Quality of life instruments and it’s importance in orthodontics

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Abstract

In recent years, the term “quality of life” has become frequently used in the dental literature, so that much of the current orthodontic treatment, with or without government subsidization, is justified by the goal of improving the quality of life in these patients. With that in mind, the application of these specific indicators for the measurement of the quality of life in orthodontic patients has the capability of providing valuable information about the diagnosis and treatment needs of the patient, in addition to the evaluation of the final result of the orthodontic treatment, enabling improvements in treatment planning, in the treatment evolution and mainly, in the patient-doctor relationship. Therefore, clinicians need to know how the quality of life of their patients can be assessed in order to select which is the most applicable to his/her practice and/or academic environment.

Keywords: Quality of life. Orthodontics. Malocclusion.

INTRODUCTION

Quality of life can be defined as a daily sense of well being, which is derived from the satisfaction or dissatisfaction in the different areas of life which are important to someone.19 The University of Toronto Centre for Health Promotion states: “Quality of life is the degree to which a person enjoys the important possibilities of his or her life”, which can be simplified according to Locker17 in the following question: “How good is your life for you?”. Estimating the quality of life with the purpose of evaluating health care has become more frequent in the clinical research, such that more than 1000 articles are published yearly with the term “quality of life”. The measurements regarding the subject are gaining more importance now that researchers understand that traditional studies have little relevance to the patient.7

Studies show that when talking about quality of life, people mention health, but do not consider it as a primary factor.19 Social, esthetic and psychological factors are thought to be very important, but there are many variations from person to person which reflect personal history and self perception. In fact, in many cases the key to one’s perception of the quality of life factors is not very clear, and it can be speculated that it is directly connected with one’s personal experiences throughout life.

This model was the basis for the development of the subjective socio-dental indicators. Locker
and Slade\textsuperscript{10} related that these indicators were defined as a measurement of the power that oral disorders have to interrupt one’s normal functioning in life.

Therefore, to evaluate any intervention in the area of health as a whole, including the service to the buccal health, it is necessary that an assessment be made regarding what is important to the patient, which reflects their perceptions, as well as the normative measurements, essential to the clinician. Therefore, subjective indicators are becoming important tools, allowing the evaluation of the impact of buccal diseases upon the quality of life of the patient, and are being vastly used in many different areas of dentistry, like Collective Health, Periodontics and Prosthetics in studies throughout the whole world.\textsuperscript{11} However, in Dentistry these measurements have not been utilized to their full potential, not only in research but also in private practice, to the extent which they exist and are used in Medicine.\textsuperscript{7}

The study of socio-dental indicators in orthodontics patients has the potential to provide information about the needs and results of treatment. Therefore, clinicians must be aware of the ways in which quality of life can be evaluated.\textsuperscript{22}

Traditionally, the measurements of alterations pre and post orthodontic treatment are based on traditional clinical measurements, like cephalometric data obtained from the dental, occlusal and osseous characteristics, and the occlusal measurement indices. Most recently, some of the subjective indicators are being developed and adapted as new methods of measurement for the necessity and comparison of treatment. In this case, the individual perception is the central link between necessity of and satisfaction with orthodontic treatment, referring to the impact which malocclusion has on one’s daily life, and whether it causes limitations and embarrassment or not. Certainly, clinical measurements are important, however, dimensions of dental, functional and social impact have become equally relevant.\textsuperscript{18,24}

In the Brazilian situation, where treatment offered by governmental institutions for orthodontic problems is restricted or non-existent, one should consider that perceived necessity is what will manifest demand. This means that it is the perceived necessity which is transformed into action, generating the usage of private practices for treatment. Throughout the world, perceived necessity has emerged as an accurate predictor of the usage of medical and dental services, and it is of great importance in recognizing the anxieties of the patient.\textsuperscript{5}

According to Oliveira and Sheiham,\textsuperscript{24} orthodontic treatment is that which most requires the use of socio-dental indicators among all dental specialties, for it generates a great psychosocial influence on the patients who undergo treatment in all its phases.

The aim of the present study is to promote the integration of clinical orthodontics with the concepts of quality of life, especially drawing orthodontists’ attention to the importance of its evaluation in the diagnosis, planning and final results of the orthodontic treatment.

**LITERATURE REVIEW**

In recent decades, many instruments have been developed to evaluate quality of life related to oral health. However, the most used questionnaires whose reliability has been confirmed by many studies are: OIDP (Oral Impacts on Daily Performance),\textsuperscript{1} DIDL (Dental Impacts on Daily Living),\textsuperscript{16} GOHAI (Geriatric Oral Health Assessment Index),\textsuperscript{4} COHQLQ (Child Oral Health Quality of Life Questionnaires),\textsuperscript{14} ECOHIS (Early Childhood Oral Health Impact Scale)\textsuperscript{20} and OHIP (Oral Health Impact Profile).\textsuperscript{23,27}

These instruments provide numeric scores which can be used to compare different groups with or without oral cavity diseases, with different diseases or with different levels of severity for the same disease. The values can also be compared...
in the pre and post treatment stages to determine the extent of change which can be attributed to treatment, which means that different treatments can also be compared in their effects on the well being and quality of life of the patients.17

Oral impacts on daily performance (OIDP)

The Oral Impacts on Daily Performance (OIDP) index, created in 1996 by Adulyanon et al,1 is based on the conceptual model of quality of life by Locker.18 This is one of the briefest instruments, whose aim is to evaluate what the authors call “ultimate impacts”. The symptoms and the oral functions are not measured; however, the impact of the oral condition on the ability of the individual to perform eight daily functions is evaluated. These daily functions are: eating and enjoying food, speaking clearly, practicing oral hygiene, sleep and relaxation, smiling, laughing and showing teeth without embarrassment, maintaining a balanced emotional state, adequately performing tasks on the job or at the social level, and enjoying contact with people.

The frequency with which a person is affected, or which a negative impact on those functions is observed, is evaluated through a temporal scale called “Frequency Scale”, stratified in the following manner: never in the last six months, less than once a month, once or twice a month, once or twice a week, three or four times a week, every day or almost every day. Besides that, the “Perceived Severity” it is also evaluated in this index and it is a scoring system through which the interviewee grades the difficulty which that function brings to his/her daily life, ranging from five (very severe) to zero (none).1

The OIDP was evaluated in a pilot study of 501 people between 35 and 44 years of age randomly selected from Thailand’s 16 islands. The inner consistency showed good reliability (Cronbach’s alpha= 0.65), and the test-retest demonstrated the stability of the index, performed with 47 people at 3 weeks intervals, obtaining kappa coefficients of 0.95 to 1.0. The OIDP has good psychometric properties and a consistent theoretical base, which allows the evaluation of behavioral impacts on daily performance, instead of using an evaluation of the perceived state of the dimensions of impact, used in many other questionnaires.2

The OIDP is a widely used index, whose main advantages are the ease of comprehension for the interviewees and the speed with which it is completed. Consequently, this has already been translated and adapted into other languages, besides English, and used in many different cultures.2

In Brazil, the OIDP was used by Oliveira and Nadanovsky,23 evaluating the impact of toothaches on 504 pregnant women and they showed an increase in the impact on the quality of life in those who presented more carious lesions, more tooth loss, and those who perceived a need for treatment.

Oliveira and Sheiham,24 in the same way, measured the impact on the quality of life of 1675 adolescents in relation to the clinical evaluation of their malocclusion and demonstrated that there were significant differences between the clinical diagnostic and the impact generated by the malocclusion.

In 2004, CHILD-OIDP10 was created, adapting the OIDP for children between 11-12 years of age. It evaluates the impact of oral problems on the same eight daily activities using pictures to illustrate the questions.

The index was evaluated with 1,100 Thai children between 11-12 years of age and was shown to be trustworthy and valid, since the values obtained through the application of the instrument showed a positive correlation between the necessity of dental treatment and the perception of oral problems. The Cronbach alpha was equal to 0.82. The stability of the CHILD-OIDP (test-retest) was tested in 90 children and presented a kappa equal to 0.91.10
Dental Impacts on Daily Living (DIDL)

Leão and Sheiham\textsuperscript{16} developed the Dental Impacts on Daily Living (DIDL) index, which evaluates the psychosocial problems reflected in the quality of life of people according to their buccal condition, using five quality of life dimensions: comfort (related to gingival health and absence of food impaction among others), appearance (one’s self esteem), pain, general performance (ability to perform normally daily activities and interact socially), and eating restrictions (difficulty to bite and chew).

The DIDL is a 36 item questionnaire whose objective is to obtain scores for each dimension and also a general score which evaluates the general impact of all the involved dimensions.\textsuperscript{16}

The dimensions are given weight proportionally to the impact perceived by the interviewee using a visual scale graded from 1 to 10 with the dimensions positioned side by side. Statistical tests were used to evaluate how much the determination of weight to the dimensions contributed to the final result, when comparing the DIDL scoring with and without weight using the Spearman correlation test. The results suggested that some patients classified as unsatisfied (score below zero) in the version without weighted dimensions had, in truth, less severe impacts when weight was given to the dimensions.\textsuperscript{16}

The instrument was tested in a convenient sample of Brazilians, where its stability (test and retest) and internal consistency were evaluated for the questionnaire (0.87 and 0.85 respectively) and for scale (0.78 and 0.59, respectively), obtaining good results. For the stability analysis, the interviews of 84 people were repeated, with a one day interval.\textsuperscript{16}

The main advantages of this index are its flexibility in producing or eliminating data (individual items, dimensions or total score) and the possibility to weight to the dimensions, reflecting the real importance of each dimension in someone’s life.

Geriatric Oral Health Assessment Index (GOHAI)

The “Geriatric Oral Health Assessment Index” (GOHAI),\textsuperscript{4} developed in studies among the elderly North American, was designed specifically to evaluate, in the elderly population, orofunctional problems and estimate the degree of social impact associated with buccal diseases, and can also be used to evaluate the functional and psychosocial effectiveness of a dental treatment.

The GOHAI is composed of 12 items which evaluate pain, discomfort and functional alterations. Among these, four items are directed at the psychosocial functions such as dissatisfaction with oral health and appearance. For the GOHAI only the total score is calculated, summing the score of 12 items, thus the total scores vary from zero to sixty.\textsuperscript{4}

The GOHAI was tested in 1755 individuals with the minimum age of 65 years, all residents of Los Angeles, who received health treatment from the government and demonstrated adequate consistency obtaining a Cronbach’s alpha equal to 0.79. This study also demonstrated that the individuals with larger numbers of natural teeth showed a more positive impact on the GOHAI scores.\textsuperscript{4}

Dolan et al\textsuperscript{8} used GOHAI in 208 Hispanics, with the mean age of 39 years, all residents of Los Angeles, who received health treatment from the government and obtained excellent internal consistency results (Cronbach’s alpha = 0.83), proving that this index can also be used reliably in younger adults.

Dolan et al\textsuperscript{8} proposed the usage of the GOHAI to test a governmental program of health promotion in Florida, evaluating 200 senior residents of one residential complex. Two years after receiving dental treatment, 119 individuals underwent a re-test, which allowed the observation of a mean improvement in the impact of 2.3 points (it became more positive), starting from a base (obtained pre-treatment) of 52.3(sd=9.0).
Nowadays, the GOHAI is commonly used reliably with elderly individuals and young adults and it was translated and adapted for many languages and cultures.8

**Child Oral Health Quality of Life Questionnaire (COHQoL)**

The “Children Oral Health Quality of Life” (COHQoL) index was constructed by Jokovic et al in 2004,14 to be adapted for modern concepts of child health and to be applicable to children between six and fourteen years of age, with a large variety of oro-facial disorders. The intention of the questionnaire is to incorporate not only the children’s perceptions but also those of the parents and to be sensitive to cognitive and emotional development. Therefore, distinct evaluations are made.

The Parental-Caregiver Perception Questionnaire (PPQ) has 31 questions, and is intended to evaluate the impact of the buccal condition of the children through the eyes of their parents. The PPQ was considered reliable in the evaluation of the 231 children’s guardians (Cronbach’s alpha = 0.94) and stable to be re-tested in 79, with an interclass correlation coefficient of 0.85.14

Because of the large variability in the perception of the children due to differences in their ages, there are three analogous questionnaires for the perception of children (Child Perceptions Questionnaire- CPQ) with 36 questions each, each intended for a specific age: 6 to 7, 8 to 10 and 11 to 14 years of age. The questionnaire was evaluated in 123 children between 11-14 years of age, and demonstrated its validity, verified through the positive correlation between the results and the buccal health perception (p=0.013) and the general well being (p<0.001). The reliability and the stability test (test and re-test) were completed for 65 children, obtaining satisfactory results, where the Cronbach’s alpha and the Interclass Correlation Coefficient were 0.91 and 0.90, respectively, demonstrating that the COHQoL scale intended for children between 11-14 years of age, was valid and trustworthy.14

The CPQ for children of 8-10 years of age was constructed from the one for children of 11-14 years of age and underwent the validity and reliability tests in 68 and 33 children respectively. The authors observed a positive correlation between the results and the perception of oral health and general well-being (P<0.001), the Cronbach’s alpha and the Interclass Correlation Coefficient were 0.89 and 0.75, respectively, demonstrating that this scale is also valid and reliable. The CPQ for children of 6-7 years of age still has not been tested in regards to its validity and reliability.14

According to the author, this instrument is ideal to measure the quality of life of children because it is relatively short and it has parallel measures for the guardians and children, thereby capturing the impact on the quality of life from both perspectives.14

**Early Childhood Oral Health Impact Scale (ECOHIS)**

The “Early Childhood Oral Health Impact Scale”, was created by researchers from the University of North Carolina, based upon the 36 items which are part of the COHQoL14 questionnaire, with the intention of evaluating the quality of life related to oral health in pre-school children.25 Thirty guardians scored these 36 items with a visual analogue scale, with the 13 items considered to be most important were selected to be part of the final questionnaire. Among those 13 questions, 9 are designed to measure the impact on children and 4 to measure the impact of the child’s problems on the family.

The questionnaire was tested in a sample of 167 guardians of American children of 5 years of age regarding the validity and reliability. The correlation between the ECOHIS scores and the general health condition (p<0.05) and the oral health condition (p<0.001), evaluated according
to perceptions of the interviewed parents, was observed. The authors also observed a correlation between the scores of the subscales of the child and the family (p<0.001). The Cronbach’s alpha of this instrument was 0.87, demonstrating a satisfactory reliability; however its stability was not tested.25

In 2006, Tesch29 produced the transcultural translation of the ECOHIS for the Portuguese language. The internal consistency for the 13 items from the questionnaire, tested in a sample of 80 children and their relatives was good (Cronbach’s alpha=0.80), and a positive correlation between the ECOHIS scores and the general health condition (p<0.01) and the oral health condition of the children (p<0.01) was observed, measured according to the perception of the interviewees. The stability test (test - re-test) was performed with 50 female individuals, with the
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the OHIP was capable of detecting a previously observed association between the social impact and the perceived necessity of treatment and, according to Locker, it is currently the most used sociodental instrument, and has been translated and adapted to many other languages and cultures.

Miotto and Barcellos performed a systematic analysis of the literature about the use and performance of the OHIP, and they were able to conclude that it is a sensible instrument to capture changes in the impact of oral conditions. The index is considered a powerful instrument in advocating for the use of resources for oral health and to prioritize the allocation of these resources based on which problems have the greatest impact on people’s quality of life. However, there is little scientific evidence available to recommend its prescription without the OHIP instrument, not only to plan but also to evaluate the oral health services. Its usage should be complementary on top of the traditionally used objective index.

Slade developed one reduced questionnaire from the OHIP-49, using epidemiologic data from a sample of 1217 south-Australians with the mean age of 60 years. The author concluded that fourteen questions were effective in determining the same clinical variation and socio-demographic patterns which were observed using the forty nine questions, in addition to containing the seven sub-groups distributed in an orderly and hierarchical fashion for each pair of questions, suggesting that the reduced version of the instrument is useful to quantify the levels of impact with good reliability, validity and accuracy. The internal reliability for the OHIP-14 was high according to the Cronbach’s alpha coefficient (\(\alpha=0.88\)) and its variation was 94% in relation to the OHIP-49.28

The OHIP was developed initially in the English language, in Australia, and the cultural situation was adapted to the reality of the original population. For its adaptation in the Brazil’s cultural context and to Portuguese, Almeida et al performed its transcultural translation in two steps. In the first, they implemented the semantic validation of the instrument which was transculturally translated, including the performance of a pilot test in its many different age groups and in users of the “Sistema Único de Saúde (SUS)” health centers. In the second step, they tested the psychometric properties of the instrument when applied in adult and elderly samples. The validation of the transculturally translated instrument demonstrated similar psychometric properties to those measured in the original situation.

Oliveira and Nadanovsky evaluated the properties of the Brazilian version of the OHIP-14 in a transversal study and concluded that this version shows properties similar to the original version, being a valid tool for international research.

The majority of studies regarding the impact of oral diseases on the quality of life were focused on adults. The explanation for this could be related to the fact that the impacts on this group tend to be more evident due to the accumulation of diseases and of their effects on oral tissues. Broder et al were the first ones to use the OHIP in a sectional study with adolescents between 12 and 17 years of age.

Oliveira and Sheiham performed a study with the purpose of evaluating the impact of orthodontic treatment on the quality of life of adolescents between 15 and 16 years of age. The patients were clinically examined through the Index of Orthodontic Treatment Need (IOTN), using two parameters to evaluate the impact of oral health on the quality of life: Oral Impact of Daily Performance (OIDP) and Oral Health Impact Profile (OHIP). The results showed that the patients who underwent complete orthodontic treatment showed a statistically significant improvement in their quality of life when comparing those who were never treated or who were undergoing orthodontic treatment.
Feu\textsuperscript{12} evaluated the quality of life, using the OHIP-14, in 92 patients who sought orthodontic treatment and 102 who did not and concluded that those who sought orthodontic treatment had experienced a significantly more negative impact on their quality of life, regardless of the gravity of the malocclusion and of its aesthetic condition as assessed the orthodontist. The dimensions of the impact most frequently affected were the “psychological discomfort” and the “psychological disability”, which denote the worry and the shame associated with malocclusion, related directly to aesthetics.

Esperão\textsuperscript{9} evaluated 117 patients who could benefit from orthodontic treatment with a mean age of 24 years, divided into three groups (20 in the pre-treatment phase, 70 in the pre-surgical orthodontic treatment and 27 post-surgical treatments) using the OHIP to evaluate the impact of treatment on the quality of life of those patients. The author concluded that the orthosurgical treatment improved the quality of life in relation to oral health, presenting a significant reduction in the OHIP values. It was also observed that the pre-surgical orthodontic treatment caused a significant improvement in the quality of life of the patients and that women have greater chances of showing negative impacts in the pre-treatment phase.

Slade and Spencer\textsuperscript{13} reported that the OHIP was initially formulated to evaluate the impact on groups and population, but that, in the same fashion, it can measure the impact on people, being then incorporated to the daily consultations, individualizing the treatment plans.

**DISCUSSION**

Nowadays, there is a general consensus in the literature that the use of quality of life indicators is an essential component in dental research and clinical studies, especially those which evaluate prevention and therapeutic options which aim to improve one’s well being.\textsuperscript{4,14,17,29} Among the many instruments designed to measure perceived necessities, the OHIP-14 is currently the most used in many studies and in different cultures and sociodemographic profiles and it is also that which is most applicable to studies of quality of life in orthodontics.\textsuperscript{6,17}

The OHIP was developed to provide an all-inclusive measurement for dysfunction, discomfort and incapacity attributed to oral conditions. This information aims to be complementary to the traditional indicators of clinical disease and thus provide a “disease impact” profile of populations and of the efficacy of health service to reduce these impacts, being adequate for research on young people, adults and elderly.\textsuperscript{6}

Locker\textsuperscript{17} affirmed that the traditional indices do not inform how much malocclusion influences the quality of life of the patient in terms of functional limitations and psychosocial well being. Therefore, the complementary usage of sociodental indicators like OHIP, which measure these impacts on patients with malocclusion, has become an essential tool when seeking the perception of the patient about the problem.

In addition to the necessities resulting from a physical deformity caused by malocclusion, the seeking of orthodontic treatment is related to many other factors which do not include health. Jenny\textsuperscript{13} related that an improvement in physical function is not the primary motivation for many who receive treatment. From the sociological point of view, the necessity and desire to achieve a culturally acceptable image and the desire of members of society to achieve the dental aesthetics standards were the main reasons for seeking out orthodontic treatment, and these motivations are the ones evaluated by the subjective indices, like OHIP.

In the same way that Shaw,\textsuperscript{26} evaluating 200 school children in Wales, concluded that dissatisfaction and the seeking of orthodontic treatment are related to increasing age and with
nicknames and embarrassment related to maloclusion, self esteem is also strictly to the seeking of orthodontic treatment. This search can be translated, from the patient’s point of view, as seeking to recover his/her self esteem and satisfaction in living socially.

According to Kiyak,\textsuperscript{15} the desire to improve dental and/or facial appearance is the principal motive for seeking orthodontic treatment. This decision is not usually related to gravity of malocclusion, as Feu’s\textsuperscript{12} study demonstrated, but rather to a general desire of the family to improve the aesthetics and self-esteem of the child/adolescent, and many times, the generated expectations are not realistic. This fact once more highlights the importance of knowing the motivation for seeking orthodontic treatment, with the intent of avoiding future frustrations and misunderstandings associated with the final results of treatment.

Modern society has modified its behavior and thinking patterns throughout recent years, driven by its aesthetics and behavior patterns, which today are part of the concept of quality of life in the majority of its members.\textsuperscript{20} Therefore, how can orthodontists ignore the factors which currently are the major patient generators, and how can they plan treatment without knowing the patient’s perspective about the problem?

Through systematic review about the subjective indicators, Biazenvic et al\textsuperscript{5} were able to conclude that subjective indicators in oral health produce more evidence about the problem’s detection than objective indicators. Self-perception allows one to have a more complete understanding of the actual oral health condition of the patient, even though this procedure does not replace the clinical examination of the patient.

In fact, there is no scientific evidence available to recommend the isolated usage of subjective health indicators to plan treatments or to evaluate the quality of oral health services. Their use should be complementary with the traditionally used objective indicators, allowing a more complete vision of the diagnosis and of the treatment objectives, involving the normative and subjective perceptions, which consider the patient’s quality of life equally important.

**CONCLUSION**

The study of quality of life in orthodontics patients has shown to be fundamentally important for the comprehension of the impact of malocclusion on daily life, especially in relation to functional limitations and psychosocial well being. The use of quality of life indices, in conjunction with normative indices for the diagnosis of malocclusion, allows the identification of those patients who benefit the most by receiving orthodontic correction, allowing the strategic planning of allocation and use of resources where their employment will be most beneficial. In a private setting, the depth which is obtained in the initial diagnosis, with the introduction of the use of quality of life indices, allows innumerable gains in the professional-patient relationship, because it enhances the knowledge of the factors which led the patient to seek treatment. In this way, planning becomes personalized, based not only on the malocclusion characteristics but also in relation to the dimensions of negative impact which most limit one’s life, bringing better clarity to the expectations of the patients and professionals regarding the final result.
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