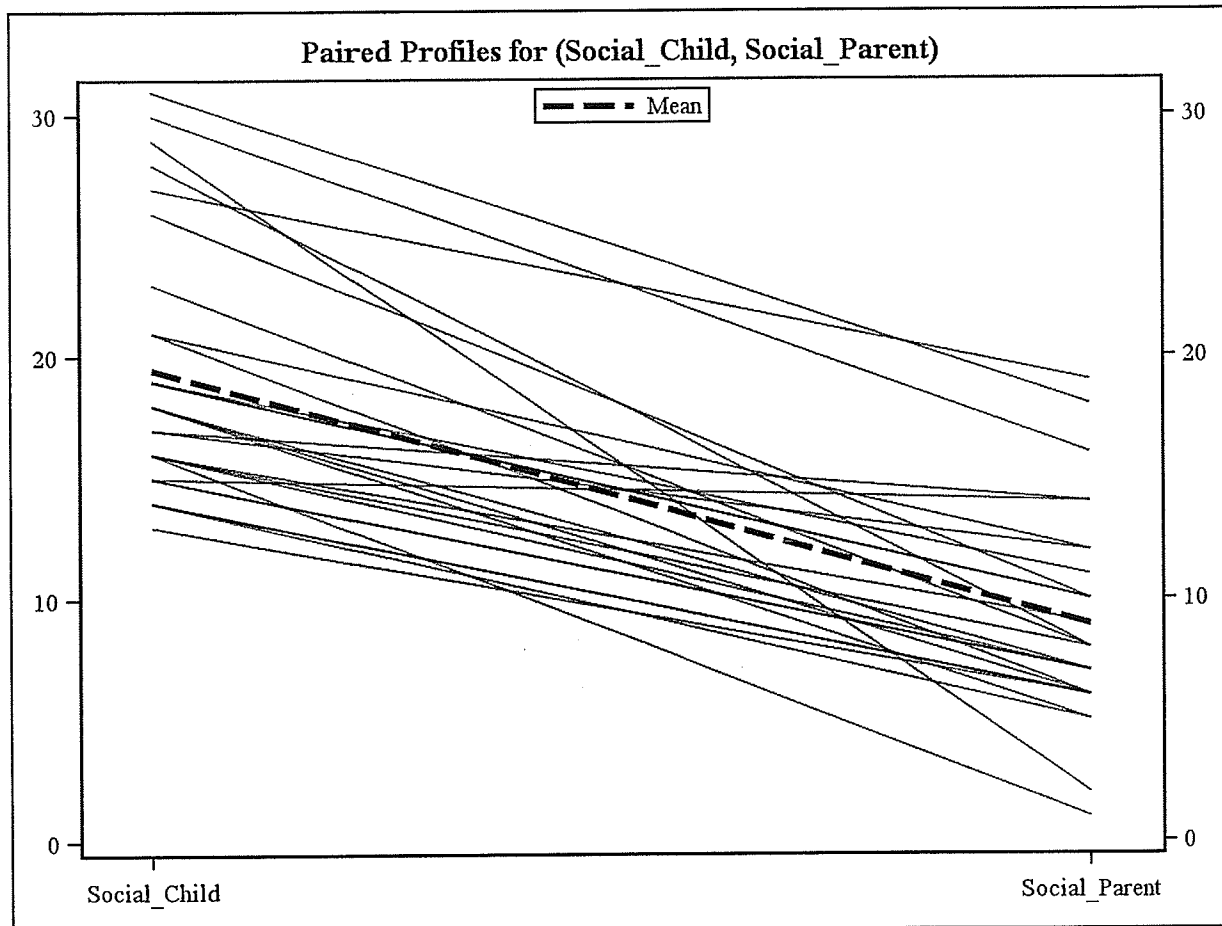
The TTEST Procedure

Difference: Social_Child - Social_Parent

N	Mean	Std Dev	Std Err	Minimum	Maximum
28	10.5357	5.2245	0.9873	1.0000	27.0000

Mean	95% CL Mean		Std Dev	95% CL Std Dev	
10.5357	8.5099	12.5615	5.2245	4.1306	7.1112

DF	t Value	Pr > t
27	10.67	<.0001



*Group B Children T1 VS Group B Parents T1
Item: Oral Symptoms*

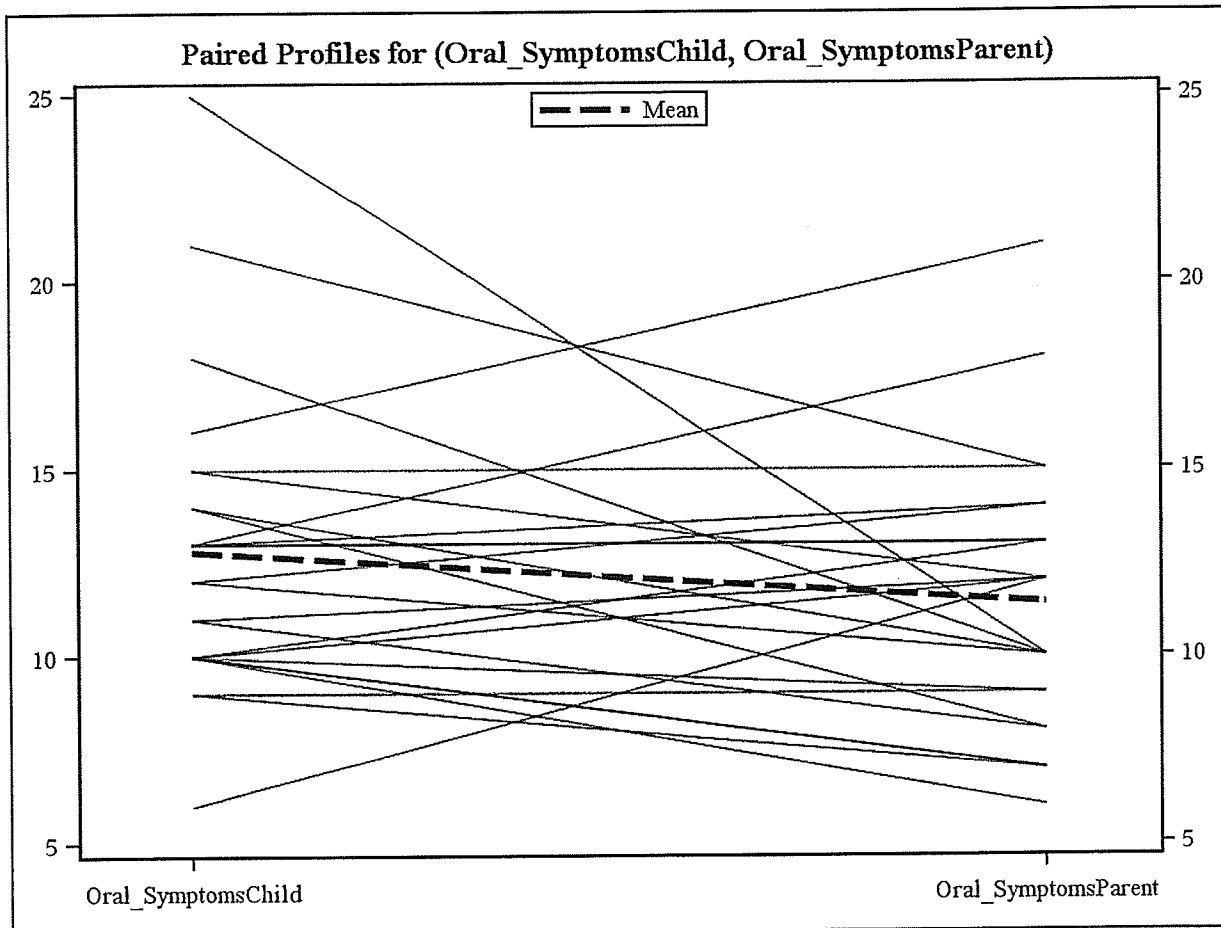
The TTEST Procedure

Difference: Oral_SymptomsChild - Oral_SymptomsParent

N	Mean	Std Dev	Std Err	Minimum	Maximum
25	1.4000	4.5369	0.9074	-6.0000	15.0000

Mean	95% CL Mean		Std Dev	95% CL Std Dev	
1.4000	-0.4727	3.2727	4.5369	3.5425	6.3115

DF	t Value	Pr > t
24	1.54	0.1359



*Group B Children T1 VS Group B Parents T1
Item: Functional Limitations*

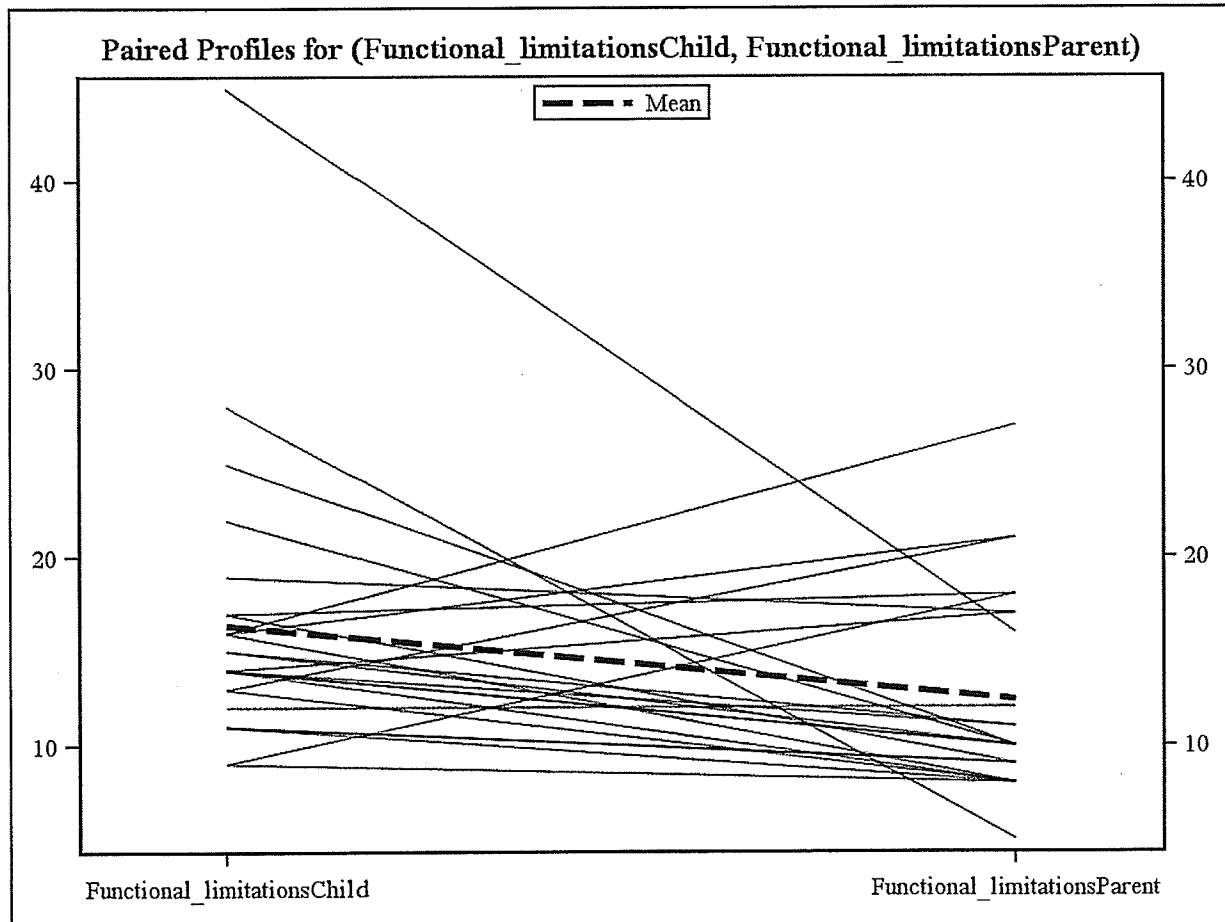
The TTEST Procedure

Difference: Functional_limitationsChild - Functional_limitationsParent

N	Mean	Std Dev	Std Err	Minimum	Maximum
25	3.9600	8.9930	1.7986	-11.0000	29.0000

Mean	95% CL Mean		Std Dev	95% CL Std Dev	
	Lower	Upper		Lower	Upper
3.9600	0.2479	7.6721	8.9930	7.0220	12.5106

DF	t Value	Pr > t
24	2.20	0.0375



*Group B Children T1 VS Group B Parents T1
Item: Emotional*

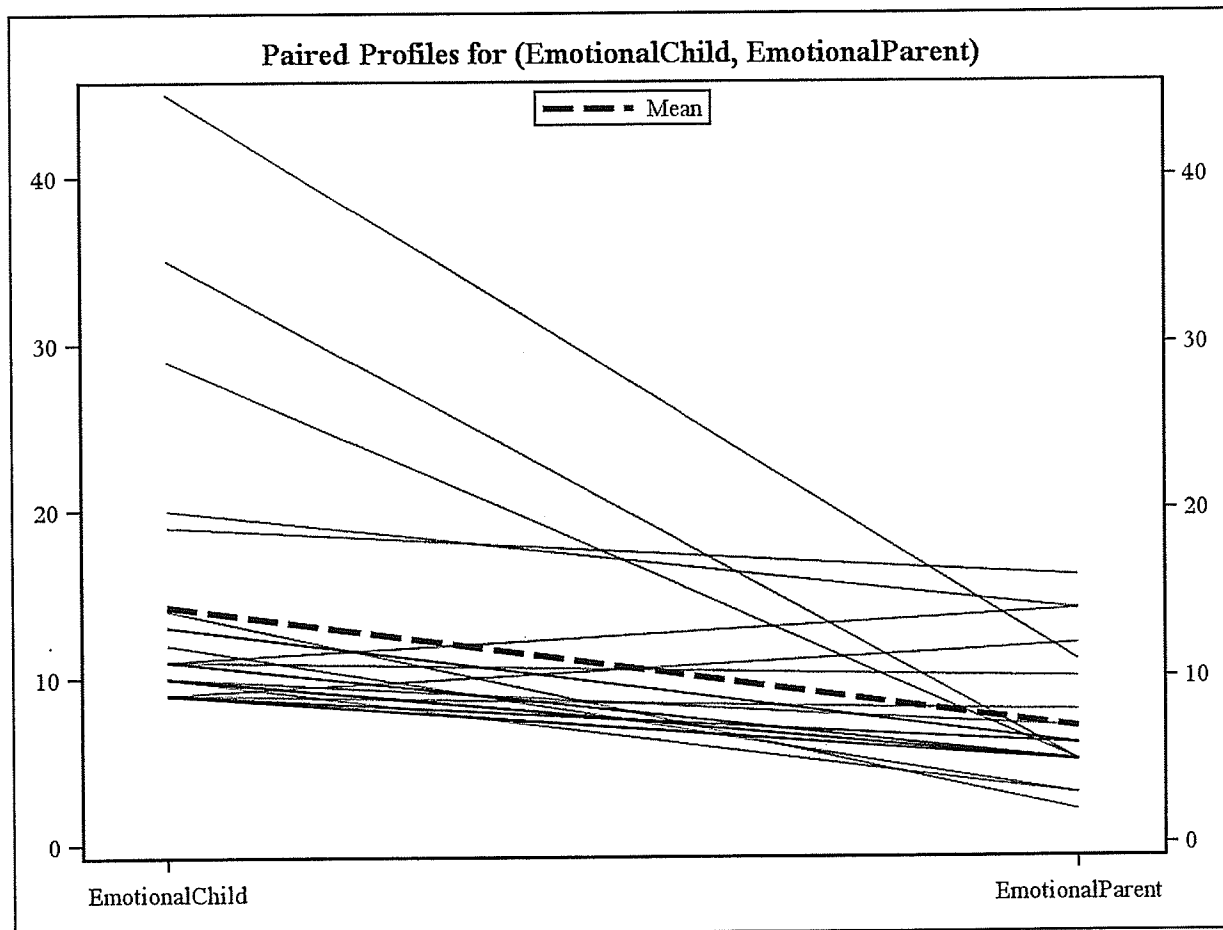
The TTEST Procedure

Difference: EmotionalChild - EmotionalParent

N	Mean	Std Dev	Std Err	Minimum	Maximum
25	7.3200	9.0172	1.8034	-3.0000	34.0000

Mean	95% CL Mean		Std Dev	95% CL Std Dev	
	7.3200	3.5979		11.0421	9.0172

DF	t Value	Pr > t
24	4.06	0.0005



*Group B Children T1 VS Group B Parents T1
Item: Social*

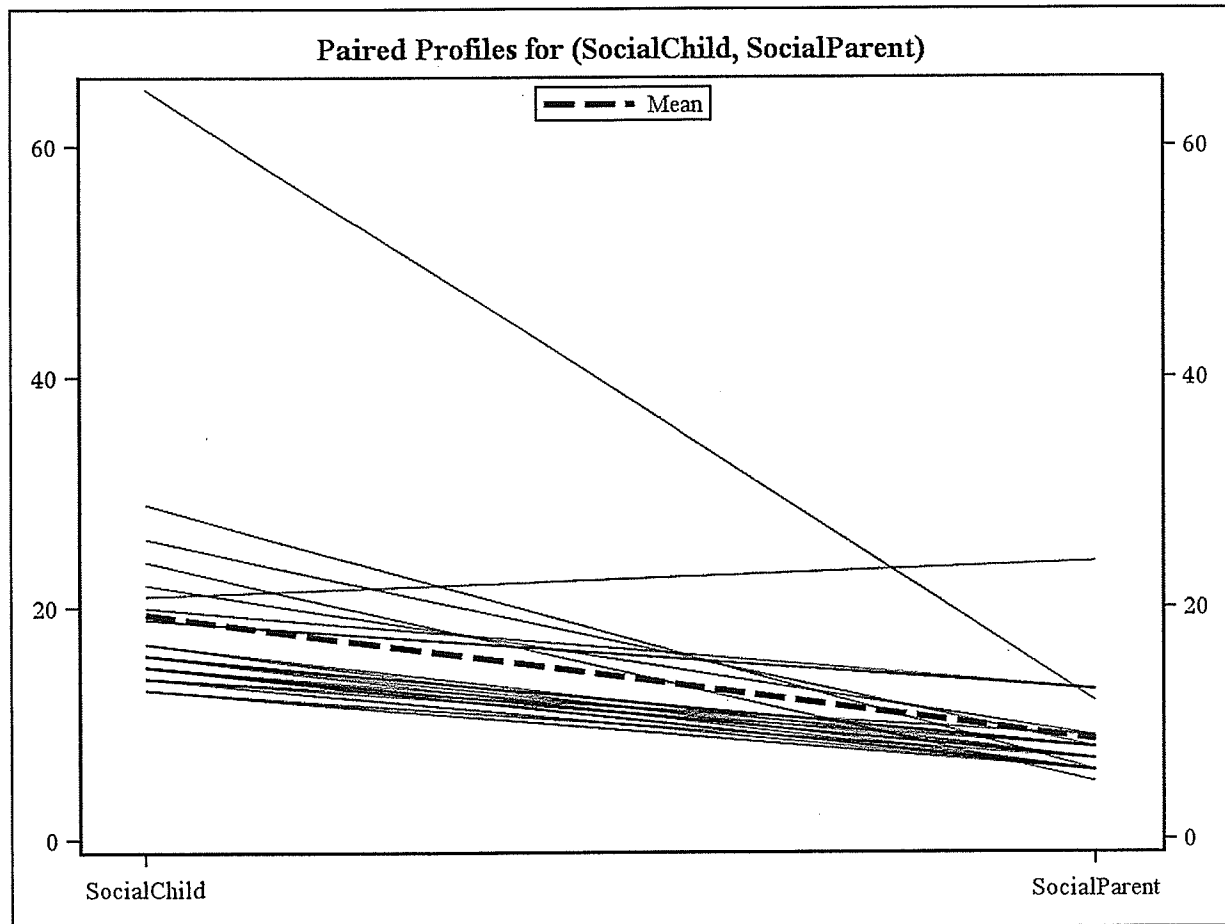
The TTEST Procedure

Difference: SocialChild - SocialParent

N	Mean	Std Dev	Std Err	Minimum	Maximum
25	10.8400	10.1311	2.0262	-3.0000	53.0000

Mean	95% CL Mean		Std Dev	95% CL Std Dev	
10.8400	6.6581	15.0219	10.1311	7.9107	14.0940

DF	t Value	Pr > t
24	5.35	<.0001



For most items, parents seem to underestimate the severity of the condition as compared to the child's assessment

*Group B Children T2 VS Group B Parents T2
Item: Oral Symptoms*

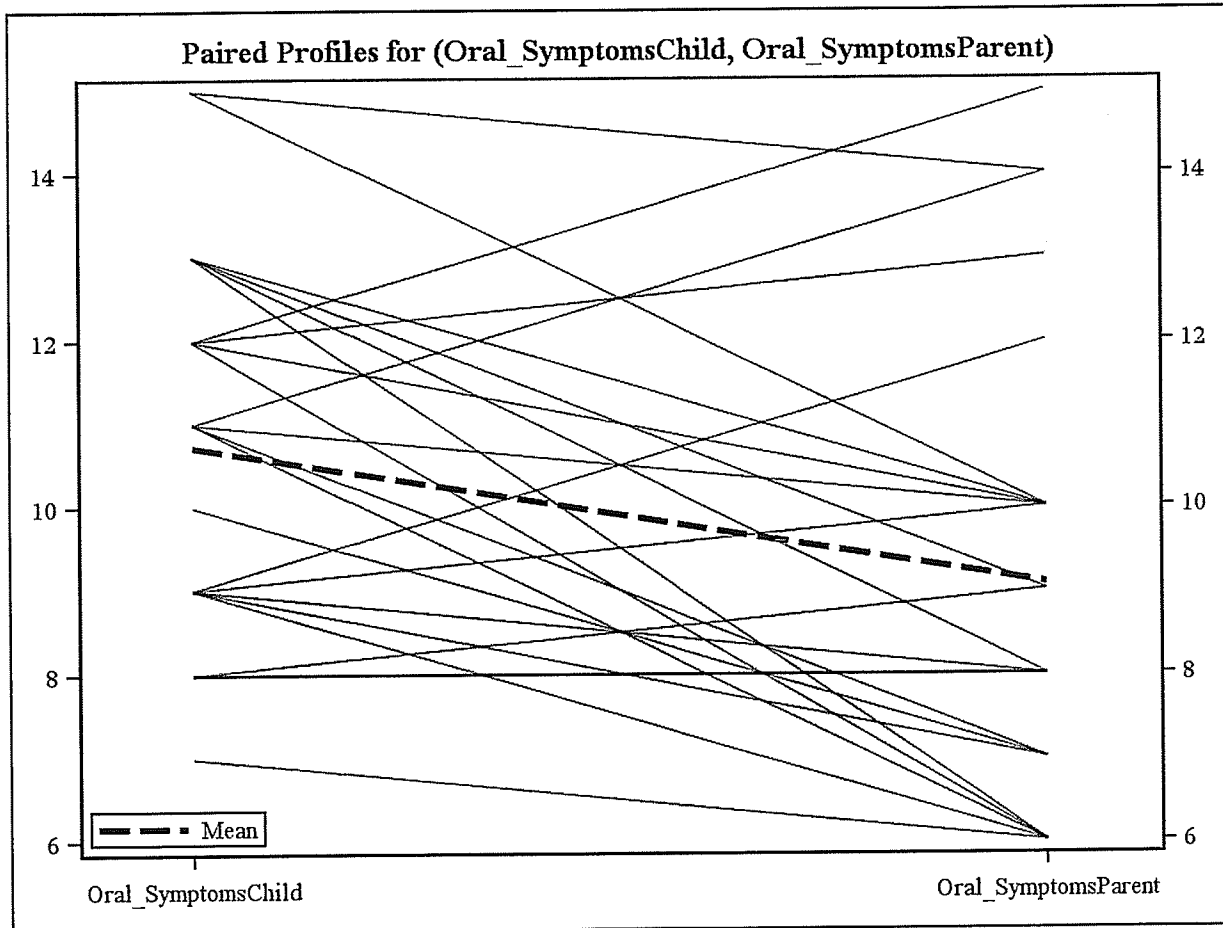
The TTEST Procedure

Difference: Oral_SymptomsChild - Oral_SymptomsParent

N	Mean	Std Dev	Std Err	Minimum	Maximum
25	1.6400	2.8414	0.5683	-3.0000	7.0000

Mean	95% CL Mean		Std Dev	95% CL Std Dev	
1.6400	0.4671	2.8129	2.8414	2.2186	3.9528

DF	t Value	Pr > t
24	2.89	0.0081



Group B Children T2 VS Group B Parents T2
Item: Functional Limitations

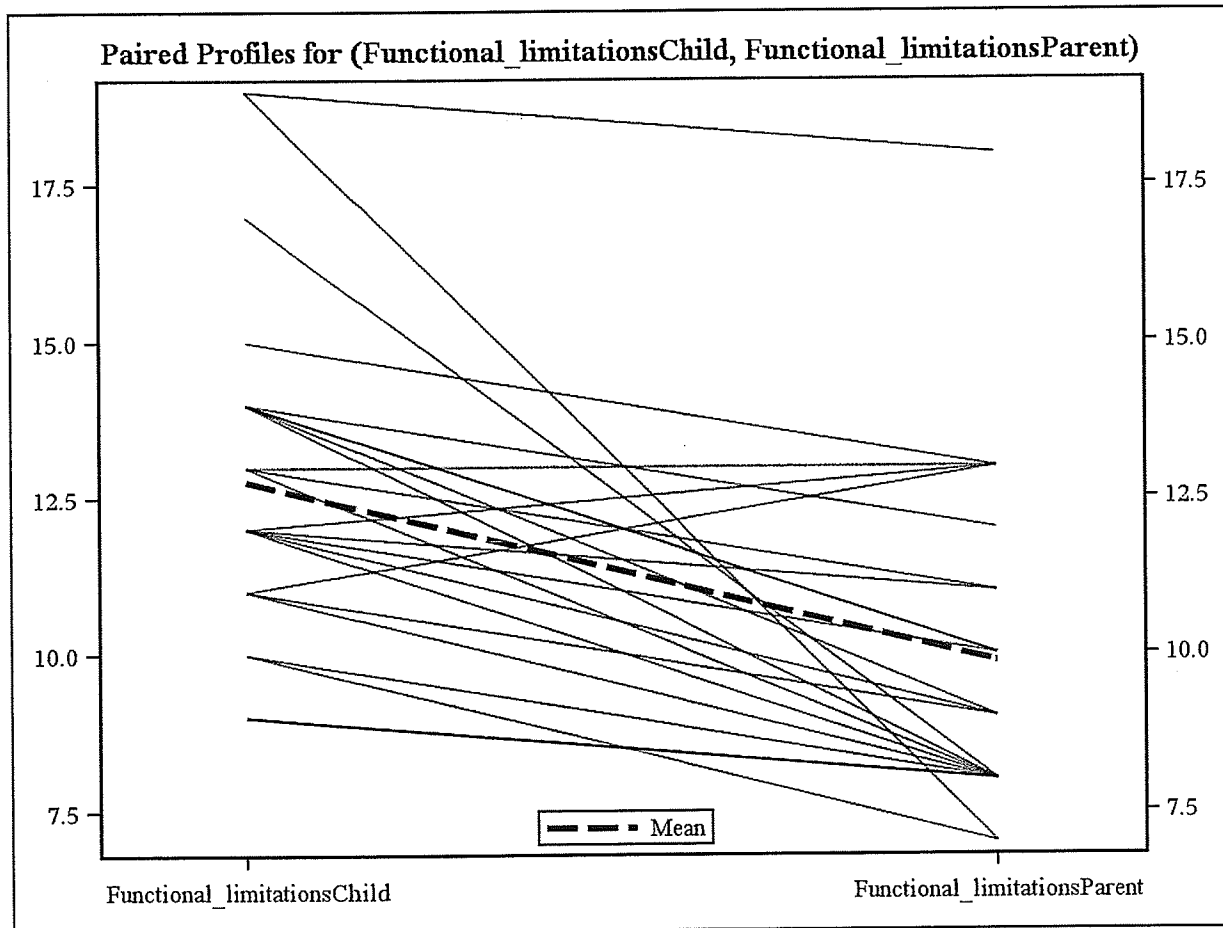
The TTEST Procedure

Difference: Functional_limitationsChild - Functional_limitationsParent

N	Mean	Std Dev	Std Err	Minimum	Maximum
25	2.8800	2.9766	0.5953	-2.0000	12.0000

Mean	95% CL Mean		Std Dev	95% CL Std Dev	
2.8800	1.6513	4.1087	2.9766	2.3242	4.1409

DF	t Value	Pr > t
24	4.84	<.0001



Group B Children T2 VS Group B Parents T2

Item: Emotional

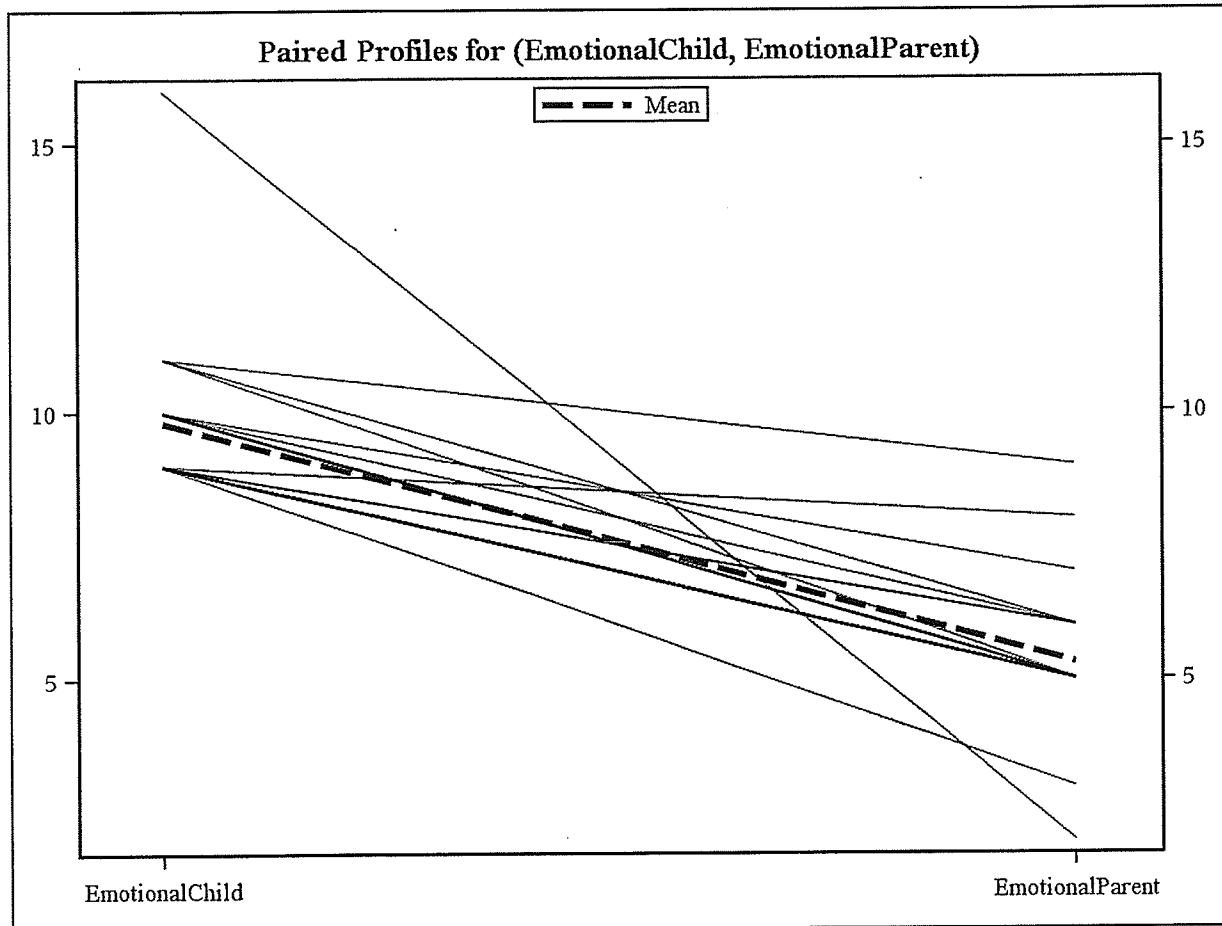
The TTEST Procedure

Difference: EmotionalChild - EmotionalParent

N	Mean	Std Dev	Std Err	Minimum	Maximum
25	4.4800	2.2752	0.4550	1.0000	14.0000

Mean	95% CL Mean		Std Dev	95% CL Std Dev	
4.4800	3.5408	5.4192	2.2752	1.7766	3.1652

DF	t Value	Pr > t
24	9.85	<.0001



*Group B Children T2 VS Group B Parents T2
Item: Social*

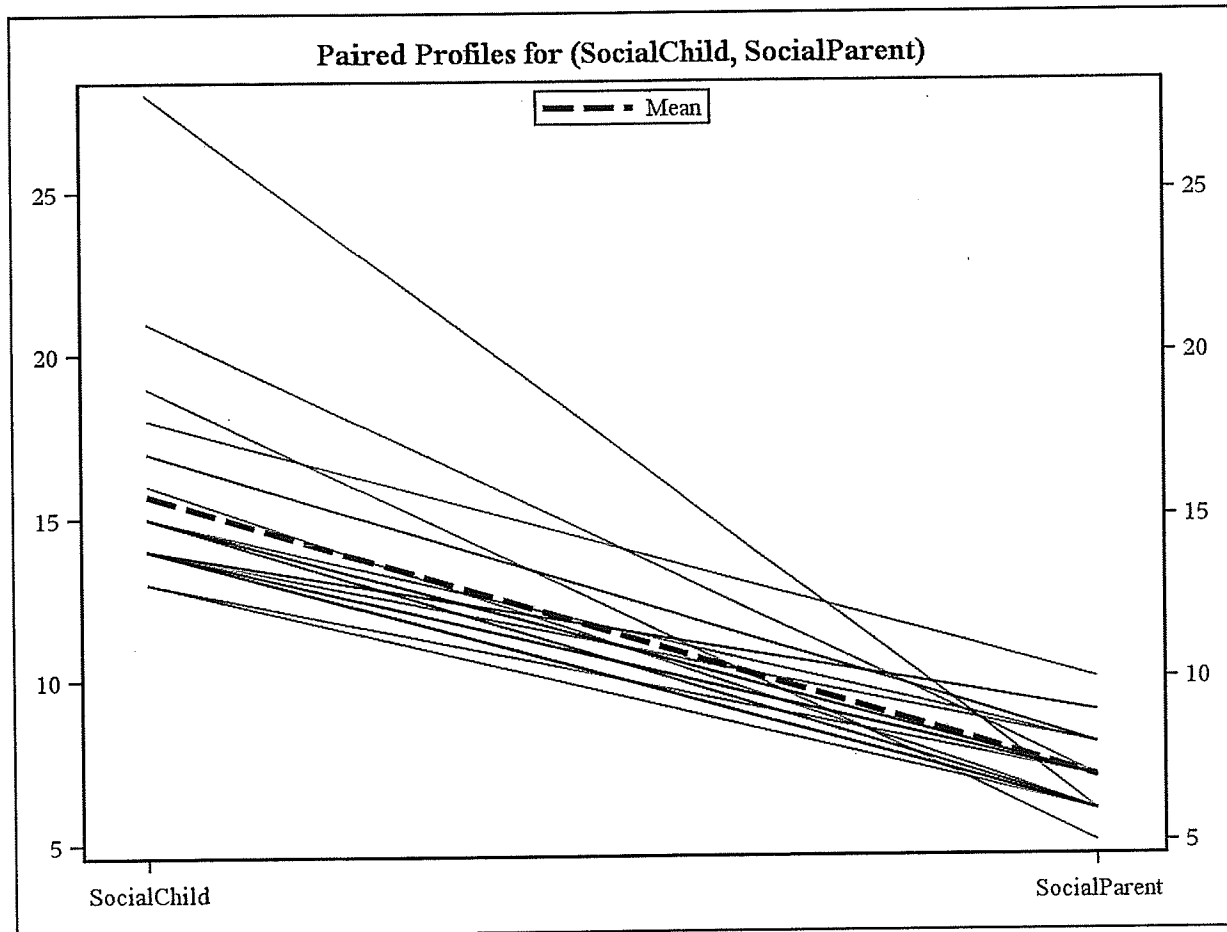
The TTEST Procedure

Difference: SocialChild - SocialParent

N	Mean	Std Dev	Std Err	Minimum	Maximum
25	8.6800	3.5086	0.7017	5.0000	22.0000

Mean	95% CL Mean		Std Dev	95% CL Std Dev	
8.6800	7.2317	10.1283	3.5086	2.7396	4.8809

DF	t Value	Pr > t
24	12.37	<.0001



For all items, parents seem to underestimate the severity of the condition as compared to the child's assessment

*Group-B Child T1 VS Group-B Child T2 (Paired Differences)
Item: Oral Symptoms*

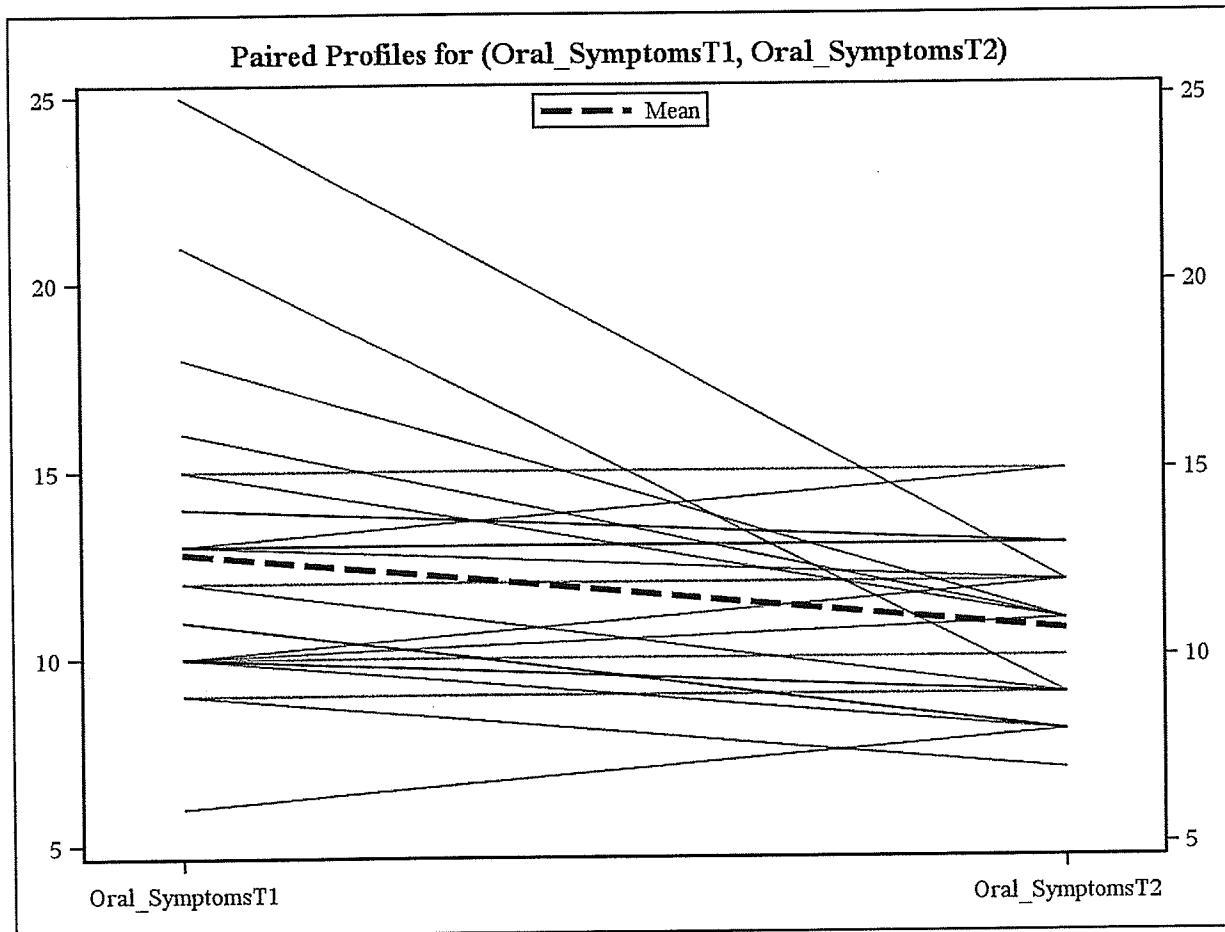
The TTEST Procedure

Difference: Oral_SymptomsT1 - Oral_SymptomsT2

N	Mean	Std Dev	Std Err	Minimum	Maximum
25	2.0800	3.8070	0.7614	-2.0000	13.0000

Mean	95% CL Mean		Std Dev	95% CL Std Dev	
2.0800	0.5085	3.6515	3.8070	2.9726	5.2961

DF	t Value	Pr > t
24	2.73	0.0116



*Group-B Child T1 VS Group-B Child T2 (Paired Differences)
Item: Functional Limitations*

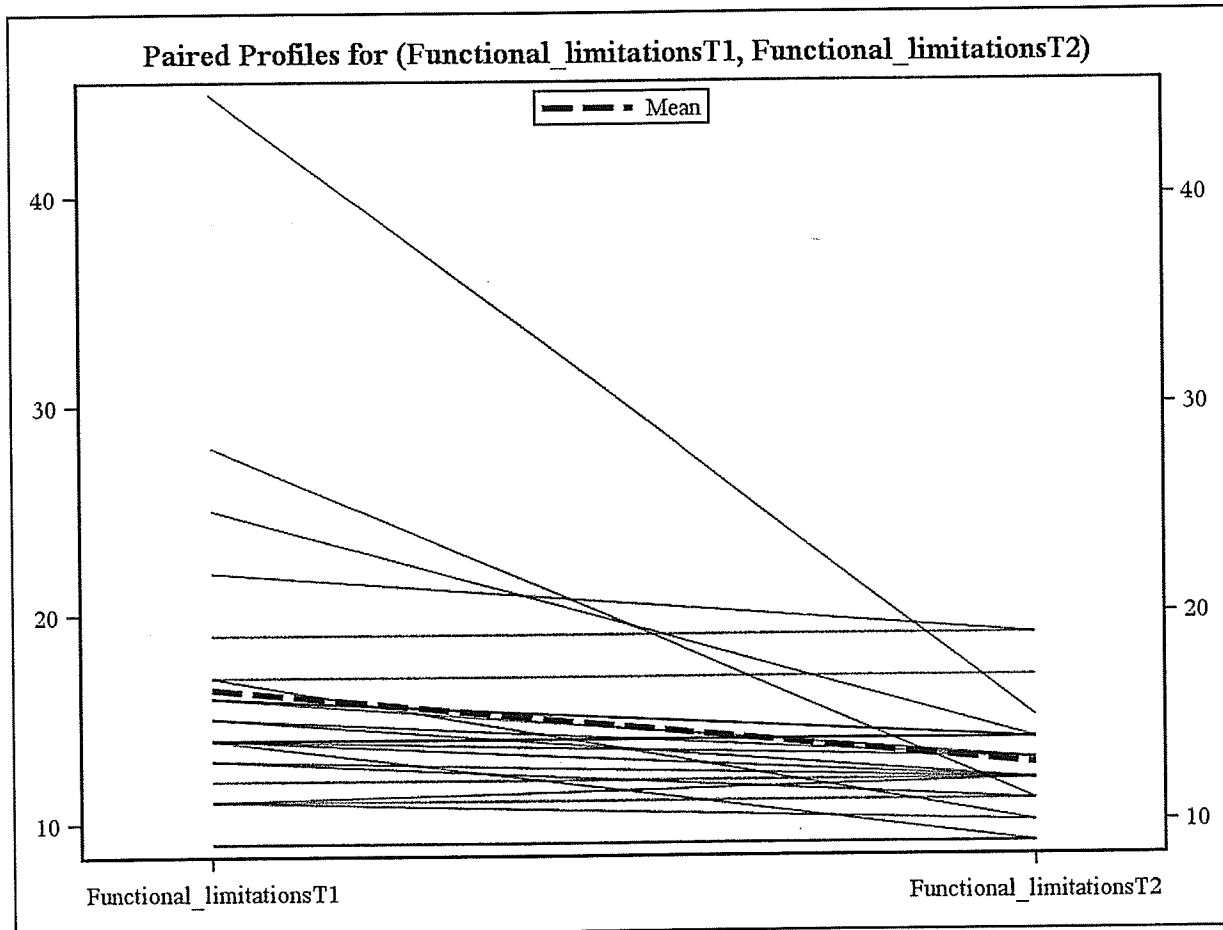
The TTEST Procedure

Difference: Functional_limitationsT1 - Functional_limitationsT2

N	Mean	Std Dev	Std Err	Minimum	Maximum
25	3.6400	6.7816	1.3563	-1.0000	30.0000

Mean	95% CL Mean		Std Dev	95% CL Std Dev	
3.6400	0.8407	6.4393	6.7816	5.2953	9.4342

DF	t Value	Pr > t
24	2.68	0.0130



*Group-B Child T1 VS Group-B Child T2 (Paired Differences)
Item: Emotional*

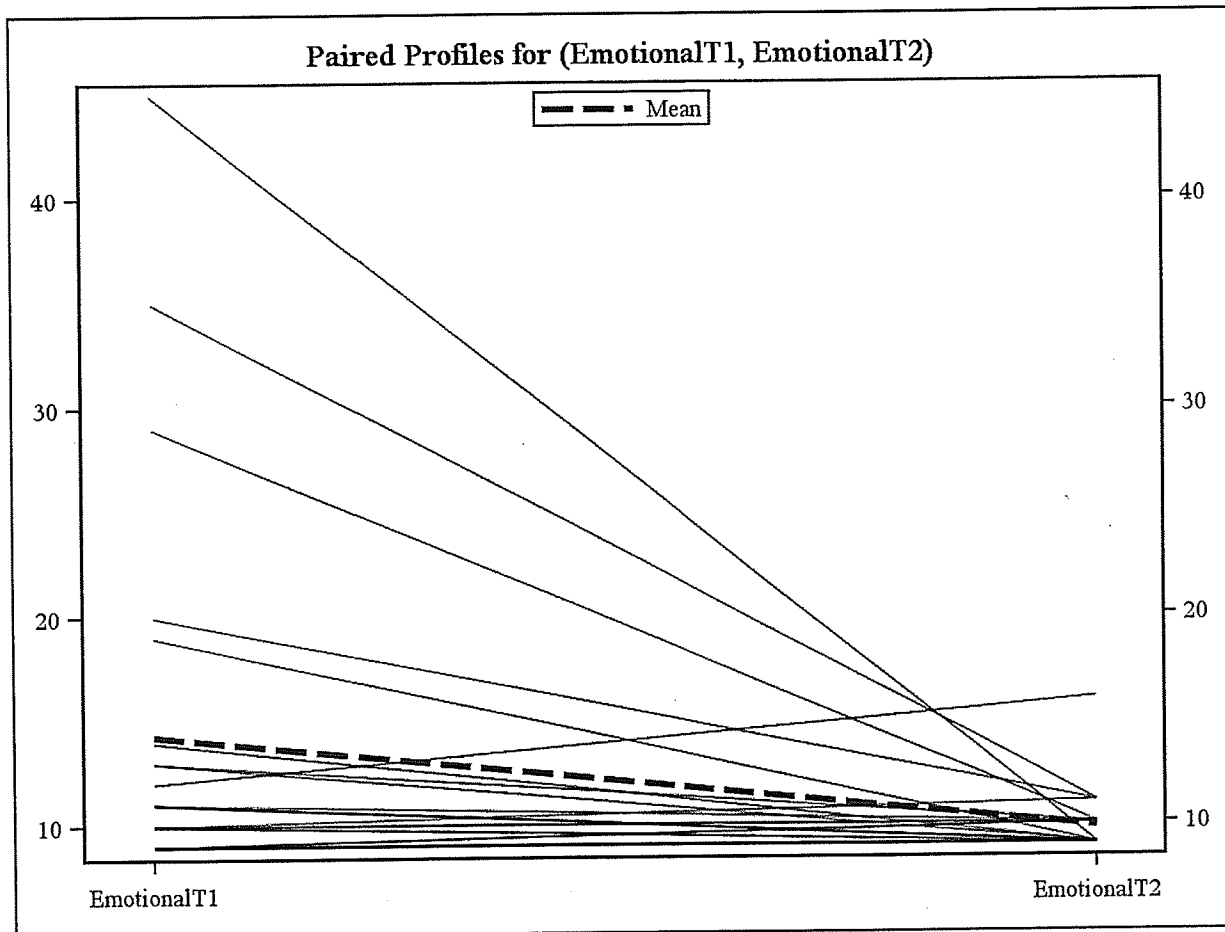
The TTEST Procedure

Difference: EmotionalT1 - EmotionalT2

N	Mean	Std Dev	Std Err	Minimum	Maximum
25	4.4800	9.1201	1.8240	-4.0000	36.0000

Mean	95% CL Mean		Std Dev	95% CL Std Dev	
4.4800	0.7154	8.2446	9.1201	7.1213	12.6875

DF	t Value	Pr > t
24	2.46	0.0217



Group-B Child T1 VS Group-B Child T2 (Paired Differences)
Item: Social

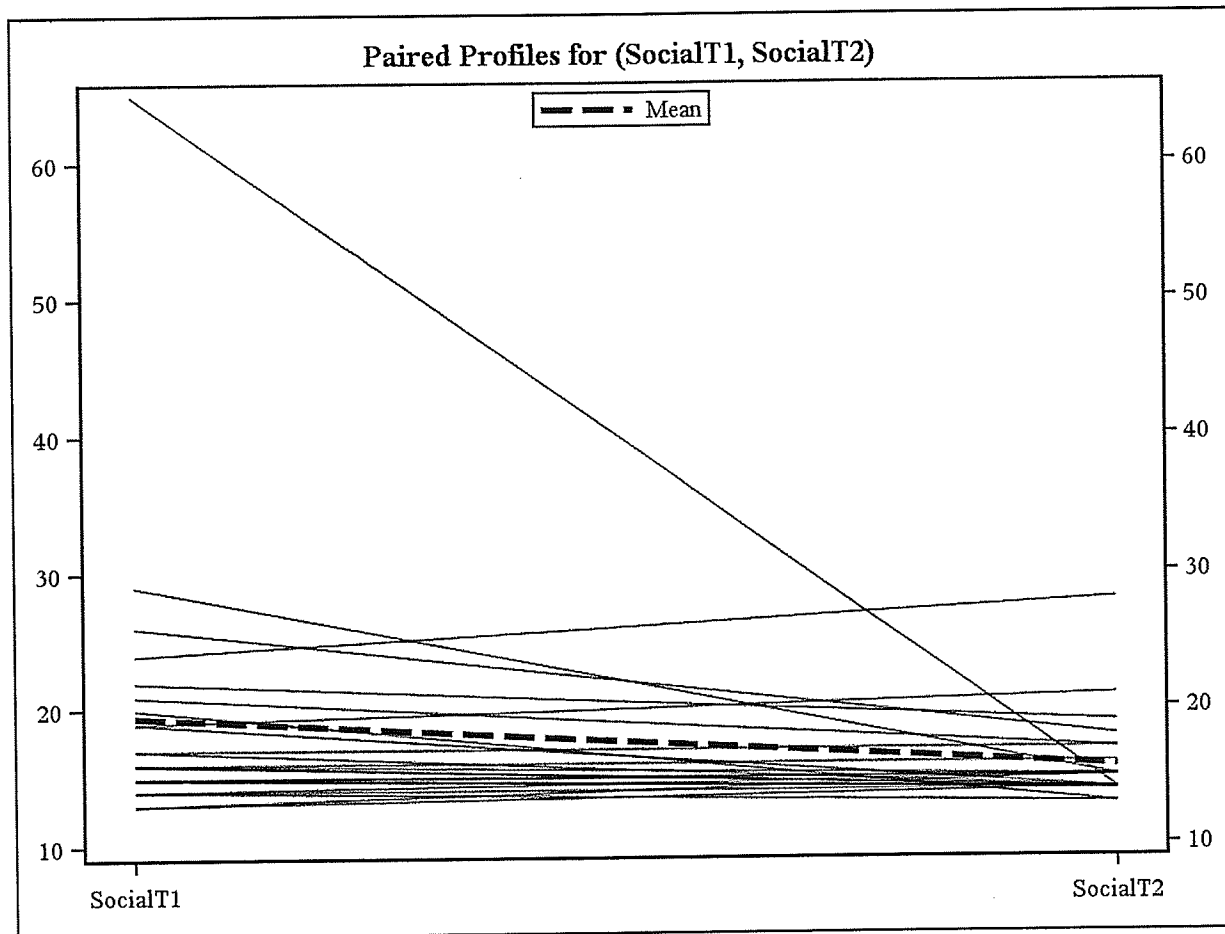
The TTEST Procedure

Difference: SocialT1 - SocialT2

N	Mean	Std Dev	Std Err	Minimum	Maximum
25	3.7600	10.5170	2.1034	-4.0000	51.0000

Mean	95% CL Mean		Std Dev	95% CL Std Dev	
	-0.5812	8.1012		10.5170	8.2119
3.7600	-0.5812	8.1012	10.5170	8.2119	14.6307

DF	t Value	Pr > t
24	1.79	0.0865



Note: although not significant according to the paired t-test, the Wilcoxon rank-sum test returned a p-value less than 0.05

Group-B Children T1 VS Group-A Children T1
Item: Global Rating

The TTEST Procedure

Variable: Global_Rating

group	N	Mean	Std Dev	Std Err	Minimum	Maximum
A	28	5.9643	1.4778	0.2793	3.0000	9.0000
B	25	5.3200	1.4353	0.2871	3.0000	9.0000
Diff (1-2)		0.6443	1.4579	0.4012		

group	Method	Mean	95% CL Mean		Std Dev	95% CL Std Dev	
A		5.9643	5.3913	6.5373	1.4778	1.1684	2.0115
B		5.3200	4.7275	5.9125	1.4353	1.1207	1.9967
Diff (1-2)	Pooled	0.6443	-0.1611	1.4497	1.4579	1.2218	1.8080
Diff (1-2)	Satterthwaite	0.6443	-0.1599	1.4485			

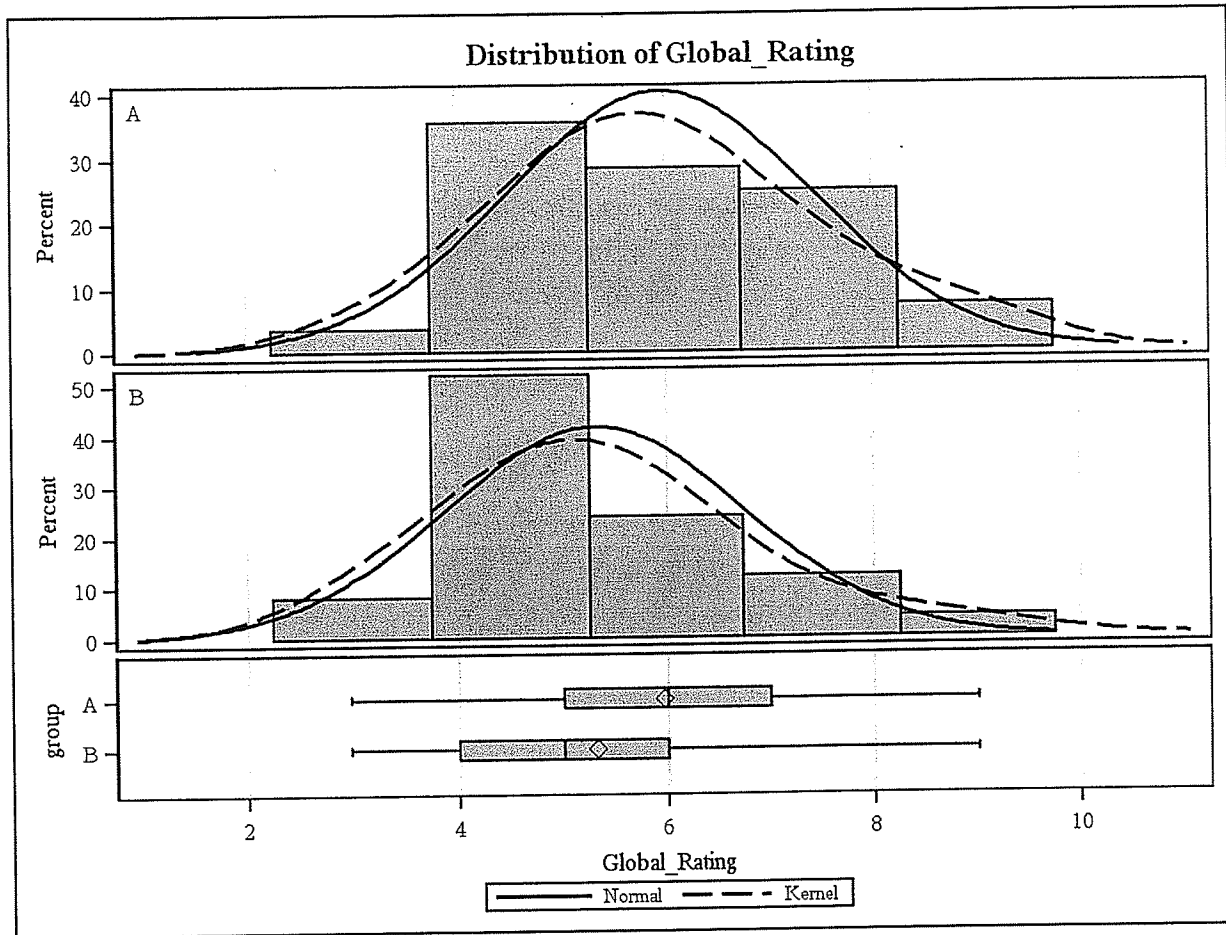
Method	Variances	DF	t Value	Pr > t
Pooled	Equal	51	1.61	0.1144
Satterthwaite	Unequal	50.622	1.61	0.1139

Equality of Variances				
Method	Num DF	Den DF	F Value	Pr > F
Folded F	27	24	1.06	0.8904

Group-B Children T1 VS Group-A Children T1
Item: Global Rating

The TTEST Procedure

Variable: Global_Rating



Group-B Children T1 VS Group-A Children T1
Item: Oral Symptoms

The TTEST Procedure

Variable: Oral_Symptoms

group	N	Mean	Std Dev	Std Err	Minimum	Maximum
A	28	13.2143	4.1842	0.7907	7.0000	24.0000
B	25	12.8000	4.0620	0.8124	6.0000	25.0000
Diff (1-2)		0.4143	4.1272	1.1356		

group	Method	Mean	95% CL Mean		Std Dev	95% CL Std Dev	
A		13.2143	11.5918	14.8368	4.1842	3.3081	5.6953
B		12.8000	11.1233	14.4767	4.0620	3.1717	5.6509
Diff (1-2)	Pooled	0.4143	-1.8656	2.6942	4.1272	3.4588	5.1182
Diff (1-2)	Satterthwaite	0.4143	-1.8621	2.6907			

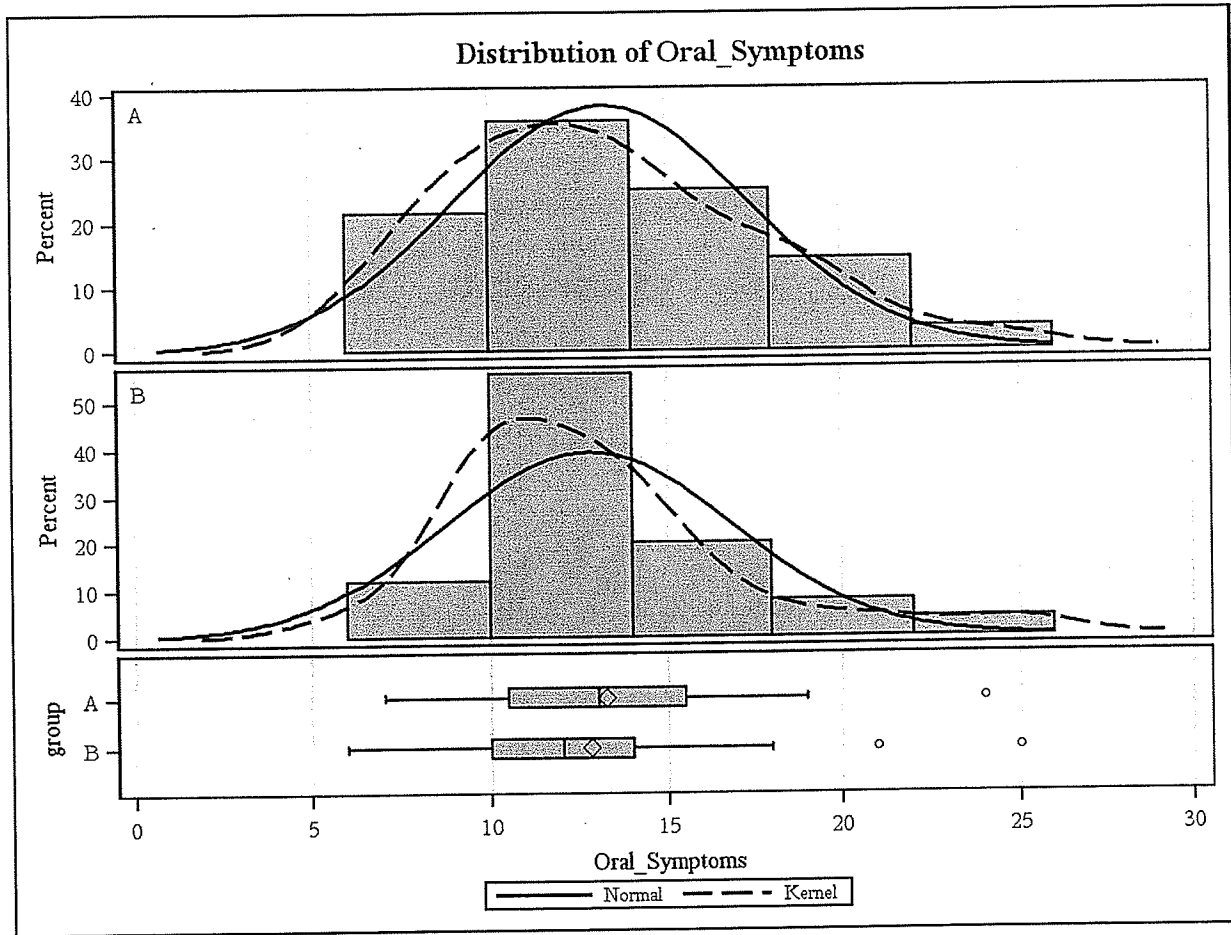
Method	Variances	DF	t Value	Pr > t
Pooled	Equal	51	0.36	0.7168
Satterthwaite	Unequal	50.626	0.37	0.7163

Equality of Variances				
Method	Num DF	Den DF	F Value	Pr > F
Folded F	27	24	1.06	0.8886

Group-B Children T1 VS Group-A Children T1
Item: Oral Symptoms

The TTEST Procedure

Variable: Oral_Symptoms



Group-B Children T1 VS Group-A Children T1
Item: Functional Limitations

The TTEST Procedure

Variable: Functional_limitations

group	N	Mean	Std Dev	Std Err	Minimum	Maximum
A	28	17.2857	6.2055	1.1727	9.0000	31.0000
B	25	16.4000	7.4666	1.4933	9.0000	45.0000
Diff (1-2)		0.8857	6.8280	1.8788		

group	Method	Mean	95% CL Mean		Std Dev	95% CL Std Dev	
			Lower	Upper		Lower	Upper
A		17.2857	14.8795	19.6919	6.2055	4.9062	8.4465
B		16.4000	13.3179	19.4821	7.4666	5.8301	10.3872
Diff (1-2)	Pooled	0.8857	-2.8862	4.6576	6.8280	5.7222	8.4676
Diff (1-2)	Satterthwaite	0.8857	-2.9344	4.7058			

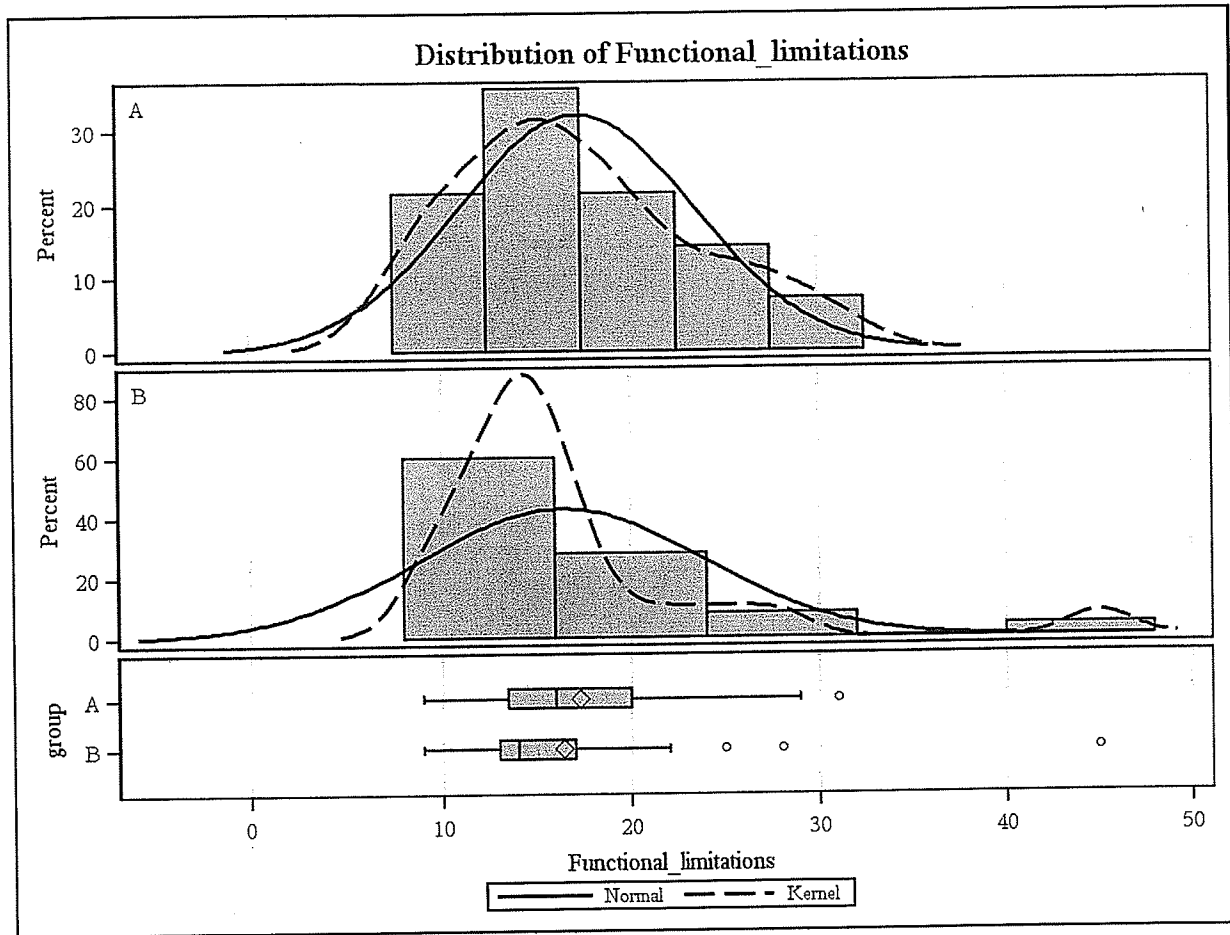
Method	Variances	DF	t Value	Pr > t
Pooled	Equal	51	0.47	0.6393
Satterthwaite	Unequal	46.881	0.47	0.6430

Equality of Variances				
Method	Num DF	Den DF	F Value	Pr > F
Folded F	24	27	1.45	0.3513

Group-B Children T1 VS Group-A Children T1
Item: Functional Limitations

The TTEST Procedure

Variable: Functional_limitations



Group-B Children T1 VS Group-A Children T1
Item: Emotional

The TTEST Procedure

Variable: Emotional

group	N	Mean	Std Dev	Std Err	Minimum	Maximum
A	28	17.2143	7.1043	1.3426	9.0000	36.0000
B	25	14.2800	9.0899	1.8180	9.0000	45.0000
Diff (1-2)		2.9343	8.0996	2.2287		

group	Method	Mean	95% CL Mean		Std Dev	95% CL Std Dev	
A		17.2143	14.4595	19.9690	7.1043	5.6168	9.6699
B		14.2800	10.5279	18.0321	9.0899	7.0977	12.6455
Diff (1-2)	Pooled	2.9343	-1.5400	7.4086	8.0996	6.7878	10.0445
Diff (1-2)	Satterthwaite	2.9343	-1.6167	7.4852			

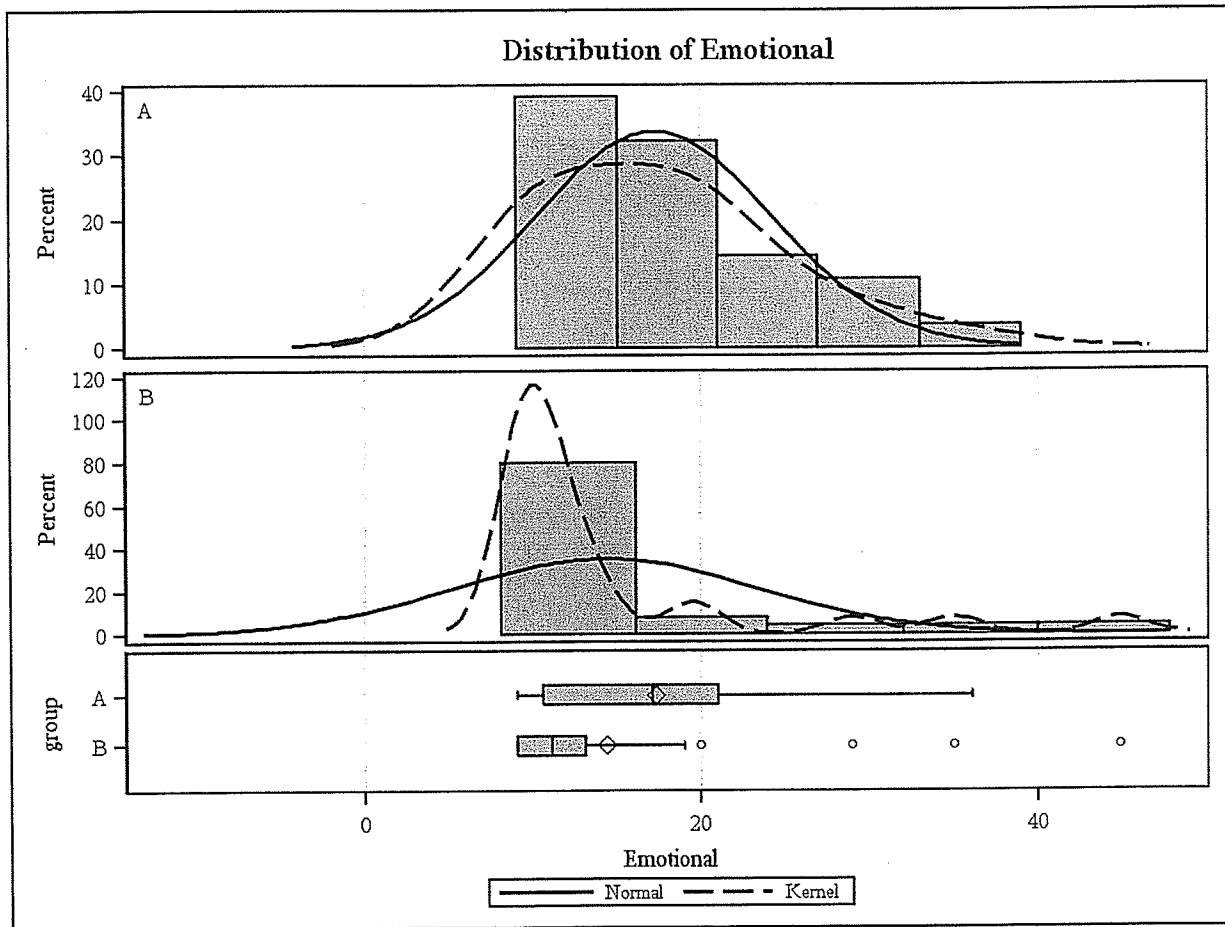
Method	Variances	DF	t Value	Pr > t
Pooled	Equal	51	1.32	0.1939
Satterthwaite	Unequal	45.332	1.30	0.2007

Equality of Variances				
Method	Num DF	Den DF	F Value	Pr > F
Folded F	24	27	1.64	0.2158

Group-B Children T1 VS Group-A Children T1
Item: Emotional

The TTEST Procedure

Variable: Emotional



*Group-B Children T1 VS Group-A Children T1
Item: Social*

The TTEST Procedure

Variable: Social

group	N	Mean	Std Dev	Std Err	Minimum	Maximum
A	28	19.4643	5.3850	1.0177	13.0000	31.0000
B	25	19.4400	10.3484	2.0697	13.0000	65.0000
Diff (1-2)		0.0243	8.1085	2.2311		

group	Method	Mean	95% CL Mean		Std Dev	95% CL Std Dev	
A		19.4643	17.3762	21.5524	5.3850	4.2575	7.3298
B		19.4400	15.1684	23.7116	10.3484	8.0803	14.3962
Diff (1-2)	Pooled	0.0243	-4.4549	4.5035	8.1085	6.7953	10.0556
Diff (1-2)	Satterthwaite	0.0243	-4.6570	4.7056			

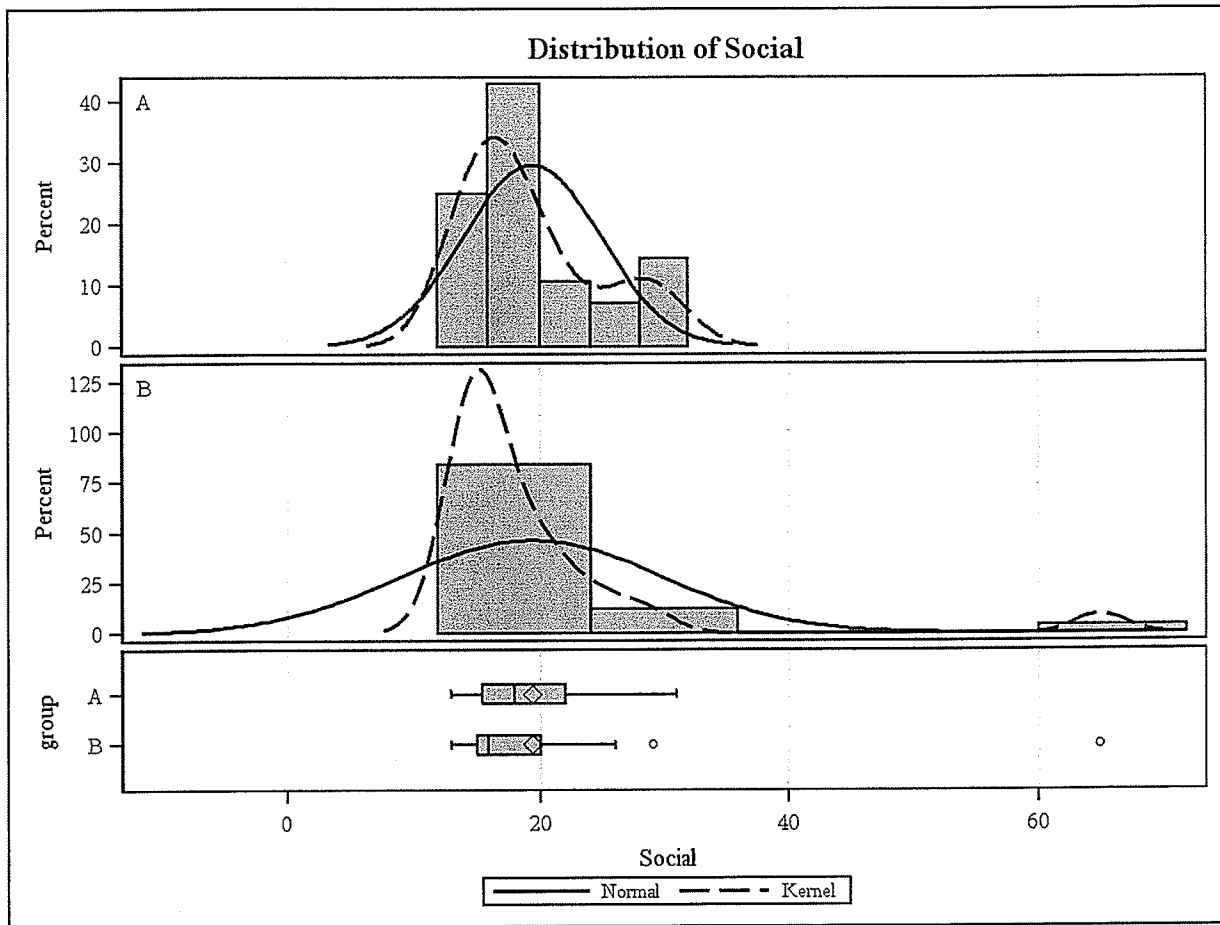
Method	Variances	DF	t Value	Pr > t
Pooled	Equal	51	0.01	0.9914
Satterthwaite	Unequal	35.18	0.01	0.9917

Equality of Variances				
Method	Num DF	Den DF	F Value	Pr > F
Folded F	24	27	3.69	0.0014

Group-B Children T1 VS Group-A Children T1
Item: Social

The TTEST Procedure

Variable: Social



*Group B Parent T1 VS Group B Parent T2 (Paired Differences)
Item: Oral Symptoms*

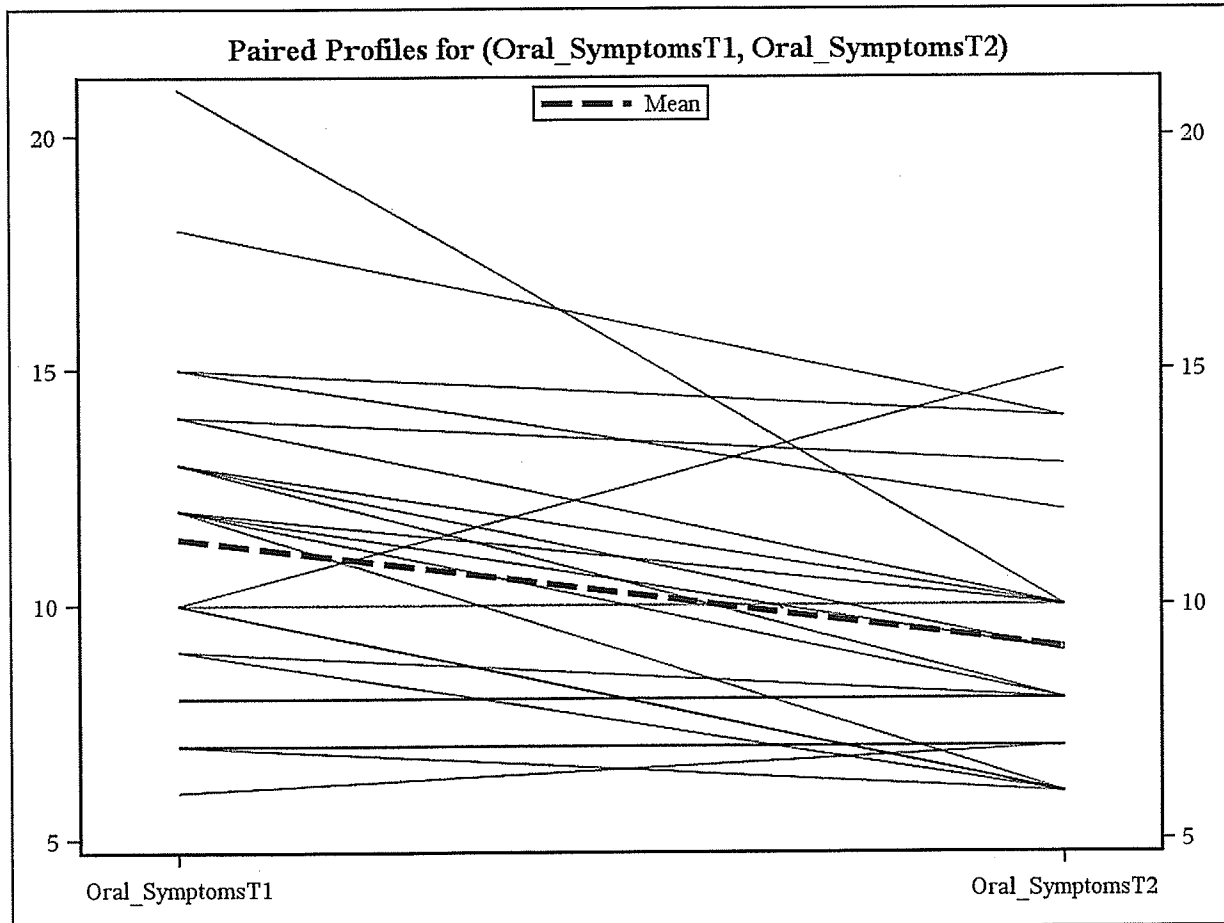
The TTEST Procedure

Difference: Oral_SymptomsT1 - Oral_SymptomsT2

N	Mean	Std Dev	Std Err	Minimum	Maximum
25	2.3200	2.9822	0.5964	-5.0000	11.0000

Mean	95% CI Mean		Std Dev	95% CI Std Dev	
2.3200	1.0890	3.5510	2.9822	2.3286	4.1487

DF	t Value	Pr > t
24	3.89	0.0007



Group B Parent T1 VS Group B Parent T2 (Paired Differences)
Item: Functional Limitations

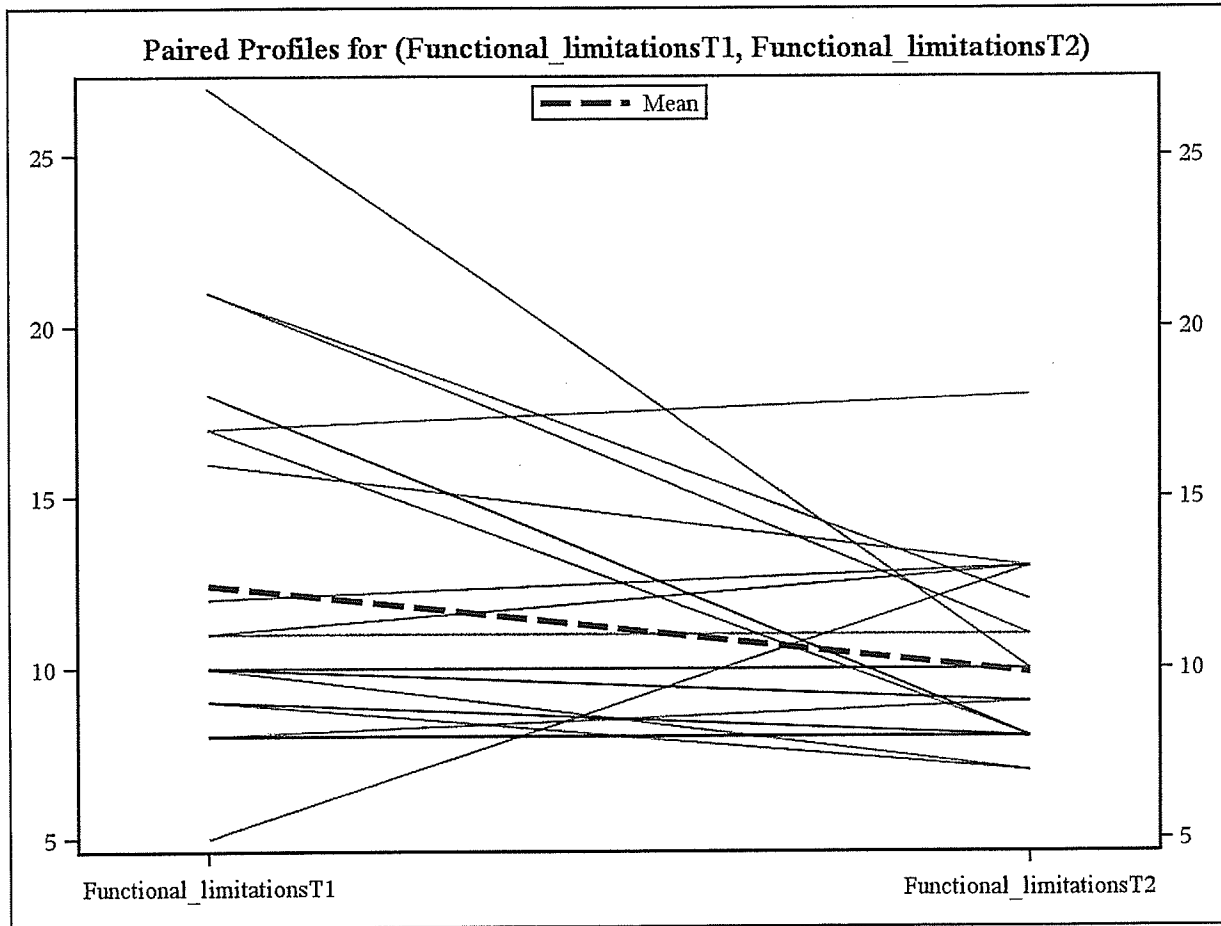
The TTEST Procedure

Difference: Functional_limitationsT1 - Functional_limitationsT2

N	Mean	Std Dev	Std Err	Minimum	Maximum
25	2.5600	5.3392	1.0678	-8.0000	17.0000

Mean	95% CI Mean		Std Dev	95% CI Std Dev	
	Lower	Upper		Lower	Upper
2.5600	0.3561	4.7639	5.3392	4.1690	7.4276

DF	t Value	Pr > t
24	2.40	0.0247



Group B Parent T1 VS Group B Parent T2 (Paired Differences)
Item: Emotional

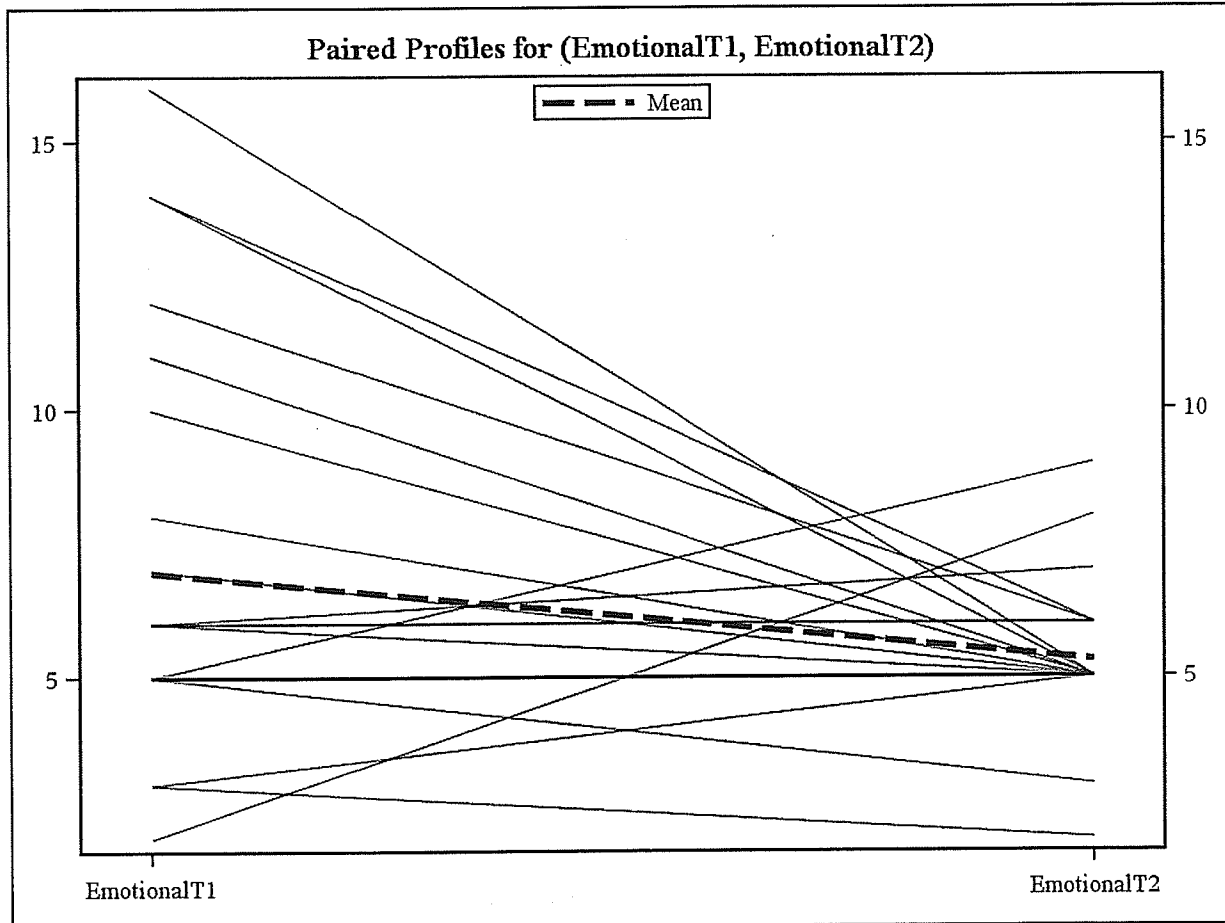
The TTEST Procedure

Difference: EmotionalT1 - EmotionalT2

N	Mean	Std Dev	Std Err	Minimum	Maximum
25	1.6400	3.9357	0.7871	-6.0000	11.0000

Mean	95% CL Mean		Std Dev	95% CL Std Dev	
1.6400	0.0154	3.2646	3.9357	3.0731	5.4752

DF	t Value	Pr > t
24	2.08	0.0480



Group B Parent T1 VS Group B Parent T2 (Paired Differences)
Item: Social

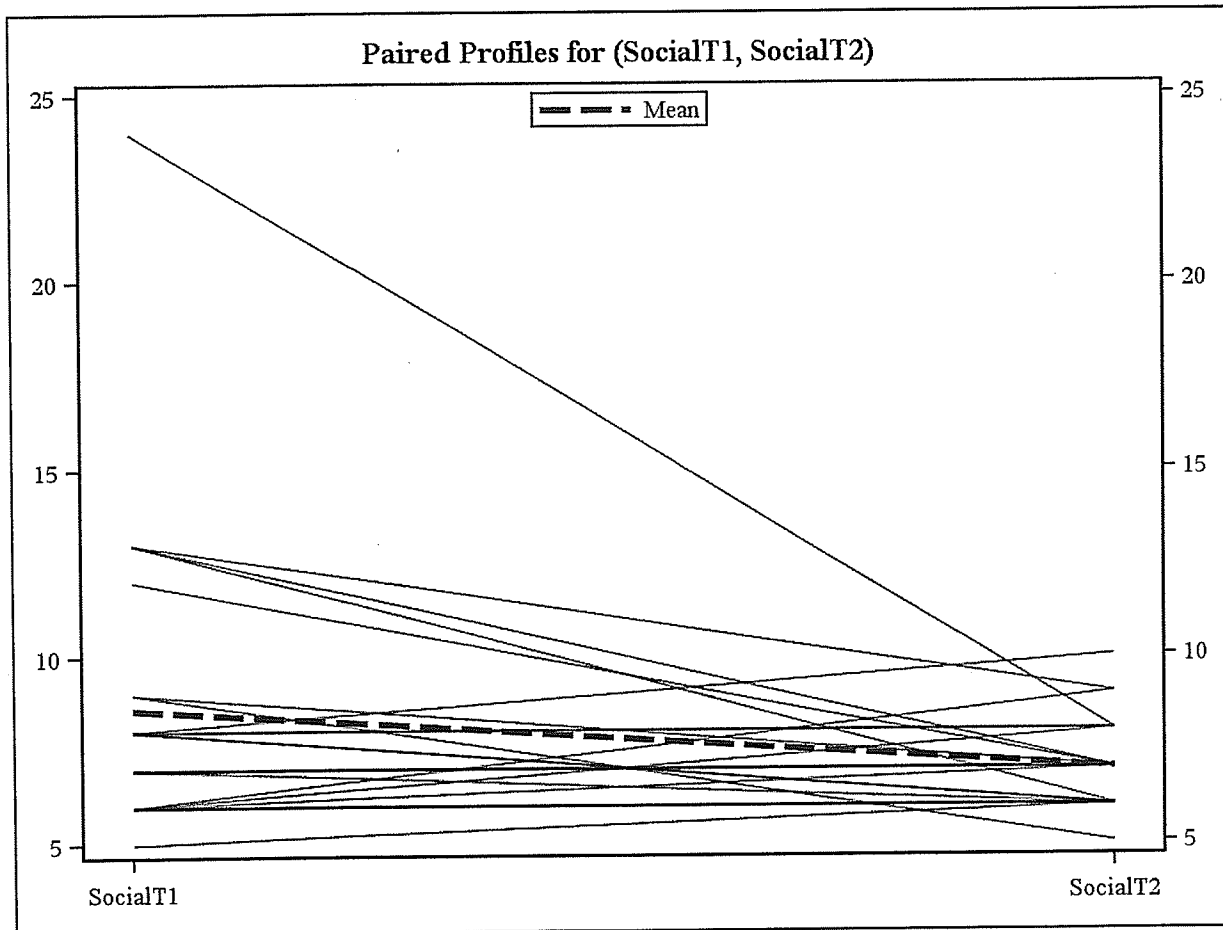
The TTEST Procedure

Difference: SocialT1 - SocialT2

N	Mean	Std Dev	Std Err	Minimum	Maximum
25	1.6000	3.9051	0.7810	-3.0000	16.0000

Mean	95% CL Mean		Std Dev	95% CL Std Dev	
1.6000	-0.0120	3.2120	3.9051	3.0492	5.4326

DF	t Value	Pr > t
24	2.05	0.0516



Group B Parent T1 VS Group B Parent T2 (Paired Differences)
Item: Family QOL

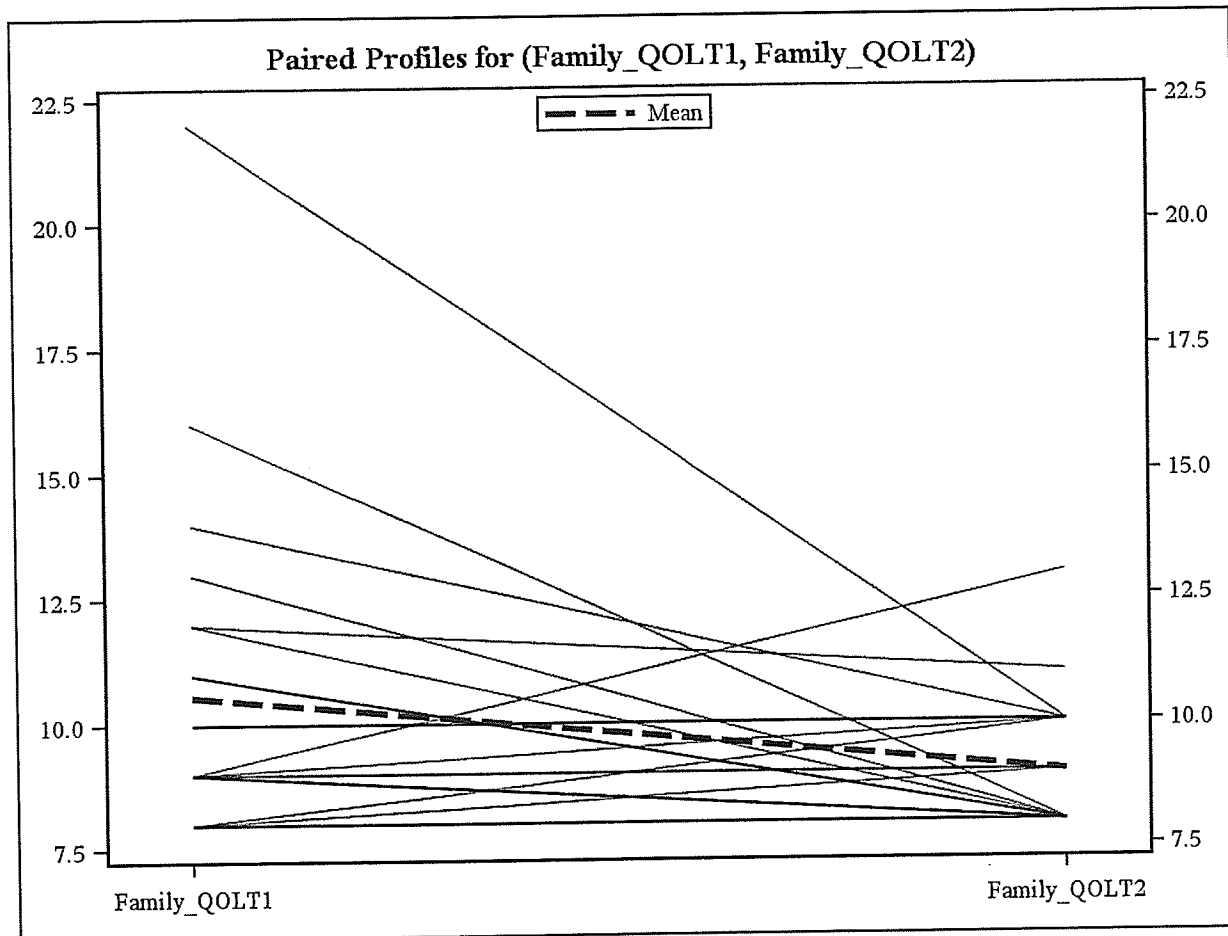
The TTEST Procedure

Difference: Family_QOLT1 - Family_QOLT2

N	Mean	Std Dev	Std Err	Minimum	Maximum
25	1.5600	3.2797	0.6559	-4.0000	12.0000

Mean	95% CI Mean		Std Dev	95% CI Std Dev	
	Lower	Upper		Lower	Upper
1.5600	0.2062	2.9138	3.2797	2.5609	4.5626

DF	t Value	Pr > t
24	2.38	0.0257



Group B Parent T1 VS Group B Parent T2 (Paired Differences)
Item: Child Behaviour

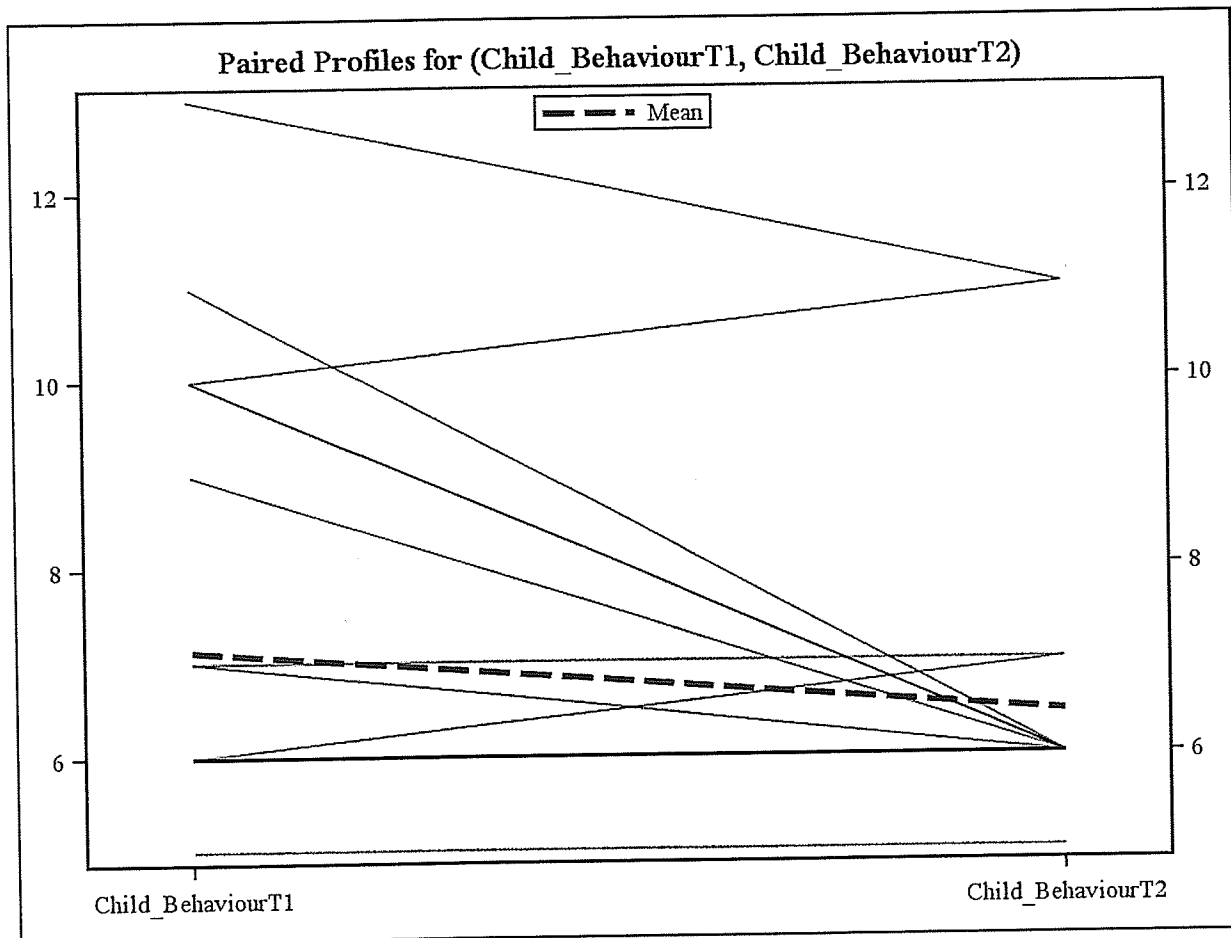
The TTEST Procedure

Difference: Child_BehaviourT1 - Child_BehaviourT2

N	Mean	Std Dev	Std Err	Minimum	Maximum
25	0.6800	1.6000	0.3200	-1.0000	5.0000

Mean	95% CL Mean		Std Dev	95% CL Std Dev	
0.6800	0.0196	1.3404	1.6000	1.2493	2.2258

DF	t Value	Pr > t
24	2.13	0.0441



*Group-B Parents at Time 1 VS Group-A Parents at Time 1
Item: Oral Symptoms*

The TTEST Procedure

Variable: Oral_Symptoms

group	N	Mean	Std Dev	Std Err	Minimum	Maximum
A	28	10.9286	3.6609	0.6918	3.0000	18.0000
B	25	11.4000	3.6171	0.7234	6.0000	21.0000
Diff (1-2)		-0.4714	3.6403	1.0017		

group	Method	Mean	95% CI Mean		Std Dev	95% CI Std Dev	
			Lower	Upper		Lower	Upper
A		10.9286	9.5090	12.3481	3.6609	2.8944	4.9830
B		11.4000	9.9069	12.8931	3.6171	2.8243	5.0319
Diff (1-2)	Pooled	-0.4714	-2.4824	1.5395	3.6403	3.0508	4.5145
Diff (1-2)	Satterthwaite	-0.4714	-2.4815	1.5387			

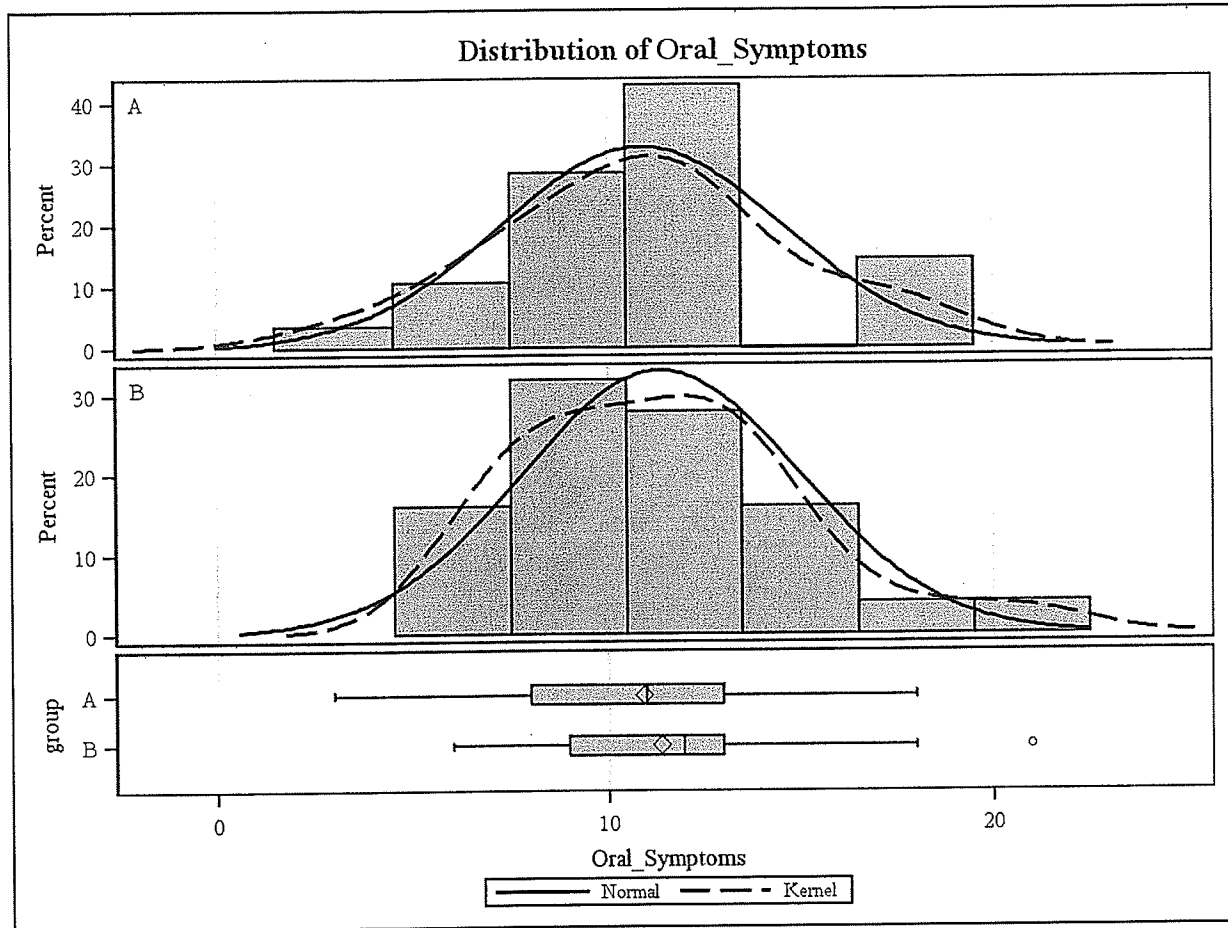
Method	Variances	DF	t Value	Pr > t
Pooled	Equal	51	-0.47	0.6399
Satterthwaite	Unequal	50.458	-0.47	0.6397

Equality of Variances				
Method	Num DF	Den DF	F Value	Pr > F
Folded F	27	24	1.02	0.9583

*Group-B Parents at Time 1 VS Group-A Parents at Time 1
Item: Oral_Symptoms*

The TTEST Procedure

Variable: Oral_Symptoms



*Group-B Parents at Time 1 VS Group-A Parents at Time 1
Item: Functional Limitations*

The TTEST Procedure

Variable: Functional_limitations

group	N	Mean	Std Dev	Std Err	Minimum	Maximum
A	28	14.4643	6.2745	1.1858	7.0000	31.0000
B	25	12.4400	5.3935	1.0787	5.0000	27.0000
Diff (1-2)		2.0243	5.8764	1.6170		

group	Method	Mean	95% CL Mean		Std Dev	95% CL Std Dev	
			Lower	Upper		Lower	Upper
A		14.4643	12.0313	16.8973	6.2745	4.9607	8.5404
B		12.4400	10.2137	14.6663	5.3935	4.2114	7.5032
Diff (1-2)	Pooled	2.0243	-1.2219	5.2705	5.8764	4.9247	7.2875
Diff (1-2)	Satterthwaite	2.0243	-1.1940	5.2426			

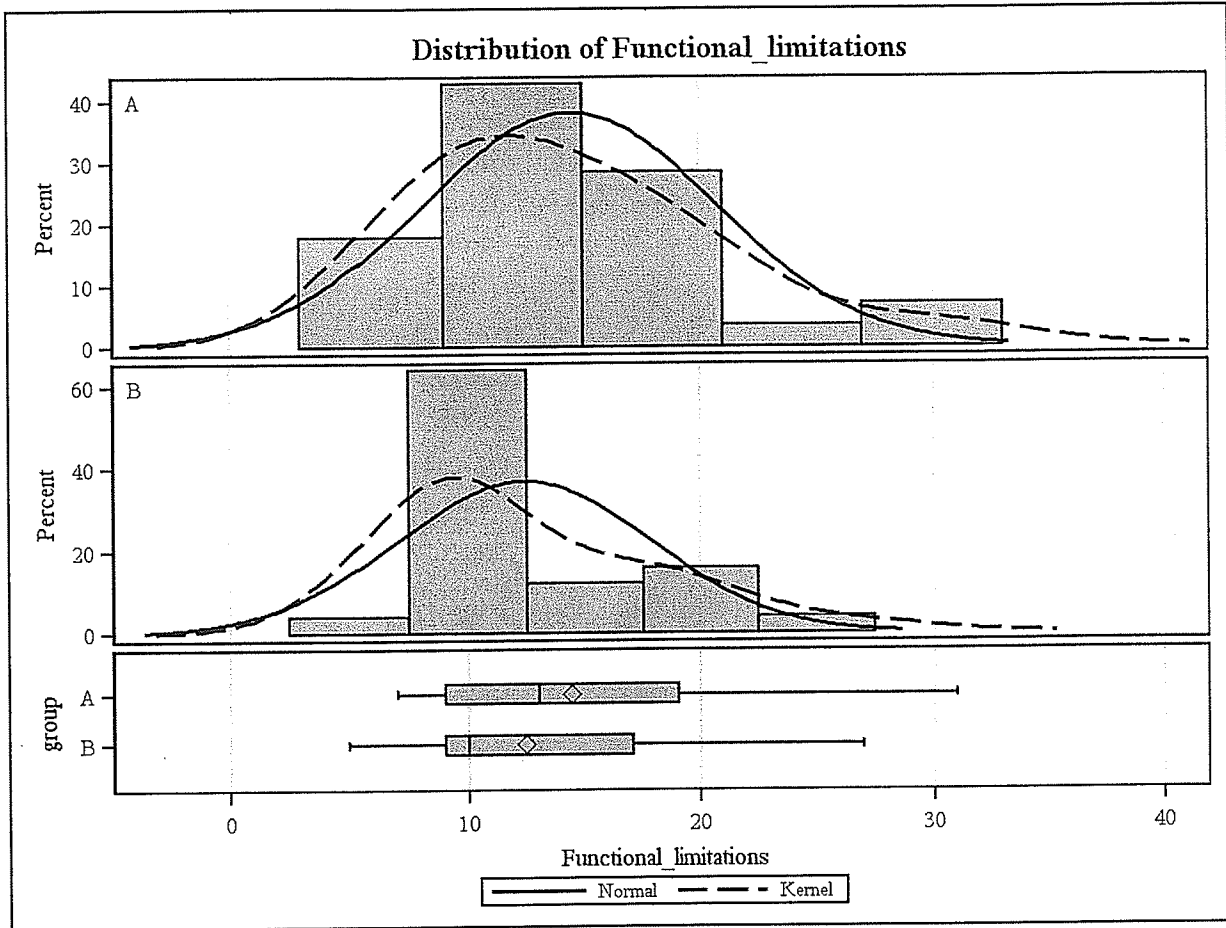
Method	Variances	DF	t Value	Pr > t
Pooled	Equal	51	1.25	0.2163
Satterthwaite	Unequal	50.936	1.26	0.2124

Equality of Variances				
Method	Num DF	Den DF	F Value	Pr > F
Folded F	27	24	1.35	0.4570

Group-B Parents at Time 1 VS Group-A Parents at Time 1
Item: Functional Limitations

The TTEST Procedure

Variable: Functional_limitations



*Group-B Parents at Time 1 VS Group-A Parents at Time 1
Item: Emotional*

The TTEST Procedure

Variable: Emotional

group	N	Mean	Std Dev	Std Err	Minimum	Maximum
A	28	8.6786	4.7691	0.9013	3.0000	20.0000
B	25	6.9600	3.7135	0.7427	2.0000	16.0000
Diff (1-2)		1.7186	4.3047	1.1845		

group	Method	Mean	95% CI Mean		Std Dev	95% CI Std Dev	
			Lower	Upper		Lower	Upper
A		8.6786	6.8293	10.5279	4.7691	3.7706	6.4915
B		6.9600	5.4271	8.4929	3.7135	2.8996	5.1660
Diff (1-2)	Pooled	1.7186	-0.6594	4.0966	4.3047	3.6076	5.3384
Diff (1-2)	Satterthwaite	1.7186	-0.6270	4.0642			

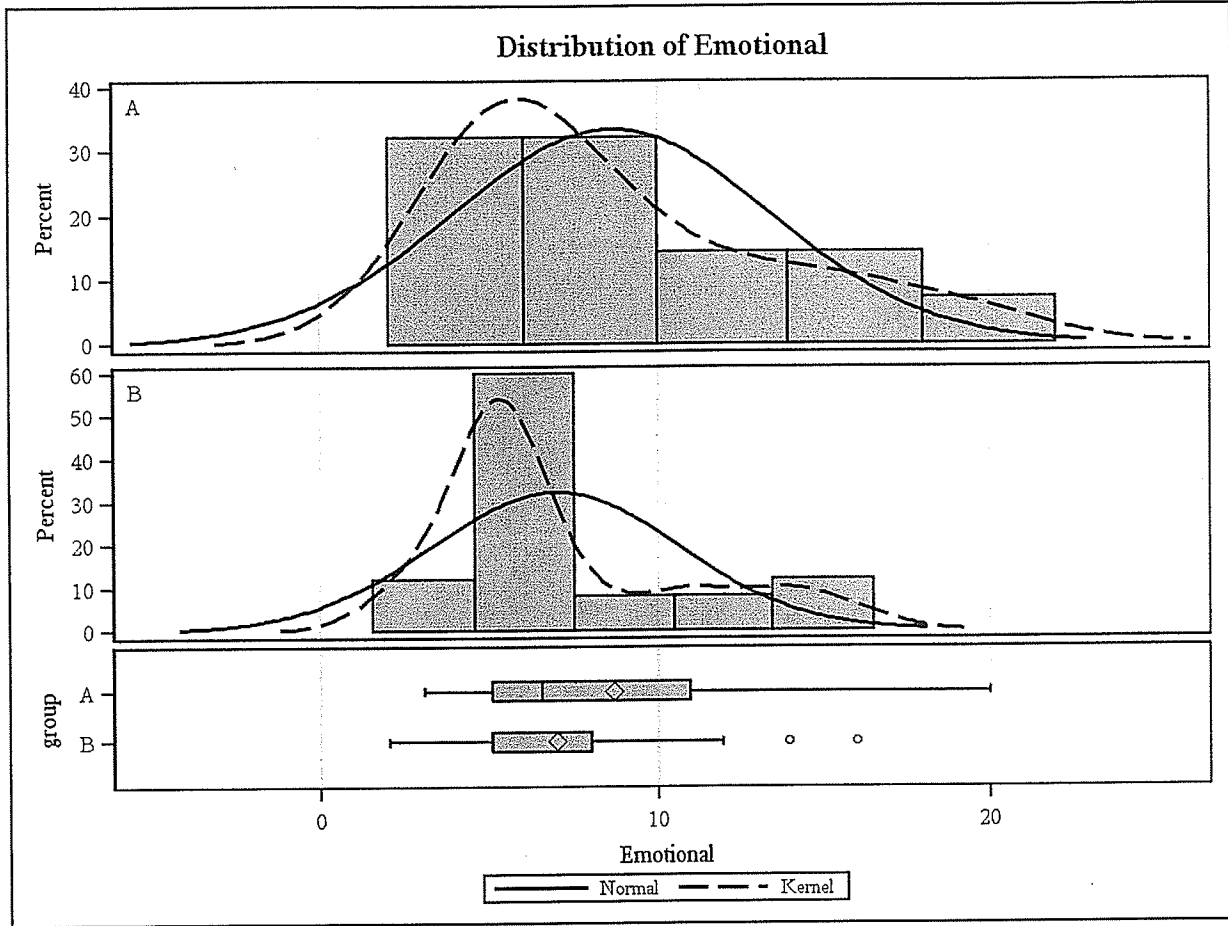
Method	Variances	DF	t Value	Pr > t
Pooled	Equal	51	1.45	0.1529
Satterthwaite	Unequal	50.119	1.47	0.1474

Equality of Variances				
Method	Num DF	Den DF	F Value	Pr > F
Folded F	27	24	1.65	0.2191

Group-B Parents at Time 1 VS Group-A Parents at Time 1
Item: Emotional

The TTEST Procedure

Variable: Emotional



*Group-B Parents at Time 1 VS Group-A Parents at Time 1
Item: Social*

The TTEST Procedure

Variable: Social

group	N	Mean	Std Dev	Std Err	Minimum	Maximum
A	28	8.9286	4.3625	0.8244	1.0000	19.0000
B	25	8.6000	3.9896	0.7979	5.0000	24.0000
Diff (1-2)		0.3286	4.1912	1.1532		

group	Method	Mean	95% CI Mean		Std Dev	95% CI Std Dev	
			Lower	Upper		Lower	Upper
A		8.9286	7.2370	10.6202	4.3625	3.4491	5.9380
B		8.6000	6.9532	10.2468	3.9896	3.1152	5.5501
Diff (1-2)	Pooled	0.3286	-1.9867	2.6438	4.1912	3.5124	5.1976
Diff (1-2)	Satterthwaite	0.3286	-1.9748	2.6320			

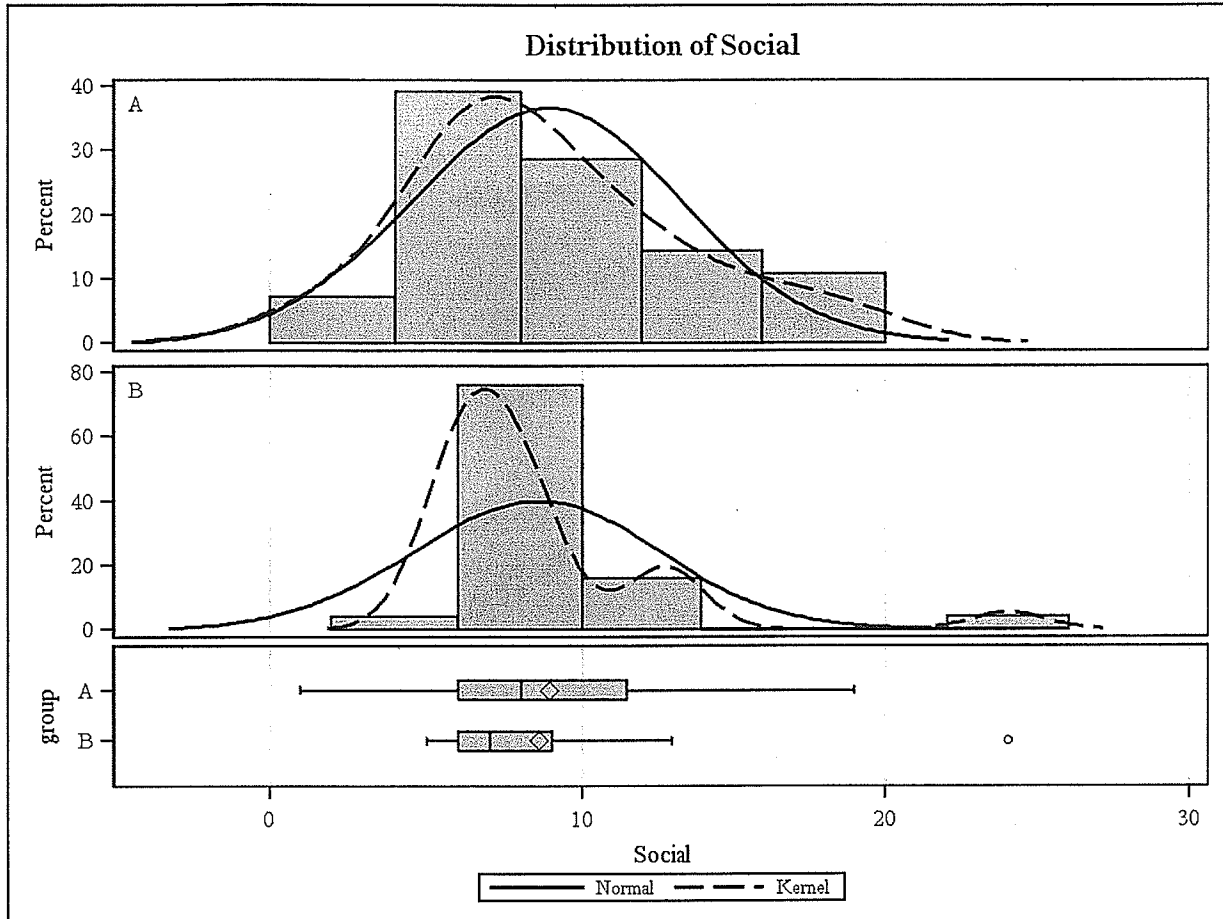
Method	Variances	DF	t Value	Pr > t
Pooled	Equal	51	0.28	0.7769
Satterthwaite	Unequal	50.965	0.29	0.7757

Equality of Variances				
Method	Num DF	Den DF	F Value	Pr > F
Folded F	27	24	1.20	0.6619

Group-B Parents at Time 1 VS Group-A Parents at Time 1
Item: Social

The TTEST Procedure

Variable: Social



*Group-B Parents at Time 1 VS Group-A Parents at Time 1
Item: Family QOL*

The TTEST Procedure

Variable: Family_QOL

group	N	Mean	Std Dev	Std Err	Minimum	Maximum
A	28	11.8929	4.1575	0.7857	7.0000	22.0000
B	25	10.5600	3.1369	0.6274	8.0000	22.0000
Diff (1-2)		1.3329	3.7123	1.0215		

group	Method	Mean	95% CL Mean		Std Dev	95% CL Std Dev	
A		11.8929	10.2808	13.5049	4.1575	3.2870	5.6589
B		10.5600	9.2652	11.8548	3.1369	2.4494	4.3639
Diff (1-2)	Pooled	1.3329	-0.7179	3.3836	3.7123	3.1111	4.6037
Diff (1-2)	Satterthwaite	1.3329	-0.6869	3.3527			

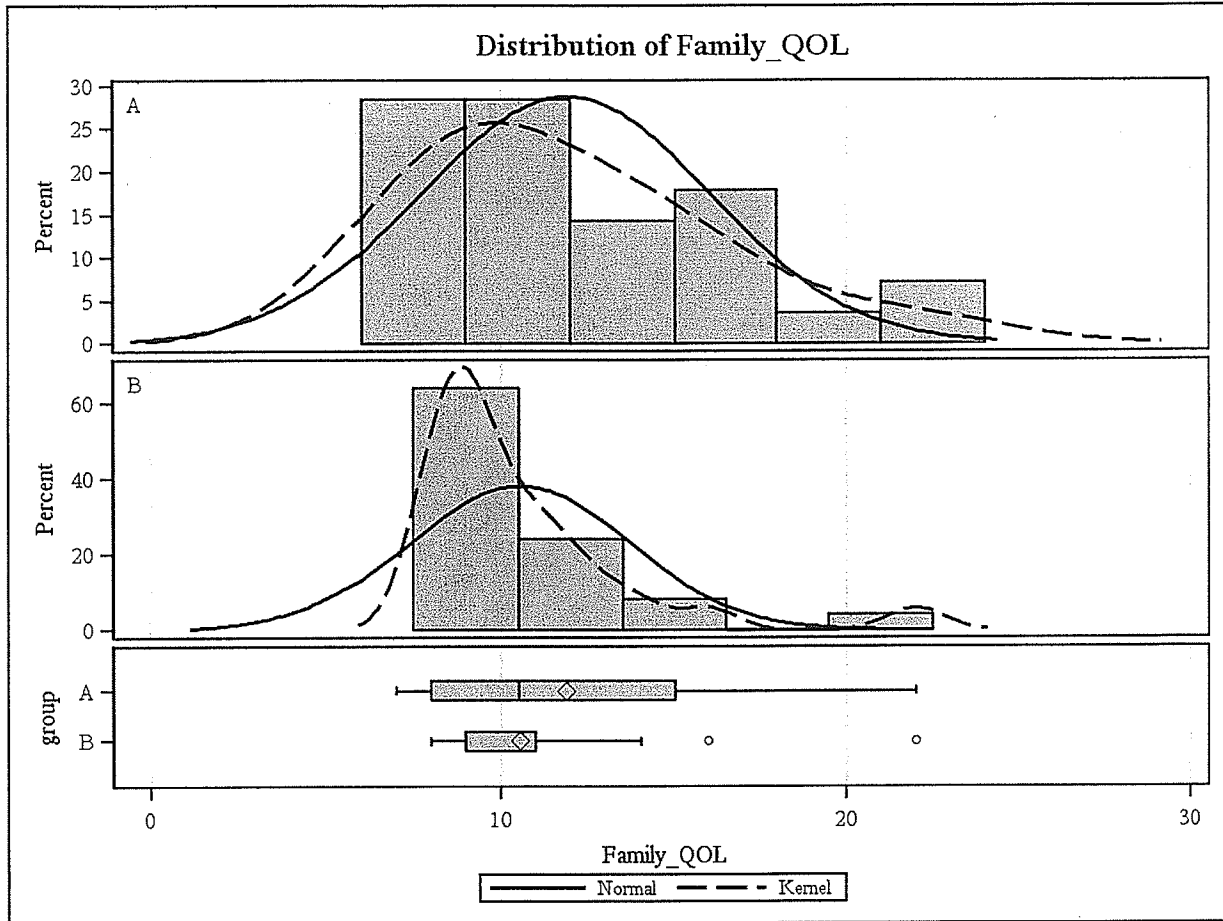
Method	Variances	DF	t Value	Pr > t
Pooled	Equal	51	1.30	0.1978
Satterthwaite	Unequal	49.684	1.33	0.1910

Equality of Variances				
Method	Num DF	Den DF	F Value	Pr > F
Folded F	27	24	1.76	0.1671

Group-B Parents at Time 1 VS Group-A Parents at Time 1
Item: Family QOL

The TTEST Procedure

Variable: Family_QOL



*Group-B Parents at Time 1 VS Group-A Parents at Time 1
Item: Child Behaviour*

The TTEST Procedure

Variable: Child_Behaviour

group	N	Mean	Std Dev	Std Err	Minimum	Maximum
A	28	7.1071	2.1316	0.4028	4.0000	15.0000
B	25	7.1200	2.0680	0.4136	5.0000	13.0000
Diff (1-2)		-0.0129	2.1019	0.5784		

group	Method	Mean	95% CL Mean		Std Dev	95% CL Std Dev	
			Lower	Upper		Lower	Upper
A		7.1071	6.2806	7.9337	2.1316	1.6853	2.9014
B		7.1200	6.2664	7.9736	2.0680	1.6148	2.8769
Diff (1-2)	Pooled	-0.0129	-1.1740	1.1483	2.1019	1.7615	2.6066
Diff (1-2)	Satterthwaite	-0.0129	-1.1722	1.1464			

Method	Variances	DF	t Value	Pr > t
Pooled	Equal	51	-0.02	0.9824
Satterthwaite	Unequal	50.631	-0.02	0.9823

Equality of Variances				
Method	Num DF	Den DF	F Value	Pr > F
Folded F	27	24	1.06	0.8861

Group-B Parents at Time 1 VS Group-A Parents at Time 1
Item: Child Behaviour

The TTEST Procedure

Variable: Child_Behaviour

