

**A COMPARISON ACROSS CULTURES OF THE
IMPACT OF ORAL HEALTH PROBLEMS IN CHILDREN**

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"TESTIMONIAL", cover of the old Life Magazine,
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Abstract

Objective: The aim of this study was to assess variations in the oral health-related quality of life in native born Caucasian children and Far-East Asian immigrant children aged 10-14 in Montreal. **Methodology:** A cross-sectional study design was used. Convenience samples of children were recruited at the Montreal Children's Hospital and a private dental clinic. Oral-health-related quality of life (OHRQoL) was evaluated using a site and age-specific instrument. Associations between ethnic group and OHRQoL were evaluated using multivariate regression models, adjusting for confounding factors. **Results:** Caucasian children reported higher frequency of impacts and higher impact scores than Asian children. In the multivariate analysis, ethnic group remained a significant predictor of oral impacts in the peer interaction, school impact and family impact domains. **Conclusions:** Results suggested that controlling for oral symptoms Caucasian children report higher OHRQoL impacts than Asian children.

Key words: cultural comparisons, oral health, quality of life

Sommaire

Objectif : Le but de cette étude était d'évaluer les variations de la qualité de vie reliée à la santé bucco-dentaire des enfants de type caucasien nés à Montréal et des enfants immigrants d'Extrême-orient âgés de 10 à 14 ans vivant à Montréal. **Méthodologie :** Une étude de type transversal a été faite. Un échantillon de convenance a été construit à partir d'enfants recrutés à l'Hôpital de Montréal pour Enfants ainsi qu'à une clinique dentaire privée. La Qualité de vie liée à la santé bucco-dentaire (QVLSB) a été évaluée en utilisant un instrument spécifique à l'âge et au site. L'association entre le groupe ethnique et la QVLSB a été évaluée en utilisant un modèle de régression multivarié tout en tenant compte d'autres facteurs. **Résultats :** Les enfants de type caucasien ont rapporté une fréquence d'impact et un score d'impact plus élevés que les enfants d'origine asiatique. Dans l'analyse multivariée, le groupe ethnique demeure un prédicteur significatif dans les domaines des impacts bucco-dentaires dans les interactions entre les pairs, l'impact scolaire et l'impact familial. **Conclusions :** Selon les résultats, les enfants de type caucasien sont plus fortement influencés par les impacts de la QVLSB que les enfants d'origine asiatique.

Mots clés : comparaison culturelle, santé bucco-dentaire, qualité de vie

Literature Review & Introduction

Health & Quality of Life (QoL)

Health has been defined by the World Health Organization as a “state of complete physical, mental, and social well-being, not merely the absence of disease or infirmity”^[1]. It includes a range of states from wellness to illness. There is no commonly held global measurement for health. The most frequently used descriptors of a nation’s health are mortality trends, life expectancy, and infant mortality. Population health is described in terms of specific disease incidence rates and prevalence, health care expenditures, activity limitations, etc.

Early health status measurements focused on survival, represented by the predominant use of morbidity and mortality. With the development in medical sciences, incidences of many infectious diseases have decreased, and patterns of diseases have changed. Non-fatal chronic conditions are becoming increasingly significant as the major health problems. Focus of health care has changed to prevention, diagnosis, and treatment of chronic diseases. These changes have lessened the value of mortality and morbidity as the major outcome of health status of a population and a measure for the effectiveness of the health care system^[2]. In addition, focusing on physical outcomes of diseases, such as morbidity or mortality, leaves the major part of the WHO definition of health unmeasured. New measures become more useful when they look into (1) the time and resources needed to achieve some specified level of decreased morbidity^[3]; (2) the extended life years and

the content or nature of those added years for the chronically ill ^[2]; and (3) the maintenance of general satisfaction with life and well-being ^[4].

The need to assess the broader aspects of health has been addressed through the development of quality of life measurements. Quality of life (QoL) is an overall assessment of well-being; or it may be indicated as the gap between a person's expectations and achievements ^[5]. It is a broad and subjective concept, rather than a specific and objective one. It covers all aspects of life, including jobs, housing, neighborhood, education, etc. Among all these, health is an important domain of overall quality of life.

Quality of life is defined, by World Health Organization Quality of Life (WHOQOL) Assessment group ^[6], as “an individual's perception of their position in life in the context of the culture and value systems in which they live and in relation to their goals, expectations, standards and concerns”. This is a broad concept. It incorporates individuals' physical health, psychological state, level of independence, social relationships, relationships to salient features of the environment and their spiritual, religious and personal beliefs ^[6].

Health-Related Quality of Life (HRQoL)

HRQoL is a new branch of QoL study. It is a new way to approach health. Using the concept of HRQoL, an ideal health assessment should include a measure of the person's physical health, a measure of his/her physical, social and psychological functioning, and a measure of quality of life ^[7]. Such an assessment covers major physical, psychological, social and spiritual domains of life, which is consistent with the WHO definition of health.

There are many definitions for HRQoL. Some people even suggest that there are as many as one for every study, since the definition is in part dependent on the situation in which it is used. That is, the specific situations in each study give HRQoL in that study its specific meanings. Although there is no generally agreed definition of HRQoL, there is some agreement among quality of life researchers about some of its characteristics.

First is the recognition that individuals have their own unique understandings of HRQoL^[6, 8], which depends on present lifestyle, past experiences, future expectations, etc. It is a personal comprehension. So it is best assessed using self evaluation.

Second is the multi-dimensional nature^[9]. Basically, HRQoL includes the following dimensions: physical (individuals' perception of their physical state), psychological (individuals' perception of their cognitive and affective state) and social (individuals' perception of the interpersonal relationships and social roles in their life)^[6]. Some HRQoL measures include additional dimensions. For instance, the EuroQoL includes a 'usual activities' dimension^[10], SF-36 includes a 'role functioning' dimension^[11], and the Sickness Impact Profile (SIP) includes a 'work' dimension^[12]. Additional domains are included to represent the specific aspects of HRQoL in that research situation.

Third, HRQoL includes both objective and subjective aspects in each dimension^[8]. The objective assessment is the health obtained by clinical or other non-patient-observed measures. It represents how the individual is and what the individual can do. The subjective assessment is the health perceived by the individual. It is the reflection of objective assessment of health by the individual's experience of quality of life. Because of the differences in perception, individuals with the same objective health status can report very different subjective quality of life: "the patient's perception of, and attributions about the

dysfunction are as important as their existence” [8].

Fourth, HRQoL includes both positive and negative dimensions [6, 13]. Positive dimension includes the helpful aspects of disease experience, such as role functioning, contentment and motivations [13]. Negative dimension includes the unfavorable aspects, like pain, fatigue, and worry. Health is traditionally measured in negative means—the sufferings from illness. But now it is moving towards positive health. Merely stopping or diminishing negative health is not enough, a better positive health is what we want now. HRQoL measures should not only indicate the reduction in ability/function as a result of disease and treatment, but should also help people toward an enhanced quality of life – ‘a life worth living’.

The concept of HRQoL reflects the patients’ view about the impact of disease and treatment; it may not directly relate to disease state or clinical measures of severity. One definition of HRQoL addresses it as ‘the value assigned to current or future health status and duration of life as modified by impairments, functional states, perceptions, and social opportunities, which in turn are influenced by disease, injury, treatment, and policy’ [14]. This definition does not have general consent, but it points out the relationship between quality and quantity of life, the multi-dimensional nature of quality of life and the influence of variation in disease, treatment and policy [15].

Corresponding to the interest in quality of life in the medical field, instruments to assess the concept have been developed. Some instruments are generic, like SIP and SF-36. Many others are specific. They can be specific to a disease (such as asthma or heart failure), to a symptom (such as anxiety or pain), to a certain function (such as motor activity or sleep), or to a certain population (such as the elderly or the adolescent). Generic measures

include all important aspects of HRQoL and can be used with both sick and healthy populations. They are good for comparisons across disease groups or between sick and healthy groups. Specific measures can be much more sensitive, for they focus on aspects of health status that are specific to the area of interest. They include only important aspects of HRQoL that are relevant to the specific interest. They can be used alone or together with general measures. Oral health is an integral part of the overall health, but most general QoL measures don't cover the impacts related to oral problems, so specific measures are required for it.

Oral Health-Related Quality of Life (OHRQoL)

The same as HRQoL, OHRQoL was raised when traditional epidemiologic measures failed to assess all the potential oral health outcomes. The traditional measures do not represent dysfunction, discomfort or disability. Moreover, the commonly used indicators of oral diseases, such as DMFT, periodontal indexes, and oral soft tissue conditions, each reflect an individual aspect of oral health, not provide an overall view of oral health. Also they do not reflect what the individual has experienced and perceived.

The concept of OHRQoL came rather late compared to HRQoL for chronic diseases. The reason for this may lie in the fact the dental health care researchers, practitioners and the general public assume the possible social consequences of dental and oral conditions to be minimal and negligible^[16]. Davis^[17] claimed that the impact of dental and oral disease on daily life was minimal. Reisine and Miller^[18] cited in an article saying that some investigators had claimed that work loss due to dental disorders was small when compared to that caused by major chronic or disabling disorders such as cancer. Most dental diseases

are not life threatening and do not make changes in life as obvious as the more serious diseases do. Some other reasons may exist, such as the nature of physical and oral disorders and approaches to patient management, and the extent to which the behavioral sciences have contributed to dental health care research ^[16].

This view of the impact of oral conditions has been challenged by later research which has shown that oral diseases do have a significant impact on the individual and the community. Reisine ^[19] investigated work loss as a result of dental condition. Cushing *et al* ^[20] described the prevalence of eating restrictions, pain, discomfort, and aesthetic dissatisfaction caused by dental disorders. Locker and Grushka ^[21] reported the impact of oral and facial pain resulting in work loss, sleep disturbance, dietary habits, bed rest, staying home more than usual and reduced social contacts.

So far, research has been done in many areas concerning OHRQoL. Some researchers work on the understanding of the concept of oral health-related quality of life ^[16, 22]. Some worked in comparing oral health status and generic health related quality of life measures ^[23]. Others work on the psychological dimensions of oral health, trying to find out its suitable determinants ^[20, 24]. Still others work to assign numerical values to a state of oral health—‘utility values’ – and to measure oral health outcomes in terms of quality adjusted life years (QALYs) ^[25, 26].

In addition to these, considerable work has been done in research on instruments designed to measure OHRQoL ^[27-31]. This includes the conceptual basis for such instruments and the development and validity testing of these measures or scales. These instruments, which assess the functional, social and psychological outcomes of oral disorders, complement the traditional clinical measures used in research and clinical

practice. The most commonly used OHRQoL measures include The Oral Health Impact Profile (OHIP), The Oral Impacts on Daily Performance (OIDP), and the General Oral Health Assessment Index (GOHAI).

OHRQoL has been described as including ^[28]: self-perceived oral health status and treatment needs; assessments of oral pain or discomfort; the impact of disease on the mechanical functioning of the oral cavity (such as speaking or opening and closing the mouth); ability to perform self care (for example brushing or flossing); psychosocial issues (such as social discomfort in conversation or concerns about appearance); and limitations on activities related to role (such as the ability to perform work or other duties). These were aspects of QoL not included in the general HRQoL measures. The existing OHRQoL measures each reflect some combinations of them.

Quality of Life for Children

The 1989 Convention on the Rights of the Child ^[32] stressed the child's 'right to adequate circumstances for physical, mental, spiritual, moral and social development'. It emphasized that a child has the right to express his or her opinion freely, and to have that opinion taken into account.

Quality of life in children with cancer is compromised during treatment. These children suffer from frequent and lengthy hospitalization, painful treatments, and lack of certainty about the future. It has been shown ^[33] that statistics based on survival alone may not accurately reflect the degree to which quality of life is compromised in the long term, taken into consideration of the incidence of both physical and psychological difficulties

reported by some survivors. A definition of quality of life in children was recently proposed by a group examining quality of life for children with cancer ^[34], 'Quality of life in pediatric oncology is multidimensional. It includes, but is not limited to, the social, physical and emotional functioning of the child, and when indicated, his/her family, and it must be sensitive to the changes that occur throughout development.' Children with other chronic diseases, like asthma and diabetes, may always need medication, may take hospitalization frequently, and may be limited in their activities, which may all result in significant compromise to quality of life. These children may have difficulties in their social or family life that are directly associated with the disease and the treatment.

Children have been criticized as unreliable respondents. Their reports of health may not meet the psychometric standards expected of health outcome measure ^[8]. Also, children are changing. Their perceptions of health and self and their cognitive ability change with age. Moreover, children learn quickly. Illness is a learning experience for them. A child with some kind of chronic disease knows much more about health and illness than a healthy child and may adjust his/her life to get along with the disease. These may be some of the reasons of previous reluctance to measure HRQoL using child's report. However, recently developed generic and disease-specific measures, such as the Child Health Questionnaire and the Childhood Asthma Questionnaires, have demonstrated that, with appropriate techniques, it is possible to obtain valid and reliable reports of HRQoL from children themselves ^[35]. So far, some work has been done in QoL research of children with various chronic diseases, such as asthma ^[36, 37], epilepsy ^[38], arthritis ^[39], Crohn's disease ^[40], spina bifida ^[41].

Children are always one of the most popular populations in oral epidemiology

research. But to date, all the OHRQoL measures developed are for adult populations, especially for the elderly. No measure has yet been developed specifically for children. Clinically, children are subject to numerous oral conditions, including caries, gingivitis, malocclusion, cleft lip and palate and craniofacial anomalies, all of which have the potential to significantly impact on their quality of life. Furthermore, oral and facial defects ranging from malocclusion to cleft lip/palate may impact on family stress, parental acceptance and psychological well being ^[42, 43]. Unsatisfactorily, little has been done on child's OHRQoL.

According to child developmental psychology, by the age of 11 children have clear understanding of complex emotions such as worry, shame, and jealousy ^[44]. Then comes the period of early adolescence which is characterized by the increasing realization of popularity with peers and others' views of self ^[44, 45]. Given the developmental differences, a single self-report health status measure for children of all ages is impossible. But age-specific questionnaire for 10-to-14-year-olds is applicable, for these children are relatively homogeneous in terms of cognitive ability. The measure we are using for this study is designed specifically for children in the age group of 10 to 14.

Cultural Content in Quality of Life

The definition of QoL given by the World Health Organization Quality of Life (WHOQOL) Assessment group ^[6] regards culture as an internal component of QoL, rather than an external influencing factor of QoL, arguing that 'the perceptions and interpretations related to QoL are rooted in that person's culture'.

There are many definitions of culture, but basically, it is 'a system of learned and

shared codes or standards for perceiving, interpreting, and interacting with others and with environment that is transmitted socially from generation to generation' ^[46]. It includes norms that influence ideas, values, feelings, and behaviors.

In the health science field, culture contributes to defining the state of health, achieving health, and treating illnesses. Medical anthropologists evaluate different cultures and their effects on diseases by 'examining the biological and the ecological aspects of disease, the cultural perspectives, and the ways in which cultures approach prevention and treatment' ^[47]. A condition scientifically pathogenic may be seen as normal, and may not be defined as illness in certain population. For example, in rural Latin America, people expect to loose their teeth beginning in early adulthood, and view a toothless old age as normal ^[47].

Although measures of diseases are universal, measures of health and quality of life are culture-related. Culture issues become essential when assessing HRQoL on international basis. In order to do comparisons across different linguistic and socio-cultural environments, the same measure must be used in these diverse culture settings. This measure should be cultural equivalent in formats, contents and implications.

The cultural content of any health status measure may be reflected in at least four ways ^[29]: (1) the particular conception of what constitutes health and ill health on which the measure is based; (2) the different dimensions of the measure intended to represent this conceptualization; (3) the division of each dimension into items which are used to assign an individual to a level of health or ill health; and (4) the relative weight attached to each item which reflects the severity of the state it describes.

Several methods have been employed to develop measures to assess HRQoL cross

cultures.

Most instruments were developed in one culture and language and then translated into other languages (e.g. the Nottingham Health Profile, the Sickness Impact Profile, and the Medical Outcomes Study Short Form-36). This method is referred to as a *sequential* model and involves a forward- and backward- translation. Strict methodological procedures are followed to maintain the cross-cultural equivalence of these instruments.

In the second method, a common set of items is identified that is relevant to several cultures, although the work is done primarily in one language (typically English) before being translated into other languages (e.g. the Euro-Quality of Life [EuroQOL] instrument and the European Organization for Research and Treatment of Cancer Quality of Life Questionnaire [EORTC QLQ-C30]). This mode is referred to as *parallel* development.

The third method is referred to as *simultaneous*, that is, to simultaneously develop the assessment in several different cultures and languages. All the cultures contribute to defining the domains and concepts to assess QoL, and those having high international consensus are identified. Items are then generated according to this in the native language of each culture setting. Many equivalent versions of the measure are thus developed and a set of internationally agreed items is established for the instrument. Some extra items specific to each culture are allowed to be included in its specific version to fully represent the culture influence of concepts^[48]. Data analyses showed that it was possible to develop a measure of quality of life with acceptable validity, reliability and sensitivity properties for use in a diverse range of cultures and languages^[7].

While there are enormous literatures on OHRQoL, articles on cultural diversity and oral health are just beginning to emerge^[49-53]. Some of the existing results show the

presence of culture difference. Tsakos *et al* ^[54] reported an independent cultural influence in the perception of oral impacts between older people of similar clinical oral status in Greece and Britain. Several articles ^[55-58] noted cultural factors (beliefs about oral health, concerns about access, etc) as another barrier to accessing quality dental health in addition to cost of services, lack of dental insurance, and patients' negative image of dentists. Slade *et al* ^[51] assessed variations in the social impact of oral disease reported by representative samples of older adults in six strata from three countries: Australia (metropolitan Adelaide and rural Mt Gambier, South Australia), Canada (metropolitan Toronto-North York and non-metropolitan Simcoe-Sudbury counties, Ontario), and the United States (blacks and whites in the Piedmont region of North Carolina). Results showed that, among dentate people, mean levels of social impact were greatest for North Carolina blacks and lowest for North Carolina whites, while people from South Australia and Ontario had intermediate levels of social impact. Among edentulous people, no statistically significant variations were detected. The findings suggested the existence of social and cultural factors influencing OHRQoL, and that these factors differed most between dentate blacks and whites in North Carolina. There are also articles revealing little culture variations in OHRQoL. Allison *et al* ^[29] compared the Oral Health Impact Profile (OHIP) item weights obtained from an English-speaking Ontario population and a French-speaking Quebec population with the originals obtained in South Australia. Similar ranking patterns were observed in the three cultures, although magnitude of weights could be quite different. It suggested a reasonable degree of cross-cultural consistency for OHIP, but also a similar level of OHRQoL between the three cultures with OHIP.

Summary and Study Rationale

HRQoL study is receiving more and more attention. Now QoL is viewed as a relevant health outcome in epidemiological studies ^[59, 60] (describing the subjectively perceived health and social status of given population), in clinical trials ^[61] (comparing interventions in terms of quality of life), and health economic studies ^[62] (assessing benefits of treatments in terms of quality of life). The same thing happens in dentistry. A lot of work has been done related to OHRQoL, but mainly in the field of measure development and validation. The elderly is the population who has been most extensively studied. Children are somewhat neglected. Cross-culture study is relatively new in OHRQoL, and nothing yet has been said on culture differences of OHRQoL in children.

The world is becoming smaller. As more and more people are migrating around the globe, communities of diverse ethnicities have developed. This trend is more evident in immigrant countries like Canada. The population of minority cultures in Canada is increasing. Different cultures coexist and inter-influence. The diversity of populations gives a challenge to oral health services research; in particular to the assessment of OHRQoL, as such assessments are becoming 'an integral part of outcome studies of dental interventions and in drafting policies that shape health care programs and health care delivery models' ^[63].

Montreal is a culturally and ethnically diverse community. It is a bilingual city with native born Caucasian children, both English-speaking and French-speaking. Also it is a city with high rates of immigration, in common with other major metropolitan centers in

Canada. In Montreal there are a lot of children with Far-East Asian background (including China, Vietnam, Philippine, Japan, etc, excluding the Indian sub-continent). Their health beliefs, health behavior, knowledge, attitudes, and health service utility are influenced by both their ethnic background and the native culture in Montreal. They may differ in OHRQoL from their Caucasian peers. Since all these children are living in the same city and are under the same oral health service system, there is a need for cross-cultural studies to investigate whether there are differences in oral impacts and QoL between them, in order to understand them better and to enhance the oral health support for them. To improve pediatric oral health care for the culturally diverse patients, oral health policies and standards of care should be made to recognize the impact of cultural differences on diseases and treatments.

Objective

Overall Aim

The overall aim of this preliminary study is to compare cross-culturally the impacts of oral health problems on children and their families between Caucasian children and Far-East Asian immigrant children in the age group of 10 to 14 years in Montreal.

Specific Objectives

Within the overall aim, some specific objectives are identified:

- To assess if the physical, emotional, peer interaction, school and family impacts related to oral health problems (oral health related impacts) differ between the two ethnic groups
- To assess if the two ethnic groups have different general self-perceived oral health
- To evaluate the associations between the oral health related impacts and some potential independent factors, such as socio-demographic factors, oral symptoms, and dental service utility
- To evaluate the association between single-item self-perceived oral health and oral health related impacts obtained from specific impact items in the questionnaire
- To evaluate the association between oral health related impacts and ethnic group,

controlling for confounding variables

Hypothesis

It is hypothesized that given the same symptoms, native born Caucasian children report more impact (physical impact, emotional impact, peer interaction impact, school impact, and family impact) from oral health problems than the Far-East Asian immigrant children.

Methodology

Study design

A cross-sectional study design was used.

Subjects

Participants in this study were native born Caucasian children and Far-East Asian immigrant children aged 10 to 14 years, now living in Montreal, with some pediatric diseases (primarily caries) or orthodontic disorders. They were recruited from the dental clinic of Montreal Children's Hospital and a private dental clinic. This was a convenience sample.

Parental/Guardian and child's written consents were obtained. A child's dissent superseded the parental consent. Ethical approval for the project was granted by McGill University and Montreal Children's Hospital IRBS.

Measures

The measure we used in this study is the preliminary version of the Child Oral and Oro-Facial Questionnaire (COOFQ). This questionnaire was developed internationally as part of the INTERQOL Group. This is a self-administered questionnaire, designed exclusively for children between the age of 10 and 14 years. The questionnaire was developed using the parallel method. Several culturally diverse centers were involved in

constructing instrument's domains, drafting and selecting items, generating response scales and pilot testing. It has several English versions developed in United States, United Kingdom, New Zealand, Canada and South Africa, two French versions developed in France and Montreal, Canada, a Dutch version developed in Holland, a Portuguese version developed in Brazil, a Chinese version developed in Hong Kong, China, and an Afrikaans version developed in South Africa. Original item pool was first generated in English and then translated to other languages. Item evaluation was performed regarding the relevance of the item and clarity of the item. After the first phase of item evaluation, only items regarded to be relevant by great proportion of children and their parents were kept, and these items were modified by the clarity evaluation for better understanding of the target respondents. This is the questionnaire used in this study.

The questionnaire has two parts, one for the child, and one for the parent/guardian. In this study an English version (Canada), a French version (Montreal, Canada), and a Chinese version (Hong Kong, China) were used.

The multi-dimensional nature of quality of life is reflected in the COOFQ structure. The COOFQ is organized into 6 broad domains of quality of life. They are oral symptoms (15 items), physical function (6 items), emotional well-being (8 items), peer interaction (10 items), schooling impact (5 items), and family impact (14 items). The child version contains 44 items representing the first 5 domains. The parent/guardian version contains 14 more items representing the sixth domain (family impact), in addition to the child version. (See Appendix for the child version of the questionnaire and the family impact domain from the parent/guardian version)

The oral symptoms items are put at the beginning of the questionnaire to familiarize

the respondents with the format and response scales. The other impact items are not arranged in domain order. They are mixed to avoid consistent responses for a domain.

The format of COOFQ is standardized with respect to instructions, headings and responses. All the items ask about the three months prior to administration of the questionnaire. The responses contain two parts: 'how often is the problem' on a four-point Likert scale ('all the time', 'often', 'sometimes', 'never'), and 'how much it bothers' on another four-point Likert scale ('very much', 'quite a bit', 'a little', 'not at all').

Besides the questionnaire, we also collected information about some potential confounding factors for OHRQoL: gender, age, number of years of formal education completed, ethnic background, birth place and length of time living in Montreal for both the child and the parent/guardian; clinical group of the child (pediatric or orthodontic), frequency of dental consultation (once a year or more often, once every two years, less often, or only with symptoms)), and the most proficient language of the child.

A single item was used to measure general self-perceived oral health of the child (Very healthy, I have no problems; It's Okay, but I have some problems; I have pain and discomfort; or I feel that I need treatment badly) ^[64].

Data Collection & Data Entry

Children aged between 10 and 14 years were possible respondents. These children and their parents/guardians were approached in the waiting rooms of the private dental clinic and the dental clinic of Montreal Children's Hospital. Children were eligible if they had any pediatric or orthodontic problems.

Before completing the questionnaires, children and the parents/guardians were explained the purpose of the research and what they would be required to do. Written consents were then obtained from both the children and the parents/guardians.

After obtaining the consents, social-demographic questions were asked and recorded by the interviewer. The single-item self-evaluation of oral health was made by the child at this point. Heading instructions were read and scales were explained to both the child and the parent before they start to complete the questionnaires themselves.

To minimize socially desirable responses and to avoid children to 'pretend to be nice in front of the parent', they were told to answer the questionnaires separately, and there was no discussion. Children were reassured that there were no right or wrong answers, and that the purpose of the questions was to 'find out how they feel'.

An ID number was given to each subject (the child and the parent/guardian), and all the data were entered in Microsoft Excel.

Statistical Analysis

Descriptive analysis was done for all the independent variables, showing their distributions in the two ethnic groups. This was done with statistical functions in Microsoft Excel.

Data were then exported to SAS for hypothesis testing and multiple linear regression analysis.

For analysis of individual impact item, two summary measures were used. One was to dichotomize the frequency responses, with responses of 'sometimes', 'often' and 'all the

time' in one category, and 'never' in the other category. Proportions of each ethnic group in these two categories were compared using Chi-square test. This was the prevalence of the impacts. The second measure made use of both the frequency response and the impact response and involved computation of a single summary impact score for each item. A score was given to each scale of the responses. In the frequency scale, "all the time" scored 3, "often" scored 2, "sometimes" scored 1, and "never" scored 0. In the impact scale, "very much" scored 4, "quite a bit" scored 3, "a little" scored 2, and "not at all" scored 1. A single summary impact score was obtained by multiplying the frequency score and the impact score. The higher the score, the more impacted is the child. T-test was used here to evaluate the difference across the two ethnic groups.

For the domain level impact, three ways were used to present the analysis. The first was the 'summary impact score' method. The domain summary impact score was the mean of all the item summary impact scores in that domain. The second was the distribution of children report 'sometimes', 'often', or 'all the time' at each level of percentage of total item numbers in the domain (e.g. number of children report 'sometimes', 'often', or 'all the time' for 100% of the items, 50% of the items and 0% of the items in the domain.). The third was the mean number of items been reported 'sometimes', 'often', or 'all the time' in a domain. Evaluation of differences by ethnic groups was performed by T-test for means and Chi-square test for distribution.

Bivariate associations between summary impact scores of the domains and the independent variables were done by Pearson correlation for continuous variables, T-test for binary variables and Spearman correlation for ordinal variables. Interactions between these

variables were added as independent variables in multivariate regression analysis if any association was found here.

An analysis of variance model was developed using multiple linear regression in which the individual domain impact score was the dependent variable, and the candidate explanatory variables were oral symptoms items (items of oral symptom domain that show significant difference between the two ethnic groups), gender, age, ethnicity (Asian or Caucasian), clinical group (pediatric or orthodontic), number of years for the child living in Montreal, frequency of dental consultation, self-perceived oral health ('very health, no problem'; 'Okay, but some problem'; 'with pain and discomfort'; 'needing treatment badly'), and all the possible interactions found in the previous analysis.

For multivariate analysis, the final model was determined using stepwise approach to select predictive independent variables from all candidates. The selection started with the null model and selected the variable that was the most significant predictor using a simple regression approach, and then it proceeded to select further variables in a forward fashion. However, at each step, after adding a new variable to the model, the new model was revised and one candidate for removal (using backward approach) was sought. This comes from the motivation that a variable that appeared 'useful' at an early stage of forward selection may become completely redundant after several other variables are added. Two different α -levels (SLENTY=0.15, SLSTAY=0.25) were set for entering and removal variables respectively. The variable ETHNICITY was retained at each stage regardless of statistical significance, for it was the focus of interest of this study.

Results

Characteristics of Subjects

188 subjects were recruited in this study. Results comparing the social-demographic characteristics between ethnic groups are summarized in Table 1. No significant difference was detected between the two groups in the distribution of age, gender, clinical group, and questionnaire language. Two groups were compatible in demographic characteristics.

Table 1. Demographic characteristics of study sample by ethnic group

Variables	Caucasian (N=103)	Asian (N=85)
Average Age (yrs)	11.6	11.7
Gender		
Male	60 (58%)	39 (46%)
Female	43 (41%)	46 (54%)
Clinical Group		
Pediatric	60 (58.3%)	51 (60%)
Orthodontic	43 (41.7%)	34 (40%)
Questionnaire Language		
English	63 (61.2%)	44 (51.7%)
French	40 (38.8%)	31 (36.5%)
Chinese	N/A	10 (11.8%)

For all the other independent variables, data were collected for 149 subjects in all (80 for Caucasian group and 69 for Asian group). Their comparisons across ethnic group are listed in Table 2.

The distributions in frequency of dental consultation of the two ethnic groups were in

the same pattern, with the vast majority in both groups going to see the dentist ‘once a year or more often’. Very few children reported the other three scales (‘once every two years’, ‘less often’, and ‘only with symptoms’). These three were combined as one (‘less than once a year’).

Table 2. Distributions of the other independent variables of study sample by ethnic group

Variable	Caucasian (N=80)	Asian (N=69)
Frequency of Dental Consultation		
Once a year or more often	78 (97.5%)	65 (94.2%)
Less than once a year	2 (2.5%)	4 (5.8%)
#Years Living in Montreal		
Born in Montreal	80 (100%)	46 (66.7%)
>5 years	0	6 (8.7%)
1 – 5 years	0	15 (22.7%)
<1 year	0	2 (2.9%)
Self-Perceived Oral Health		
Very healthy, I have no problems	52 (65%)	20 (29%)*
It’s Okay, but I have some problems	26 (32.5%)	49 (71%)
I have pain and discomfort	2 (2.5%)	0
I feel that I need treatment badly	0	0

*** p<0.001

The ‘self-perceived oral health’ variable showed significant difference in its distribution. Specifically, the Asian children were more likely to report a worse perception of oral health than the Caucasian group. Asian group has a much higher proportion in the choice, ‘It’s Okay, but I have some problems’ and a much lower proportion in the choice, ‘Very healthy, I have no problems’ than Caucasian group (p<0.001). The interaction of ethnicity and self-perceived oral health was added into the later regression model as a

potential explanatory variable.

Item Level of Impact

For each domain, there are two graphs showing the prevalence (percent of children report 'sometimes', 'often', or 'all the time' for the frequency scale) and the summary score of each item respectively.

Oral Symptom Domain

Items in Oral Symptoms Domain

1. Had pain in your teeth
 2. Had any other pain in your mouth or jaws
 3. Had clicking or popping in your teeth jaw joint
 4. Been breathing through your mouth or snoring
 5. Had numbness (lack of feeling) in your lips or mouth
 6. Had sores or sore spots (ulcer, abscess) in the mouth
 7. Had difficulty opening or closing your mouth
 8. Had bad breath
 9. Had bleeding gums
 10. Had food sticking in or between your teeth
 11. Had food sticking in roof/top of your mouth
 12. Had pain or sensitivity in the teeth with hot or cold things
 13. Been clenching or grinding your teeth
 14. Had dry mouth or lips
 15. Had trouble biting off or chewing food such as apple, carrot or firm meat
-

Caucasian children had higher prevalence in 12 out of the 15 items and higher impact score in 13 out of the 15 items, comparing with Asian children.

Item 14 was the only item showing significant higher prevalence for Asian children.

Item 1, 10, and 12, which were significantly different between the two groups in impact score, were entered as independent variables later in the multivariate analysis across ethnic group to control for oral symptoms.

Fig 1. Prevalence for each item in oral symptom domain (%)

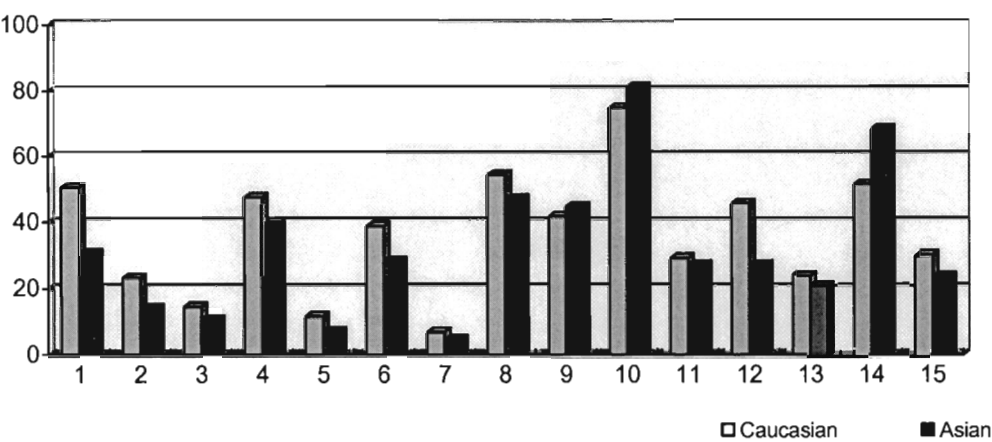


Fig 2. Impact score for each item in oral symptom domain

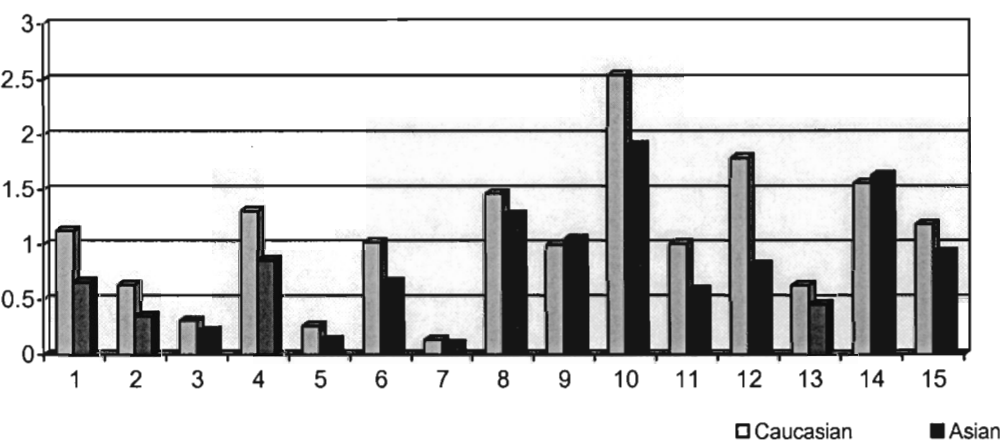


Table 3. Items with significant difference in oral symptom domain

Item	Prevalence		Impact Score	
	Caucasian (%)	Asian (%)	Caucasian	Asian
1. Had pain in your teeth	50.5	30.6**	1.1	0.6*
10. Had food sticking in or between your teeth	----	----	2.5	1.9*
12. Had pain or sensitivity in the teeth with hot or cold things	45.6	27.1**	1.8	0.8**
14. Had dry mouth or lips	51.5	68.2*	----	----

*p<0.05 ; ** p<0.01

Physical Function Domain

Items in Physical Function Domain

- 19. Had difficulty eating foods your like to eat
- 24. Had trouble sleeping
- 28. Had difficulty saying certain words
- 31. Had difficulty being understood
- 34. Had difficulty keeping your teeth clean
- 43. Taken longer to finish a meal

The Caucasian group reported a higher prevalence and a higher impact score than the Asian group for all the items in this domain. However, the difference was statistically significant in prevalence for item 34 only.

Fig 3 : Prevalence for each item in physical function domain

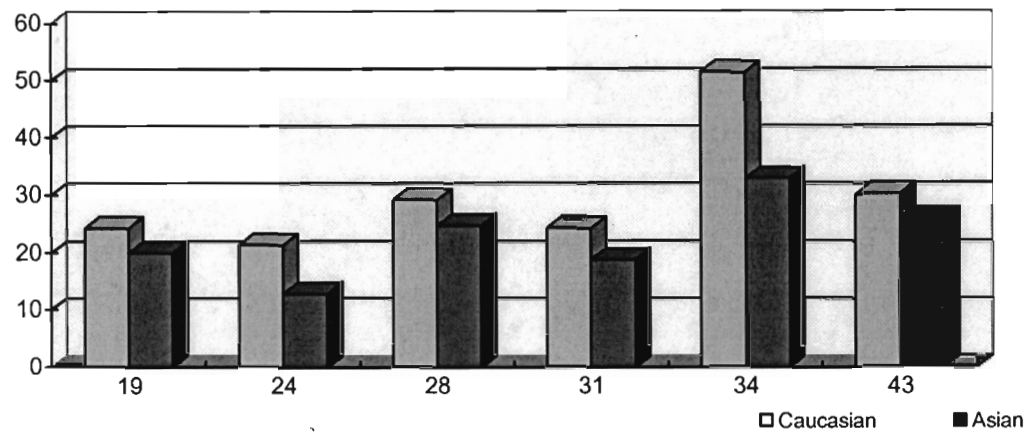


Fig 4 : Impact score for each item in physical function domain

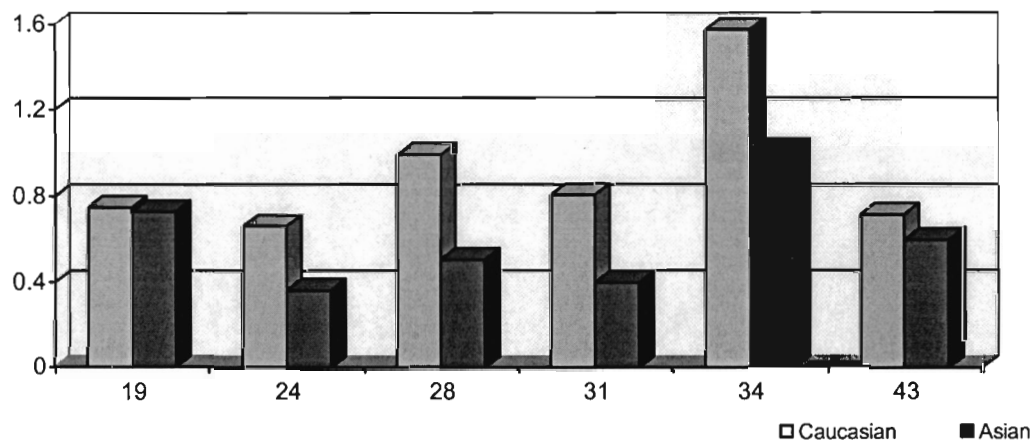


Table 4. Items with significant difference in physical function domain

Item	Prevalence		Impact Score	
	Caucasian (%)	Asian (%)	Caucasian	Asian
34. Had difficulty keeping your teeth clean	51.5	32.9*	----	----

*p<0.05

Emotional Well-being Domain

Items in Emotional Well-being Domain

- 16. Been unhappy or sad
- 20. Felt worried or anxious
- 21. felt shy or withdrawn
- 25. Got angry
- 29. Felt that you look different
- 32. Felt that you are not good looking
- 33. Felt that you have fewer friends
- 35. Been worried about what other people think about your teeth or mouth

Caucasian children had higher prevalence and higher impact score than Asian children in seven of the eight items in this domain, but with significant difference in only item 16 and 25 for prevalence and item 33 for impact score.

Item 21 was the only item showing higher prevalence and higher impact score for Asian than for Caucasian children, but with no significant difference.

Fig 5. Prevalence for each item in emotional well-being domain

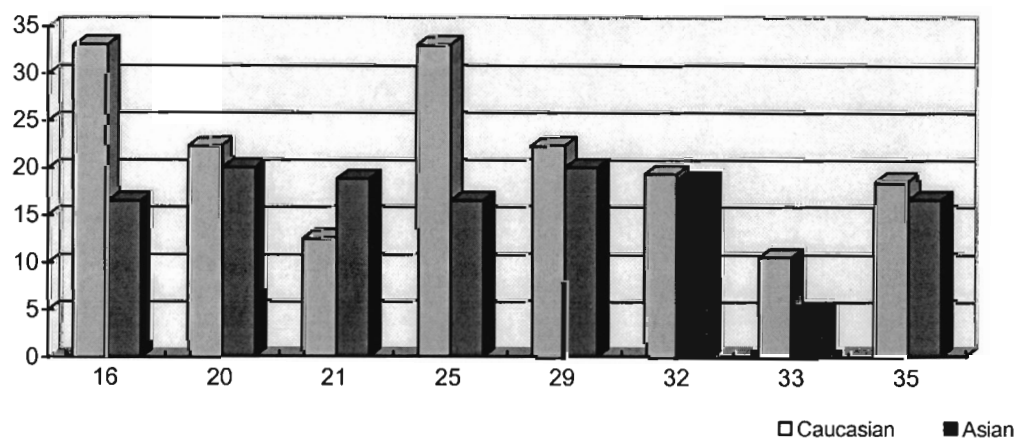


Fig 6. Impact score for each item in emotional well-being domain

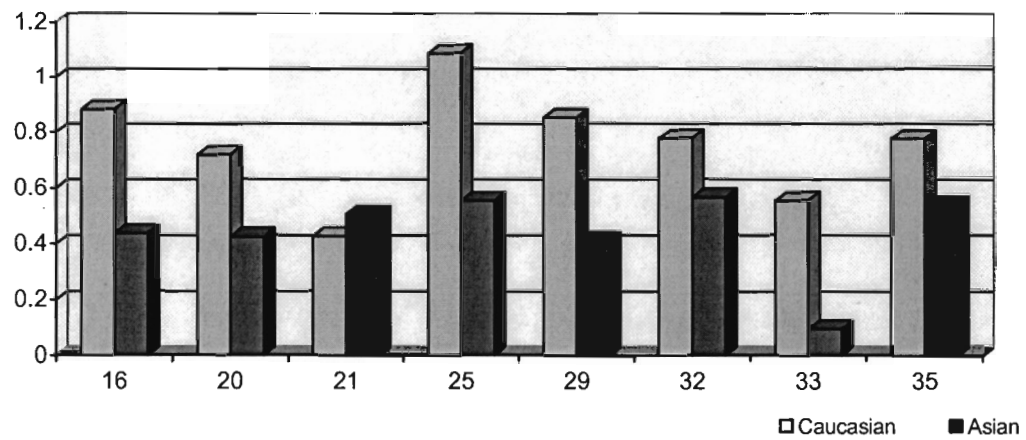


Table 5. Items with significant difference in emotional well-being domain

Item	Prevalence		Impact Score	
	Caucasian (%)	Asian (%)	Caucasian	Asian
16. Been unhappy or sad	33.1	16.5**	----	----
25. Got angry	33.1	16.5**	----	----
33. Felt that you have fewer friends	----	----	0.6	0.1*

*p<0.05 ; ** p<0.01

Peer Interaction Domain

Items in Peer Interaction Domain

- 18. Avoided eating with other children (at school or parties)
- 23. Avoided smiling or laughing with other children
- 27. Been teased, bullied or called names by other children
- 30. Been treated differently or left out by other children
- 36. Avoided going out with friends
- 38. Avoided meeting new people
- 40. Been asked questions by others about your teeth, mouth or face
- 41. Avoided taking part in activities like sports, clubs, drama, school trips, playing a musical instrument
- 42. Avoided talking with other children
- 44. Fought or argued with other children

More items showed significant difference in this domain than the previous domains. Three items (item 27, 30, and 40) had significant prevalence difference. The same three plus two others (item 23 and 36) had significant impact score difference. Caucasian group was the one having higher prevalence and higher impact score for all these significantly different items.

Fig 7: Prevalence for each item in peer interaction domain

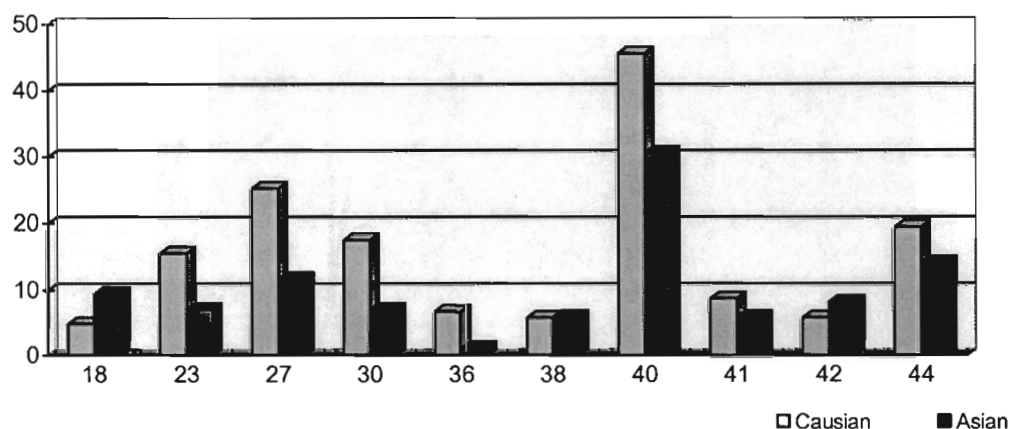


Fig 8: Impact score for each item in peer interaction domain

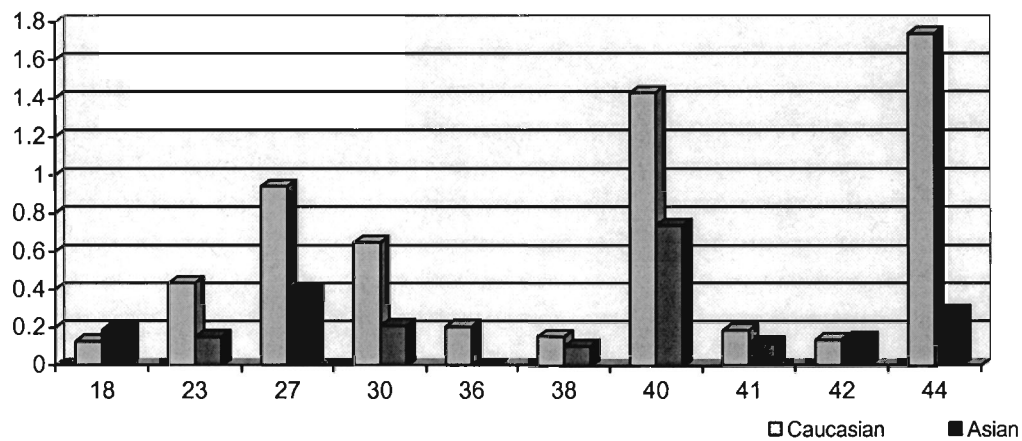


Table 6. Items with significant difference in peer interaction domain

Item	Prevalence		Impact Score	
	Caucasian (%)	Asian (%)	Caucasian	Asian
23. Avoided smiling or laughing with other children	----	----	0.5	0.1*
27. Been teased, bullied or called names by other children	25.2	11.7*	0.9	0.4*
30. Been treated differently or left out by other children	17.5	7.1*	0.7	0.2*
36. Avoided going out with friends	----	----	0.2	0*
40. Been asked questions by others about your teeth, mouth or face	45.6	30.6*	1.4	0.7*

*p<0.05

School Impact Domain

Items in School Impact Domain

- 17. Missed school for any reason
- 22. Had difficulty paying attention in school
- 26. Not wanted to speak/read out loud in class
- 37. Not wanted to go to school
- 39. Been treated differently by teachers

For item 26 and 39, the two groups had almost the same prevalence, but Caucasian children showed higher impact scores, which means ‘more impacted’, than Asian children (no statistic significance detected).

Fig 9. Prevalence for each item in school impact domain

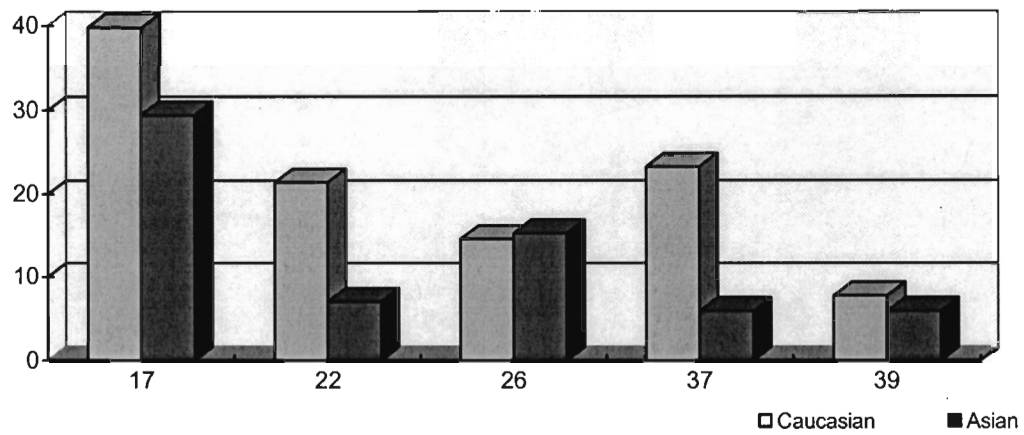


Fig 10. Impact score for each item in school impact domain

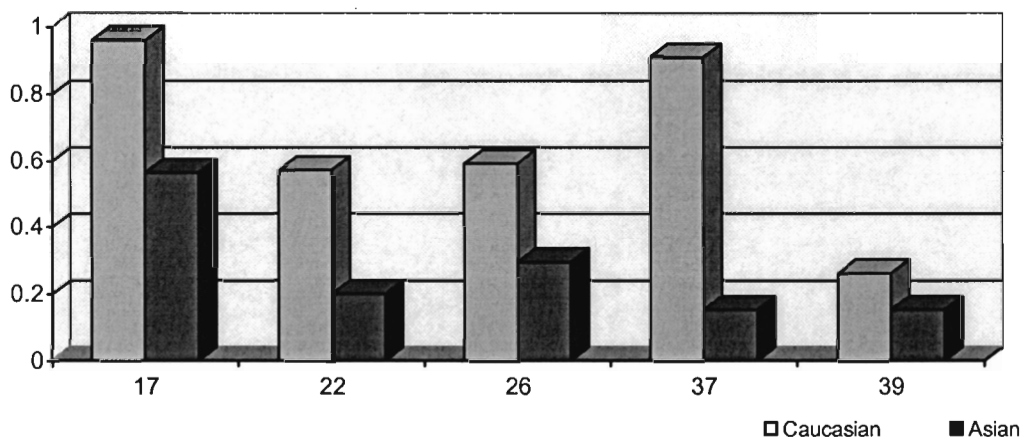


Table 7. Items with significant difference in school impact domain

Item	Prevalence		Impact Score	
	Caucasian (%)	Asian (%)	Caucasian	Asian
17. Missed school for any reason	----	----	1.0	0.6*
22. Had difficulty paying attention in school	21.4	7.1**	0.6	0.2*
37. Not wanted to go to school	23.3	5.9***	0.9	0.2**

*p<0.05 ; ** p<0.01 ; *** p<0.001

Family Impact Domain

Items in Family Impact Domain (answered by caregivers)

- F1. Has your child avoided gatherings or going out with the family on holidays and outings
- F2. Have you been upset
- F3. Have you taken time off work
- F4. Has your sleep been disrupted
- F5. Has your child required extra care and attention from you
- F6. Has your child been difficult with you
- F7. Have family activities such as eating, playing games and shopping been disrupted
- F8. Has your child blamed you for problems with his/her teeth, mouth or face
- F9. Have you felt uncomfortable in public places
- F10. Have you or any other family members felt guilty
- F11. Has your child been jealous about other family members
- F12. Has there been family conflict
- F13. Has the family had financial difficulties
- F14. Have you worried about your child's future

The two groups had the same level of prevalence and impact score for item F2 and F9. Asian children had higher prevalence and impact score than Caucasian children in item F1. Caucasian children had higher prevalence and impact score for the remaining items.

Fig 11: Prevalence for each item in family impact domain

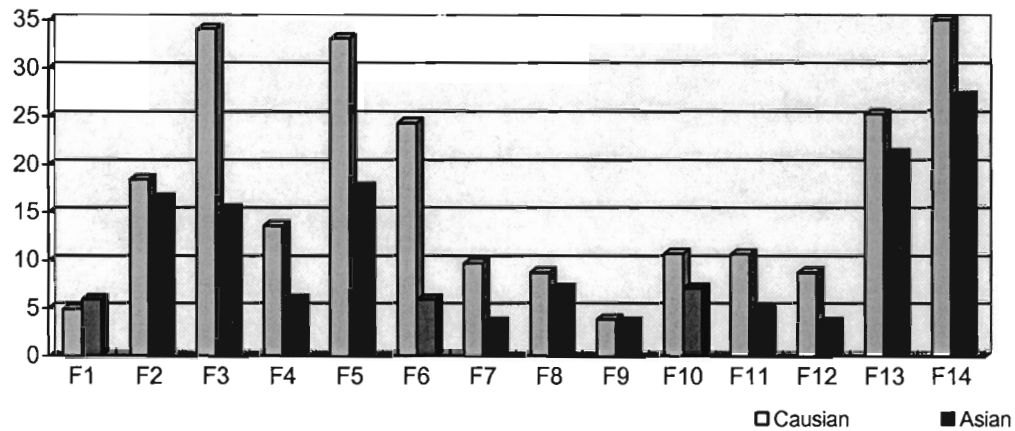


Fig 12 : Impact score for each item in family impact domain

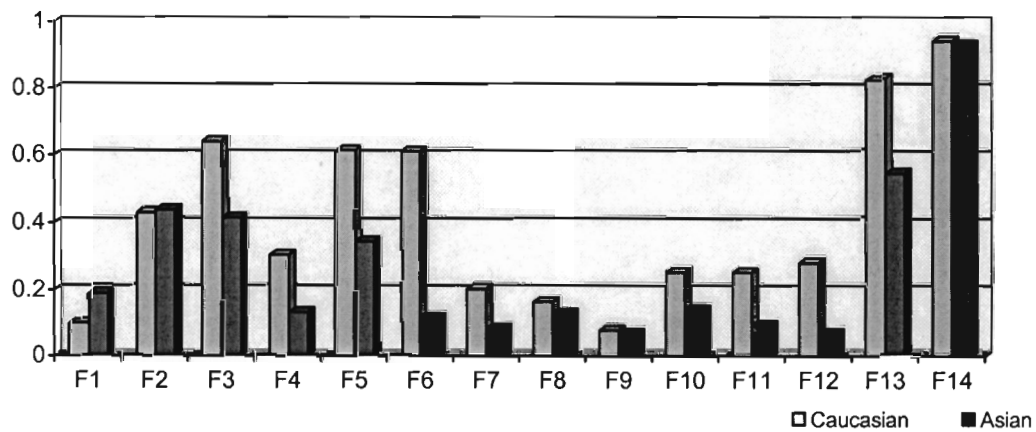


Table 8. Items with significant difference in family impact domain

Item	Prevalence		Impact Score	
	Caucasian (%)	Asian (%)	Caucasian	Asian
F3. Have you taken time off work	34.0	15.3**	----	----
F5. Has your child required extra care and attention from you	33.0	17.7*	0.6	0.3*
F6. Has your child been difficult with you	24.3	5.9***	0.6	0.1**

*p<0.05 ; ** p<0.01 ; *** p<0.001

For all the 43 impact items in the questionnaire, 11 items showed significant prevalence difference across the two ethnic groups, ranging from 1 to 3 in each domain (Table 4 – Table 8). Caucasian group had the higher prevalence for all these 11 items.

In addition, 11 items had significant impact score difference, with none in physical function domain, one in emotional well-being domain, five in peer interaction domain, three in school impact domain, and two in family impact domain. Caucasian group was again the one with higher impact score in the two ethnic groups.

Domain Level of Impact

Table 9 lists the number of children reporting ‘sometimes’, ‘often’, or ‘all the time’ for the frequency scale at different levels of number of items for each domain.

The two groups were compatible for the domain of oral symptom, physical function and emotional well-being. Peer interaction, school impact, and family impact domains had significantly different distributions of children according to the number of items they reported.

Table 9. Number of children reporting 'sometimes', 'often', or 'all the time' for the frequency scale at different levels of number of items for each domain

Number of items	Caucasian (N=103)		Asian (N=85)		P-value
	N	%	N	%	
Oral Symptom (total 15)					
>10	6	5.8	1	1.2	
6 – 10	41	39.8	48	56.4	
1 –5	52	50.5	34	40.0	
0	4	3.9	2	2.4	
Physical Function (total 6)					
>3	19	18.5	9	10.6	
1 – 3	57	55.3	44	51.7	
0	27	26.2	32	37.6	
Emotional Well-being (total 8)					
>4	11	10.7	6	7.1	
1 – 4	52	50.5	42	49.4	
0	40	38.8	37	43.5	
Peer Interaction (total 10)					**
>5	2	1.9	2	2.4	
1 – 5	68	66.1	35	41.2	
0	33	32.0	48	56.4	
School Impact (total 5)					*
> 3	15	14.5	6	7.1	
1 – 2	45	43.7	28	32.9	
0	43	41.7	51	60.0	
Family Impact (total 14)					***
>7	4	3.9	4	4.7	
1 – 7	72	69.9	34	40.0	
0	27	26.2	47	55.3	

*p<0.05 ; **p<0.01; *** p<0.001

Table 10 gives the average number of items been reported 'sometimes', 'often', 'all the time' for each domain.

Physical function domain showed different ($p<0.05$) average items, although it did not have different distribution (see Table 9). The three domains, peer interaction, school impact, and family impact, which had different distribution, also had difference in average items.

Table 10. Average number of items been reported 'sometimes', 'often', 'all the time' for each domain (Mean \pm SD)

Domain	Caucasian (N=103)	Asian (N=85)	P-value
Oral Symptom	5.4 \pm 2.8	4.7 \pm 2.4	
Physical Function	1.8 \pm 1.6	1.3 \pm 1.4	*
Emotional Well-being	1.7 \pm 1.9	1.3 \pm 1.6	
Peer Interaction	1.5 \pm 1.6	1.0 \pm 1.5	*
School Impact	1.1 \pm 1.1	0.6 \pm 0.9	**
Family Impact	2.4 \pm 2.3	1.4 \pm 2.1	**

* $p<0.05$; ** $p<0.01$

Table 11 shows the impact scores of each domain. All domains showed significant difference except the domain of family impact.

Table 11. Mean impact score for each domain

Domain	Caucasian		Asian	
	Mean	95%CI	Mean	95%CI
Physical Function	0.9	0.69 -- 1.14	0.602*	0.41 -- 0.79
Emotional Well-being	0.8	0.51 -- 1.01	0.441*	0.27 -- 0.61
Peer Interaction	0.6	0.35 -- 0.85	0.233**	0.14 -- 0.33
School Impact	0.7	0.46 -- 0.86	0.273***	0.17 -- 0.38
Family Impact	0.4	0.31 -- 0.41	0.263	0.14 -- 0.38

* $p<0.05$; ** $p<0.01$; *** $p<0.001$

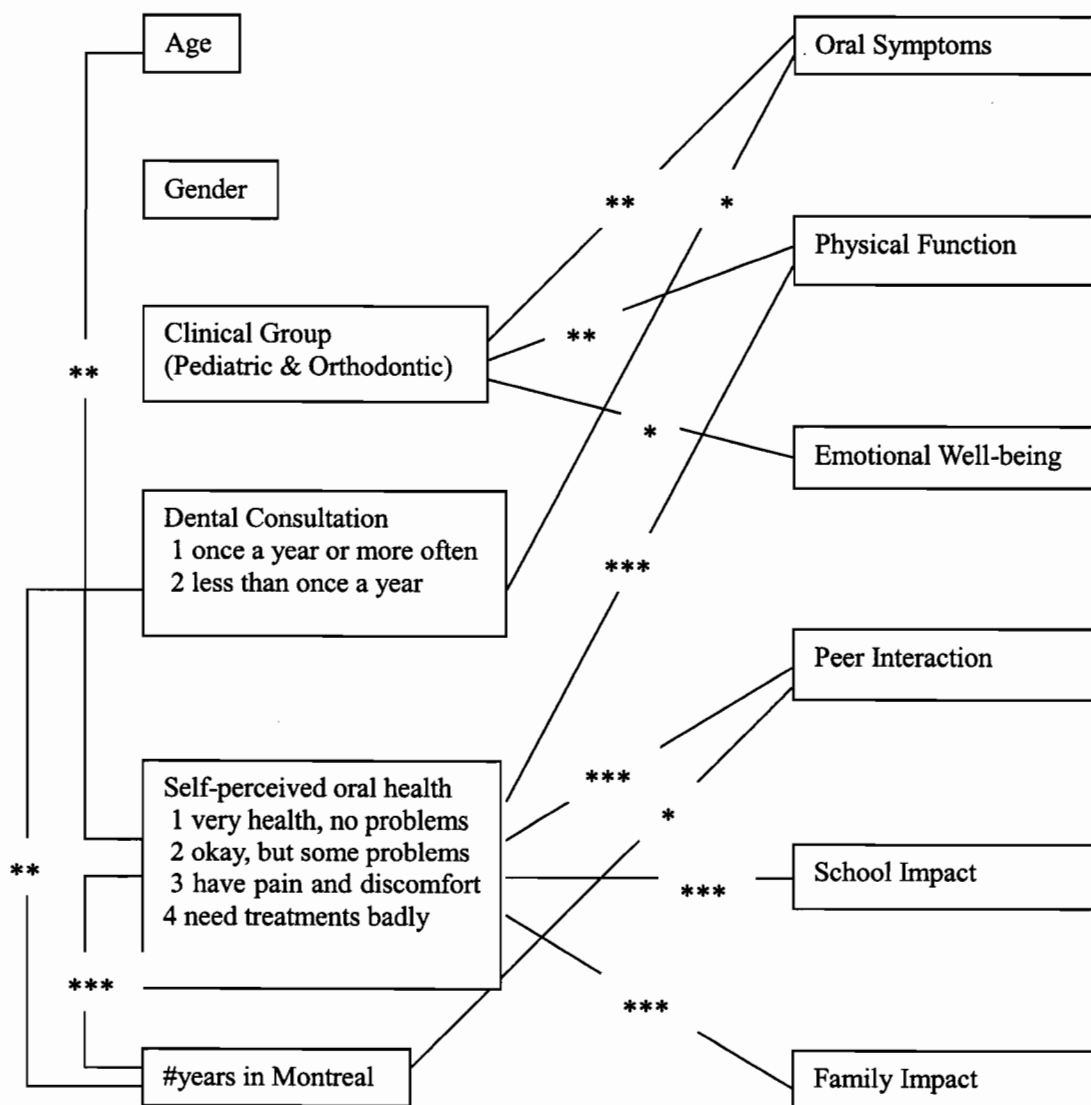
Bivariate Associations

Pearson correlation revealed that the impact scores of all the domains were highly correlated among themselves ($p < 0.0001$).

Some associations between independent variables and the summary impact scores of the domains were also observed (Fig 13)

All the independent variables were candidate explanatory variables in multivariate regression. Associations between age and self-perceived oral health, frequency of dental consultation and number of years living in Montreal, and self-perceived oral health and number of years living in Montreal were detected. These three pairs were added as potential interactions in regression analysis. No association was found for gender, which meant boys and girls behaved the same way.

Fig 13 Bivariate associations between independent variables and impact scores of domains



*p<0.05 ; ** p<0.01 ; *** p<0.001

Regressions

All the independent variables, the three oral symptom items which showed difference across the two ethnic groups, and the possible interactions previously mentioned are candidate explanatory variables for model selection. In all there were eleven. The three oral problem items were labeled as Oral Symptom 1 (pain in his/her teeth), Oral Symptom 2 (food sticking in or between his/her teeth) and Oral Symptom 3 (pain or sensitivity in the teeth with hot or cold things).

In all the final multivariate models, no interactions were found to be significant predictors.

Table 12 shows all the variables left in the final models according to the model selection criteria.

Ethnicity was forced in all the final models. Gender, clinical group, self-perceived oral health and the three oral symptom items were predictors of some of the dependent variables. Age, frequency of dental consultation and length of time living in Montreal were not found to be useful predictors.

Table 12. Parameters and P values for variables left in final models

	Physical Function	Emotional Well-being	Peer Interaction	School Impact	Family Impact
Ethnicity					
Parameter (SE)	0.16 (0.16)	0.15 (0.14)	0.29 (0.09)	0.19 (0.11)	0.19 (0.06)
P-value	0.3118	0.548	0.0014	0.008	0.005
Age					
Parameter (SE)				-0.06 (0.04)	
P-value				0.1409	
Gender					
Parameter (SE)	0.22 (0.14)				-0.10(0.06)
P-value	0.1469				0.1
Clinical Group					
Parameter (SE)	0.37 (0.15)	0.28 (0.14)			
P-value	0.0225	0.062			
Oral Symptom 1					
Parameter (SE)			0.08 (0.04)	0.12 (0.05)	
P-value			0.083	0.0354	
Oral Symptom 2					
Parameter (SE)	0.10 (0.03)	0.15 (0.03)	0.05 (0.01)	0.05 (0.02)	
P-value	0.0066	< .0001	0.0053	0.0622	
Oral Symptom 3					
Parameter (SE)	0.15 (0.04)		0.06 (0.02)	0.11 (0.03)	0.04 (0.01)
P-value	0.0013		0.0127	0.0011	0.048
Self-Perceived Oral Health					
Parameter (SE)	0.34 (0.14)		0.14 (0.07)		0.13 (0.06)
P-value	0.0178		0.0809		0.027
MODEL R ²	0.3502	0.1916	0.3473	0.2903	0.1683
P-value	<0.0001	<0.0001	<0.0001	<0.0001	0.0007

Oral Symptom 1: pain in teeth

Oral Symptom 2: food sticking in or between teeth

Oral Symptom 3: pain or sensitivity in teeth with hot or cold things

For physical function domain, after adjusting for oral symptoms, clinical group and self-perceived oral health remained as significant predictors of physical function impact. Ethnicity was forced into the final model, but is not significant.

For emotional well-being domain, only clinical group left with marginal significance ($p=0.06$) after controlling for oral symptoms. Difference in this domain could not be said to be attributed to ethnicity.

For peer interaction domain, after adjusting for oral symptoms, ethnicity was the only variable found to be significantly associated with peer interaction impact score ($p=0.0014$).

For school impact domain, ethnicity ($p=0.008$) and two oral symptom items were detected to be independently significantly predictive of the impact score.

For family impact domain, ethnicity ($p=0.0052$) and self-perceived oral health ($p=0.0273$) were significantly associated with the impact score after adjusting for oral symptoms.

All the five final models were significantly predictive of the dependent variables ($p<0.0001$ for all except the family impact domain ($p=0.0007$)), indicating substantial correlation between the observed responses (remaining explanatory variables) and the predictive responses (impact scores for domains) based on the models. R-squares for the final models ranged from 0.1683 to 0.3502.

Discussion

This study found evidence that oral health problems produced a number of impacts on the well-being of Far-East Asian immigrant children and the native born Caucasian children in Montreal. Furthermore, there was substantial variation between the two ethnic groups in the impact of oral health problems, and the difference persisted after adjusting for social demographic and clinic variables. The impacts were diverse and included those associated with physical disability, psychological disability, and social disability.

The prevalence of oral impacts (frequency of impacts) was higher for the Caucasian children than the Asian immigrant children. Caucasian group was more impacted (magnitude of impact) from oral health problems than their Asian counterparts. Even after controlling for social demographic variables (age, gender, and number of years living in Montreal), clinical group (pediatric and orthodontic), frequency of dental consultation, clinical oral symptoms, and the general self-perceived oral health, the impact difference existed across ethnic groups in peer interaction impact, school impact and family impact. Within the limitation of the study design, this suggested an independent cultural influence.

Incidence of Oral Impacts

Children were recruited after being screened to have some pediatric or orthodontic problems. All reported some kind of oral symptoms. 87% of the children admitted to have experienced at least one impact item from all the impact domains because of their teeth, mouth, jaw or related oral and facial conditions. Specific to each domain, 69% had physical

function impact, 59% had emotional impact, 57% had peer interaction impact, 50% had school impact, and 61% had family impact. These suggested that oral health impact was a common occurrence in children.

This estimate of the incidence of physical function, emotion, peer interaction, school and family impacts related to oral health problems may have overestimated the true incidence in the general population, due to the clinic-based nature of the sample. This study was done with a clinic-based, rather than a population-based sample. Children, who have more oral health problems, who pay more attention to oral health problems, and who are more sensitive to the impacts from oral health problems are more likely to appear in clinics, and thus be recruited in this study.

Children with craniofacial defects, such as cleft lip and cleft palate, were not taken into this study. These children are special in that they suffer from more severe oral-facial problems than the conventional dental problems like caries or bleeding gums. They may be more widely and more severely affected in all aspects of life than children with relatively mild oral problems.

Several studies have shown that impacts from oral conditions among older adults are common ^[50, 51, 54]. A child study in Toronto, Canada ^[35] reported 48.8% of the children had functional limitations, 21.1% had impacts on their emotional well-being, and 30.1% had impacts on their social well-being, as 'often' or 'every day' in the prior three months, because of their oral and facial diseases, signs and symptoms. This result is consistent with what we have found in this study.

Oral Health-Related Impact Difference between the Two Ethnic Groups

Prevalence vs. Impact Score

The instrument used in this study to evaluate OHRQoL generated a series of impact prevalence and summary impact score for each item and each domain, rather than for the overall OHRQoL measure. Thus the cross-cultural comparison was performed on item and domain basis.

There were 11 items showing significant prevalence difference and there were another 11 items showing significant impact score difference between the two ethnic groups. 9 items were shared between these two 11-item-sets. Caucasian group had a consistent higher prevalence and higher impact score for the nine items. They were more impacted both in frequency and magnitude.

Five items showed impact score difference, without prevalence difference. There were compatible prevalence of these five impacts between the two ethnic groups, but the Caucasian children reported higher impact scores than the Asian children. Taken into consideration that the impact score was the combination of both frequency scale and impact scale, while the prevalence only reflected the frequency scale, it suggested that even when the two groups were both impacted from the item, the Caucasian children appeared to be more impacted than the Asian children for these five items.

Another four items were in the opposite situation, prevalence difference with no impact score difference. Caucasian groups showed a higher prevalence in the four items, but when combine the effect of frequency scale and impact scale, Caucasian children were influenced at a similar level as Asian children (similar impact scores). This suggested that

the impact score difference was very small even with a significant different prevalence. It may be related to the small sample size, or it may be that the difference is actually too minimal to show. In addition, it may also suggest that the Caucasian children are in fact less impacted in these four items, with the lower magnitude of impact being offset by the higher prevalence.

Domain Impact Scores

Physical function impacts are relatively objective comparing with other impacts, such as emotions and peer interactions. They are related largely to the clinical conditions, although the individual's experiences and expectations may influence the perception of the discomfort and reactions. In the final multivariate analysis, oral symptom items appeared as strong predictors of the physical function impacts. Clinical group, which is highly associated with symptoms, was also an important predictor. Ethnicity played a minor part in this category of impacts.

More Caucasian children reported to be 'unhappy or sad' and 'angry' because of their oral problems, but the summary impact scores were compatible between the two groups. Furthermore, Caucasian children were more influenced by the feeling of 'having fewer friends than other children'. After adjustment, an oral symptom item was seen as the primary predictor, together with clinical group, which had a marginal significance. Difference in impacts of the emotional well-being domain could not be said to be attributed to ethnic group. The R-square of this final model was rather low (0.19). Some other undetected variables may be responsible for the emotional well-being impacts. Further research is needed to reveal them.

Peer interaction domain was the one with the largest number of items having

significant difference. Together with school impact domain, it contains the activities taking the most part of children's time. More significantly different items were revealed in these two domains than the other domains. After controlling for oral symptoms, ethnic group persisted as a significant predictor in explaining the variations in impacts between the two groups.

Family function is important. Children are dependent. The families are persons closest to them. They may affect children's HRQoL, and in turn, they may also be affected by the children's health status. More caregivers of Caucasian children reported to take time off work because of the children's oral diseases, but the summary impacts were not detected to be different in the two ethnic groups in this study. 'Child requires extra care and attention' and 'child's been difficult' were bothering the Caucasian parents more than the Asian immigrant parents. Ethnic group played an important part in the variations between the two groups after adjustment.

For all the people categorized as 'Asian' by ethnicity, they have among themselves some difference socio-culturally. One preliminary study done in U.S.A. concerned three Asian cultures. Cruz *et al* ^[64] compared the perception of oral health among subgroups of Asian-American residents of New York City: Chinese, Indian and Pakistani. Ethnic differences were detected after adjusting for clinical variables as well as for demographic variables. Predictors associated with the perception of oral health are different for each ethnic group. Another study revealed significant cultural differences in dental health attitudes and behavior among freshman dental students in Japan, Hong Kong, and West China ^[65].

In this study, the Asian group included children from Mainland China, Hong Kong,

Philippines, Vietnam and several other Asian countries and areas. There may be considerable differences culturally inside the group. Further study is needed to reveal variations among different subgroups of the Asians.

However, little is known about the real cause of all the dysfunction, discomfort and disability revealed by the questionnaire items. This study provided cross-sectional comparisons, and can not be relied to assess cause-effect relationships.

Associations between Social-Demographic / Clinical Variables and Oral Health-Related Impact Difference

Length of Time Living in Montreal & Oral Impacts

‘Number of years living in Montreal’ was associated with peer interaction impact ($p < 0.05$) in bivariate association. But in multivariate analysis, this association disappeared, which suggested that other variables might be responsible for their previously existing association, or their association revealed by this small sample study was too minimal to show after controlling for other variables. A larger sample size may help in the latter case.

Some Canadian oral health public surveys ^[66-69] have confirmed the disadvantage of immigrant children compared to Canadian-born children in their oral health status and use of dental services. Also they indicated an improvement in health status and a diminish in treatment needs as the length of time since immigration increased. However, the immigrant adolescents remained in disadvantage despite the increased time they have been in Canada, and do not reach the same level of oral health as native born adolescents. In this study, little

oral symptom difference was detected between the native born children and immigrant children. Several factors may help to explain this inconsistency with the other surveys. Oral symptom items answered by children and their caregivers were used to measure oral status in this study. This may be subjective and incomplete comparing with the commonly used clinical indices observed by clinicians, such as DMFT and Gingival Index. Another factor involved lies in the fact that about sixty percent of the Asian immigrant children group was born in Montreal. The foreign born children were too few to show difference.

Although in this study, no association was revealed between oral symptoms and time since immigration, and between oral impacts and time since immigration, self perception of oral health was better in the group of children living longer in Montreal. The improved oral health with increasing time since immigration, suggested by the other studies^[66, 67], but not revealed in this study, may partly attribute to the positive association between self-perceived oral health and time since immigration. Cultural influence may also play a part.

Clinical Group & Oral Impacts

Children in the two clinical groups have different oral symptoms. The pediatric group is more likely related with oral pain and discomfort, while the orthodontic group is more concerned with esthetics and appearance. These differences account for the clinical group effect in physical function impact and emotional well-being impact.

Single-Item Self-Perceived Oral Health

Measures of self-perceived oral health represent a subjective, individual perception of personal oral health. The measure commonly used is the single-item perceived oral

health rating, 'How would you rate your overall oral health?' [70-73]

Single-item perceived oral health & other self-reported measures of oral health

Studies have shown that the single-item perceived oral health rating is associated with other perceived oral health measures – such as self-rating of esthetics, perceived mouth dryness, worry about teeth [71, 72]. In this study, oral symptoms and all the oral impacts (physical function, emotional, peer interaction, school, and family impacts) were responses of the children themselves, thus could be regarded as self-reported oral health measures. The association analysis showed high correlations ($p < 0.0001$) among the impact scores of the oral symptom domain and the five oral impact domains. The one-item self-perceived oral health was revealed to be highly correlated ($p < 0.001$) with the five impact domain scores. But no association was found between the one-item self-perceived oral health and self-report oral symptoms in this study.

Single-item Self-Perceived Oral Health & Age

The relations of some social-demographic characteristics with the single-item perceived oral health rating have also been examined [71-74]. Findings regarding the association of age with perceived oral health are inconsistent. A young, employed sample study demonstrated that age was not significant in a multivariate model to predict self-rated oral health unless the number of missing teeth was also included. Both variables were then significant predictors of perceived oral health [73]. Two other studies, with older age samples, noted no significant age effect on perceived oral health [72, 74].

This study was done with children aged 10 to 14 years. Theoretically, children in this age group are relatively homogenous in their cognitive ability and emotional development. From the findings in this study we could see a tendency of better self-perceived oral health

with increasing age. Elder children were more ready to make a high evaluation of their oral health. Inside the Asian group, majority of the children evaluated themselves to be the second best state, 'Okay, having some problems'. The portion of children who perceived themselves as in the first best state, 'very healthy, no problems' were exclusively around the upper limit of the age range. The same was true for the Caucasian group. Majority reported the first best state, 'very healthy, no problems'. Those who reported the second best states, 'Okay, having some problems', or the worse states were largely around ten and eleven years old, entering this age group lately. The elder ones seemed more confident in themselves, which may be related to their increasing realization of 'self'. This seemed true for both ethnic groups.

Single-Item Self-Perceived Oral Health & Length of Time Living in Montreal

'Number of years living in Montreal' was a variable designed exclusively for the Asian immigrant children. All the Asian children in this study were the second generation of immigrants; no matter they were born in Montreal or in other countries. The bivariate association figure (Fig 13) showed a significant association ($p < 0.001$) between 'number of years in Montreal' and 'self-perceived oral health'. The longer they have lived in Montreal, the better perception they appeared to have in their oral health. This may partly be the influence of western culture. Furthermore, studies have shown an association between oral health status and time since immigration^[66], arguing that those who had been in Canada 6 or more years had significant better oral health than those who had arrived within the preceding 2 years. This may be another reason for the positive relationship between self-oral-health-perception and time living in Montreal, although this study did not reveal any relationship between oral symptoms and time living in Montreal.

Single-Item Self-Perceived Oral Health & Ethnic Group

Findings regarding the association of ethnic group with perceived oral health are limited.

One study, in an older age sample (mean age, 74yrs), noted that White individuals rated their oral health more positively than did non-Whites ^[72]. Another study across six ethnic groups in three locations in USA concluded ethnic group as one of the most important significant predictors of the single-item perceived oral health ^[70].

A more recent study conducted in the USA ^[63] found that most Asian-American adult residents (Chinese, Indian and Pakistani) perceived their own oral health as ‘Okay, having some problems’, which appeared to be similar to this study with the difference that respondents in this study were Asian immigrant children. These children were raised in a family atmosphere full of their own ethnic and cultural background. They were likely to accept the norms parents passed to them and behave in a similar way.

However, given the cross-sectional nature of this study, confirmation is needed by studies with longitudinal designs.

General Self-Perceived Oral Health & Oral Health-Related Impacts

Caucasian children reported a better general self-perception of oral health with the single self-perceived-oral-health item, but appeared to be more impacted according to the questionnaire items. This seems contradictory. But when ethnic and culture are taken into consideration, they are actually two opposites within one unity. Asian culture tells people to be modest and humble, and children are raised to be introverted and conservative. They are

less likely to fully express themselves. A more conservative self-perception of oral health and less impact reported are both demonstrations of this characteristic. On the other hand, Caucasian children are brought up in a social atmosphere of 'expressing oneself'. They seem to be more confident in themselves, which leads to a good self-perception despite the actual impacts. 'The culture of a group does influence, but does not determine, how people live.'^[75]

When we took out the influence of culture and saw the two groups as a whole, a positive association was detected, as expected, between the self-perceived oral health and the impact scores. Those who perceived to have a better oral health are less impacted in terms of the impact items (Table 12).

A factor should be pointed out here is that children were asked to rate their overall oral health with the single question, 'how would you rate your overall oral health', before they started filling the questionnaire with all the impact items. They may not have realized all the possible impacts related to their oral conditions when they were doing the general self-rating. They might have a slightly different perception when finishing the questionnaire. Moreover, the general self-perceived oral health was evaluated by a single question with four scaled responses. Most of the results turned out to crowd in the first two choices. More sensitive scales and further research are needed to detect the subtle change in self-rating of oral health that might occur before and after filling the questionnaire.

Limitations of This Study

There are several limitations to this study.

This study was based on a convenience clinic-based sample that was not

representative of the larger population of either Far-East Asian immigrant children or native born Caucasian children in Montreal. They were recruited from the dental clinic of Montreal Children's Hospital and a private orthodontic clinic. The nature of clinic-based study and the preference of clinics all attributed to the sample bias. This was also a convenience sample. Even though the two groups were balanced in terms of age, gender, clinical group, language and dental service utility, they were not randomly selected. Some other factors may influence the results unnoticed.

This study used a small sample (N=188). The sample size was just big enough to meet the criteria for multivariate analysis. (Sample size should be 10 to 15 times of the number of variables in the multivariate model.) Its ability to detect difference was limited. The impact scores of domains had significant difference between the two ethnic groups, but the 95% confidence intervals of the impact scores of the two groups were overlapped for most domains (see table 11).

Since this study is the first to explore the ethnic difference of oral health impacts in Asian and Caucasian children, there is no reference result available for sample size calculation. This preliminary study is an exploratory one to generate hypothesis for future research.

The COOFQ questionnaire is still in development, although some validation studies have already been done. At this stage it only contains negative items. The positive side of oral problems is not measured here. The two ethnic groups may display a different pattern in the positive effects of oral problems.

Values of This Study

Although the results of this preliminary study are not definitive, and should be treated with caution, it points out the importance of impacts related to oral health problems. Oral problems which look minimal do impact on the children experiencing them and their families, physically, psychologically, and socially. This should be taken into consideration when making the overall treatment plan. Furthermore, similar level of clinical condition can be related to different levels of oral impact. This prompts different considerations for each individual.

In addition, this study suggests the need of considerations being invested in dental treatment, dental service planning, and dental health policy making when diverse ethnic groups are involved. Different cultural norms may have a strong influence on the attitudes and perceptions of dental care. It is important to investigate the patients' attitudes about the dental profession, their concerns, expectations and motivations for seeking treatment.

This preliminary study is the first conducted on two groups of children with Eastern and Western ethnic background respectively, comparing oral health impacts using specific items and comparing general self-perception of oral health with detail impacts items. It suggests influence of culture in oral health impacts, which is becoming important in the dental care management with increasing Asian immigrants to the western countries.

Conclusions

Oral health impact was a relatively common event in children aged 10 to 14 years (based on data from dental clinics).

Using the single-item self-perceived oral health question, native-born Caucasian children reported a better oral health than immigrant Asian children.

Using the specific impact items in the questionnaire, there were variations between the two ethnic groups in frequency and magnitude of impacts from oral health problems. Native Caucasian children had a higher prevalence and a higher impact score for most of the impact items.

After adjusting for social demographic variables and clinical variables, ethnic group persisted as significant predictor for oral health-related impact in peer interaction impact, school impact and family impact.

References

1. World Health Organization. Constitution of the World Health Organization. Geneva, Switzerland: World Health Organization, 1948.
2. McDowell I, Newell C. Measuring health: A guide to rating scales and questionnaire. New York: Oxford University Press, 1987.
3. Green LW, Kreuter MW. Health promotion planning: An educational and environmental approach. Mountain View, CA: Mayfield Publishing Company, 1991.
4. Stewart AL, Ware JE. Measuring functioning and well-being. Durham, NC: Duke University Press, 1992.
5. Eiser C, Cotter I, Oades P, et al. Health-related quality-of-life measures for children. *Int. J. Cancer* 1999; Sup. 12: 87-90.
6. The WHOQOL Group. The world health organization quality of life assessment (WHOQOL): position paper from the world health organization. *Soc. Sci. Med* 1995; 41: 1403-1409.
7. The WHOQOL group. The world health organization quality of life assessment (WHOQOL): development and general psychometric properties. *Soc Sci Med* 1998; 46: 1569-1585.
8. Eiser C, Morse R. A review of measures of quality of life for children with chronic illness. *Arch Dis Child* 2001; 84: 205-211.
9. Power M, Bullinger M, Harper A, et al. The world health organization WHOQOL-100: tests of the universality of quality of life in 15 different cultural groups worldwide. *Health Psychology* 1999; 18: 495-505.
10. Brazier J, Jones N, Kind P. Testing the validity of the Eroqol and comparing it with the SF-36 health survey questionnaire. *Qual Life Res* 1993; 2: 169-174.
11. Ware JE, Gandek B, the IQOLA Project Group. The SF-36 health survey: development and use in mental health research and the IQOLA project. *Int J Mental Hlth* 1994; 23: 49-54.
12. Bergner M, Bobbitt RA, Carter WB, et al. The Sickness Impact Profile: development and final revision of a health status measure. *Med Care* 1981; 19: 787-793.

13. Patrick DL, Bergner M. Measurement of health status in the 1990's. *A Rev Pub Hlth* 1990; 11: 165-169.
14. Patrick DL, Bergner M. Measurement of health status in the 1990s. *Ann Rev Public Health* 1990; 11: 165.
15. Ebrahim S. Clinical and public health perspectives and applications of health-related quality of life measurement. *Soc Sci Med* 1995; 41: 1383-1394.
16. Locker D. Measuring oral health: A conceptual framework. *Community Dent Health* 1988; 5: 3-18.
17. Davis P. Compliance structures and the delivery of health care: the case of dentistry. *Soc Sci Med* 1976; 10: 329-335.
18. Reisine S, Miller J. A longitudinal study of work loss related to dental disease. *Soc Sci Med* 1986; 22: 1309-1314.
19. Reisine S. The economic, social and psychological impact of oral health conditions, diseases and treatments. In *Social Sciences and dentistry; a critical bibliography: Volume II* 1984; Quintessence Pub. Co. London.
20. Cushing AM, Sheiham A, Meizels J. Developing socio-dental indicators – the social impact of dental disease. *Community Dent Health* 1986; 3: 3-17.
21. Locker D, Grushka M. The impact of dental and facial pain. *J Dent Res* 1987; 66: 1414-1417.
22. Gift HG, Atchison KA, Dayton CM. Conceptualizing oral health and oral health-related quality of life. *Soc Sci Med* 1997; 44: 601-609.
23. Tosenberg D, Kaplan S, Badner V. Relationships among dental functional status, clinical dental measures, and generic health measures. *J of Dent Edu* 1988; 52: 653-657.
24. Strauss RP, Hunt RJ. Understanding the value of teeth to older adults: influences on the quality of life. *JADA* 1993; 124: 105-110.
25. Downer MC, Jullien EJ, Speight PM. An interim determination of health gain from oral cancer and pre-cancer screening: 3 Pre-selecting high risk individuals. *Community Dent Health* 1998; 15: 72-76.
26. Fyffe HE, Kay EJ. Assessment of dental health state utilities. *Community Dent Oral Epidemiol* 1992; 20: 269-273.
27. Slade GD, Spencer AJ. Development and evaluation of the oral health impact profile. *Community Dent Health* 11:3-11.

28. Kressin N, Spiro A 3rd, Bosse R, etc. Assessing oral health related quality of life: findings from the Normative Aging Study. *Med Care* 34:416-427.
29. Allison P, Locker D, Jokovic A, et al. A cross-cultural study of oral health values. *J Dent Res* 1999; 78: 643-649.
30. Lock D, Matear D, Stephens M, et al. Comparison of the GOHAI and OHIP-14 as measures of the oral health-related quality of life of the elderly. *Community Dent Oral Epidemiol* 2001; 29: 373-381.
31. Slade GD. Derivation and validation of a short-form oral health impact profile. *Community Dent Oral Epidemiol* 1997; 25: 284-290.
32. Pal DK. Quality of life assessment in children: a review of conceptual and methodological issues in multidimensional health status measures. *J Epidemiol Community Health* 50:391-396.
33. Eiser C, Jenney MEM. Measuring symptomatic benefit and quality of life in paediatric oncology. *Br J Cancer* 1996; 73: 1313-1316.
34. Jenney MEM, Campbell S. Measuring quality of life. *Arch Dis Child* 1997; 77: 347-354.
35. Jokovic A, Locker D, Stephens M, et al. Validity and reliability of a questionnaire for measuring child oral-health-related quality of life. *J Dent Res* 2002; 81: 459-463.
36. Mishoe SC, Baker PR, Poole S, et al. Development of an instrument to assess stress levels and quality of life in children with asthma. *J Asthma* 1998; 35: 553-563.
37. Christie MJ, French D, Sowden A, et al. Development of child-centered disease-specific questionnaires for living with asthma. *Psychosom Med* 1993; 55:541-548.
38. Hoare Pm Russell M. The quality of life of children with chronic epilepsy and their families: preliminary findings with a new assessment measure. *Dev Med Child Neurol* 1995; 37: 689-696.
39. Duffy CM, Arsenault L, Duffy KN, et al. The Juvenile Arthritis Quality of Life Questionnaire – development of a new responsive index for juvenile rheumatoid arthritis and juvenile spondyloarthritis. *J Rheumatol* 1997; 24: 738-746.
40. Rabbett H, Hlbadr A, Thwaites R, et al. Quality of life in children with Crohn's disease. *J Pediatr Gastroenterol Nutr* 1996; 23: 528-533.
41. Parkin PC, Kirpalani HM, Rosenbaum PL, et al. Development of a health-related quality of life instrument for use in children with spina bifida. *Qual Life Res* 1997; 6: 123-132.

42. Broder HL, Slade G, Caine R, etc. Perceived impact of oral health conditions and quality of life among African American adolescents. *J Dent Res* 77:Abst. 808.
43. Phillips C, Bennett B, Broder HL. Psychological status among patients seeking orthognathic treatment. *Angle Orthodontist* 68:547-556.
44. Bee H. Lifespan development. 2nd ed. New York: Addison Wesley Longman. 1998.
45. Hetherington EM, Parke RD, Locke VO. Child psychology: a contemporary viewpoint. 5th ed. New York: the McGraw-Hill Companies. 1999.
46. Albrecht GL, Fitzpatrick R, Scrimshaw SC. Cultural variation in the experience of health and illness. In *Handbook of Social Studies in Health and Medicine*. London ; Thousand Oaks, Calif. : Sage, 2000.
47. Scrimshaw SC. Our multicultural society: implications for pediatric dental practice. *Pedi Dent* 2003; 25: 11-15.
48. Skevington SM, BradshawJ, Saxena S. Selecting national items for the WHOQOL: conceptual and psychometric considerations. *Soc Sci Med* 1999; 48: 473-487.
49. Atchison KA, Gift HC. Perceived oral health in a diverse sample. *Adv Dent Res* 1997; 11: 272-280.
50. Hunt RJ, Slade GD, Strauss RP. Differences between racial groups in the impact of oral disorders among older adults in North Carolina. *J Public Health Dent* 1995; 55: 205-209.
51. Slade GD, Spencer AJ, Locker D, et al. Variations in the social impacts of oral conditions among older adults in south Australia, Ontario, and North Carolina. *J Dent Res* 1996; 75: 1439-1450.
52. Strauss RP. Culture, dental professionals and oral health values in multicultural societies: measuring cultural factors in geriatric oral health research and education. *Gerodontology* 1996; 13: 82-89.
53. Allison PJ. Health-related quality of life comparisons in French and English-speaking populations. *Community Dent Health* 2001; 18: 214-218.
54. Tsakos G, marcenes W, Sheiham A. Cross-cultural differences in oral impacts on daily performance between Greek and British older adults. *Community Dent Health* 2001; 18: 209-213.
55. Nakazono TT, Daviddson PL, Andersen RM. Oral health beliefs in diverse populations. *Adv Dent Res* 1997; 11: 235-244.
56. Aday LA, Forthofer RN. A profile of black and Hispanic subgroups' access to dental care: findings from the National Health Interview Survey. *J Public Health Dent* 1992; 52:

210-215.

57. Mueller CD, Schur CL, Paramore LC. Access to dental care in the United States. *JADA* 1998; 129: 429-437.
58. Hardie R, Ransford E, Zernik J. Dental patients' perceptions in a multiethnic environment. *J Calif Dent Assoc* 1995; 23: 77-80.
59. Collier J, MacKinlay D, Phillips D. Norm values for the Generic Children's Quality of Life Measure (GCQ) from a large school-based sample. *Qual Life Res* 2000; 9: 617-623.
60. Cortes MIS, Marcenes W, Sheiham A. Impact of traumatic injuries to the permanent teeth on the oral health-related quality of life in 12-14-year-old-children. *Community Dent Oral Epidemiol* 2002; 30: 193-198.
61. Bert Spilker. Quality of life assessments in clinical trials. Raven Press. New York 1990.
62. Dougherty CJ. Quality-adjusted life years and the ethnical values of health care. *Am J Phys Med Rehabil* 1994; 73: 277-281.
63. Lawrence HP. Cross-cultural perceptions of oral health and oral-health-related quality of life. *Community Dent Health* 2001; 18: 207-208.
64. Cruz GD, Galvis DL, Kim M, et al. Self-perceived oral health among three subgroups of Asian-Americans in New York City: a preliminary study. *Community Dent Oral Epidemiol* 2001; 29: 99-106.
65. Kawamura M, Yip HK, Hu DY, et al. A cross-cultural comparison of dental health attitudes and behaviour among freshman dental students in Japan, Hong Kong and West China. *Int Dent J* 2001; 51: 159-163.
66. Locker D, Clarke M, Murray H. Oral health status of Canadian-born and immigrant adolescents in North York, Ontario. *Community Dent Oral Epidemiol* 1998; 26: 177-181.
67. Abramson A, Heimann GA. A comparison of dental disease between Windsor Essex county children and recent immigrant children. *Can J Community Dent* 1997; 12: 22-25.
68. Woodward GL, Leake JL. Risk markers for new dental decay in eight-year-old North York children. *Can J Community Dent* 1995; 10: 7-13.
69. Lee J. Comparison of the dental health of Toronto's ethnic groups. *Can J Community Dent* 1987; 2: 8-12.
70. Atchison KA, Gift HC. Perceived oral health in a diverse sample. *Adv Dent Res* 1997; 11: 272-280.

71. Atchison KA, Matthias RE, Dolan TA, et al. Comparison of oral health ratings by dentists and dentate elders. *J Public Health Dent* 1993; 53: 223-230.
72. Matthias RE, Atchison KA, Mayer-Oakes SA, et al. Factors affecting self-rating of oral health. *J Public Health Dent* 1995; 55: 197-204.
73. Reisine ST, Bailit HL. Clinical oral health status and adult perceptions of oral health. *Soc Sci Med* 1980; 14: 597-605.
74. Berkey DB, Call RL, Loupe MJ. Oral health perceptions and self-esteem in non-institutionalized older adults. *Gerodontology* 1985; 1: 213-216.
75. Kleinman A. Patients and healers in the context of culture. An exploration of the borderland between anthropology, medicine and psychiatry. Berkeley, CA: University of California Press 1980.



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CERTIFICATION OF ETHICAL ACCEPTABILITY FOR RESEARCH INVOLVING HUMAN SUBJECTS

The Faculty of Medicine Institutional Review Board consisting of:

LAWRENCE HUTCHISON, MD

MICHAL ABRAHAMOWICZ, PhD

ARTHUR CANDIB, MEd

PATRICIA DOBKIN, PhD

CELESTE JOHNSTON, DEd

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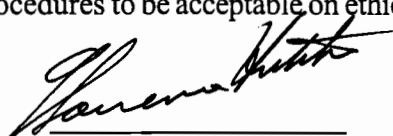
MARGARET SWAINE, BA

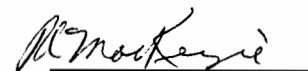
has examined the research project **A06-B25-01A** entitled **"Measuring Child Oral Health-Related Quality of Life"**

as proposed by: Dr. Paul Allison to N.I.H.
Applicant Granting Agency, if any

and consider the experimental procedures to be acceptable on ethical grounds for research involving human subjects.

July 30, 2001
Date


Chair, IRB


Dean of Faculty

Institutional Review Board Assurance Number: M-1458

CHILD ORAL HEALTH QUESTIONNAIRE – CHILD VERSION

During the last 3 months, how often have you...

How much has this bothered you?

	All the time	Often	Sometimes	Never	Don't know	N/ A	Very much	Quite a bit	A little	Not at all	N/ A
1. Had pain in your teeth	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Had any other pain in your mouth or jaws	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Had clicking or popping in your teeth jaw joint	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Been breathing through your mouth or snoring	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Had numbness (lack of feeling) in your lips or mouth	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. Had sores or sore spots (ulcer, abscess) in the mouth	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. Had difficulty opening or closing your mouth	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. Had bad breath	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9. Had bleeding gums	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10. Had food sticking in or between your teeth	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

During the last 3 months, how often have you...

How much has this bothered you?

	All the time	Often	Some- times	Never	Don't know	N/ A	Very much	Quite a bit	A little	Not at all	N/ A
11. Had food sticking in roof/top of your mouth	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12. Had pain or sensitivity in the teeth with hot or cold things	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
13. Been clenching or grinding your teeth	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
14. Had dry mouth or lips	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
15. Had trouble biting off or chewing foods such as apple carrot or firm meat	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

During the last 3 months, how often have you...

because of your teeth, mouth, jaw or related oral and facial conditions

How much has this bothered you?

	All the time	Often	Some times	Never	Don't know	N/A	Very Much	Quite a Bit	A little	Not at all	N/A
16. Been unhappy or sad	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
17. Missed school for any reason	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
18. Avoided eating with other children (at school or parties)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
19. Had difficulty eating foods you like to eat	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
20. Felt worried or anxious	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
21. Felt shy or withdrawn	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
22. Had difficulty paying attention in school	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
23. Avoided smiling or laughing with other children	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
24. Had trouble sleeping	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
25. Got angry	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

During the last 3 months, how often have your teeth, mouth, jaw or related oral and facial conditions							How much has this bothered <u>you</u> ?				
	All the time	Often	Some times	Never	Don't know	N/A	Very Much	Quite a Bit	A little	Not at all	N/A
26. Not wanted to speak/read out loud in class	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
27. Been teased, bullied or called names by other children	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
28. Had difficulty saying certain words	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
29. Felt that you look different	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
30. Been treated differently or left out by other children	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
31. Had difficulty being understood	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
32. Felt that you are not good looking	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
33. Felt that you have fewer friends	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
34. Had difficulty keeping your teeth clean	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

During the last 3 months, how often have you...

because of your teeth, mouth, jaw or related oral and facial conditions

How much has this bothered you?

	All the time	Often	Some times	Never	Don't know	N/A	Very Much	Quite a Bit	A little	Not at all	N/A
35. Been worried about what other people think about your teeth or mouth	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
36. Avoided going out with friends	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
37. Not wanted to go to school	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
38. Avoided meeting new people	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
39. Been treated differently by teachers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
40. Been asked questions by others about your teeth, mouth or face	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
41. Avoided taking part in activities like sports, clubs, drama, school trips, playing a musical instrument	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
42. Avoided talking with other children	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

During the last 3 months, how often have you...

because of your teeth, mouth, jaw or related oral and facial conditions

All the time

Often

Some times

Never

Don't know

N/A

How much has this bothered you?

Very Much

Quite a Bit

A little

Not at all

N/A

43. Taken longer to finish a meal

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44. Fought or argued with other children

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FAMILY IMPACT

During the last 3 months, how often....

because of your children's teeth, mouth, or related condition

All the time

Often

Some times

Never

Don't know

N/A

How much has this bothered YOU?

Very Much

Quite a Bit

A little

Not at all

N/A

1. Has your child avoided gatherings or going out with the family on holidays and outings

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2. Have you been upset

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3. Have you taken time off work

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4. Has your sleep been disrupted

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5. Has your child required extra care and attention from you

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6. Has your child been difficult with you

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7. Have family activities such as eating, playing games and shopping been disrupted

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During the last 3 months, how often....

because of your children's teeth, mouth, or related condition

All the time

Often

Some times

Never

Don't know

N/A

How much has this bothered YOU?

Very Much

Quite a Bit

A little

Not at all

N/A

8. Has your child blamed you for problems with his/her teeth, mouth or face

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9. Have you felt uncomfortable in public places

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10. Have you or any other family members felt guilty

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11. Has your child been jealous about other family members

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12. Has there been family conflict

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13. Has the family had financial difficulties

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14. Have you worried about your child's future

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