Quality of life instruments and their role in orthodontics

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Abstract

Objective: The purpose of this study was to survey reliable information about quality of life as it relates to oral health in the literature, allowing clinicians to access and understand its influence on the process of finding and treating their patients. **Methods:** The MEDLINE, LILACS, BBO and Cochrane Controlled Trials electronic databases were researched between 1980 and 2010 and 158 studies were found that discuss quality of life related to oral health. **Results:** Thirty studies were selected: two prospective longitudinal studies, two systematic reviews, five case-control studies, twelve epidemiological studies, five cross-sectional studies and three reviews of literature, in addition to the Statement of the World Health Organization (WHO). The selection was based on the goal of describing the indicators of quality of life and the methodology used in the studies. **Conclusions:** The use of quality of life indicators in dental research and clinical orthodontics are extremely important and helpful in diagnosis and planning but do not replace standard indexes and should be used in a strictly complementary manner.

Keywords: Quality of Life. Orthodontics. Malocclusions.

INTRODUCTION

Quality of life is characterized as a "sense of well-being derived from satisfaction or dissatisfaction with areas of life considered important for an individual".[25,30] The focus of clinical studies has been on measuring the quality of life of patients with the purpose of evaluating health care. These measurements are gaining more importance as researchers realize that traditional studies bear little or no relevance to patients.[25] Therefore, to fully evaluate any intervention in health care, including oral health care services such as orthodontics, only those measures that really matter to patients should be implemented, while clinicians continue to be provided with the usual pertinent information.[19,23]

Typically, assessments of pre- and post-orthodontic treatment changes are based on traditional clinical or standard measurements, such as cephalometric data and occlusal indexes. More recently, some subjective indicators have

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been developed and adapted as new methods for measuring treatment need and comparing results. In this case, the individual's perception is the crucial link to all orthodontic treatment need and satisfaction, reflecting the impact that malocclusion exerts on their daily lives, whether by causing limitations and constraints or not. Clinical measurement is undeniably important, however, the dimensions of dental, social and functional impact are equally relevant,[18,25] especially in orthodontics, where all treatment phases play a remarkable psychosocial part in patients' lives.[25]

In Brazil, where provision of orthodontic treatment by governmental institutions is either circumscribed or non-existent, perceived need determines demand. In fact, perceived need generates action, which in turn leads to the use of private services for treatment. Worldwide, perceived need has emerged as an important predictor of the use of medical and dental services, underscoring the importance of learning about the desires of the patient.[22]

The purpose of this study was to identify reliable information about quality of life as it relates to oral health in the literature, describing the most widely employed indexes in the literature[28,29] while allowing clinicians to access and understand the influence of such information on the process of finding and treating their patients.

MATERIAL AND METHODS

In September 2010, a search was conducted in the MEDLINE, LILACS, BBO and Cochrane Controlled Trials electronic databases spanning the period from 1980 through 2010. Descriptors (keywords) were taken from the Medical Subject Headings (MeSH): "Oral health related quality of life", "quality of life" and the expression "life quality". Five hundred and sixty-nine articles were found, among which 158 were selected because they addressed oral health related quality of life (the others were linked to medical areas, or were studies in the dental field that used general quality of life questionnaires). Based on the analysis of 158 articles, 30 were identified as being directly related, through development, evaluation, testing, translation or discussion, to the subjective quality of life indexes. Only those articles were selected which validated the original versions of the subjective indicators discussed, reviews conducted by their authors, as well as validations and tests conducted for the Portuguese language.

Articles published in Portuguese, Spanish, English, French and Italian were included and all studies published in other languages were excluded, even with summaries or abstracts written in English. Extraction of data from the selected articles was performed by a single reviewer using a pre-structured instrument. The following information was gleaned: Author names, location where the study was conducted, year of publication, study period, study design, age or age group of the population, type of subjective indicator used, main findings and relevant issues.

RESULTS

Thirty studies were selected: two prospective longitudinal studies, two systematic reviews, five case-control studies, twelve epidemiological studies, five cross-sectional studies and three literature reviews, in addition to the Statement of the World Health Organization (WHO). All were used to describe the seven quality of life indexes discussed in this article. No Randomized Clinical Trials (RCT) or systematic reviews of The Cochrane Collaboration were found on the subject.

According to the literature, the most widely used and most reliable questionnaires[28,29] are: Oral Impacts on Daily Performance (OIDP),[1] Dental Impacts on Daily Living (DIDL),[16]

Geriatric Oral Health Assessment Index (GOHAI),[3] Child Oral Health Quality of Life Questionnaires (COHQLQ),[14] Early Childhood Oral Health Impact Scale (ECOHIS),[29] Oral Health Impact Profile (OHIP)[24,27] and Orthognathic Quality of Life Questionnaire (OQLQ).[8]

Among these indexes, some are specific to children and some specific to the elderly, since the cognitive abilities of understanding and self-perception change with age.[28] Moreover, complaints and personal experiences also change considerably.[8,20]

These instruments provide numerical scores that can be used to compare groups with or without disease in the oral cavity, with different diseases or different degrees of severity of such diseases. Score values can also be compared before and after treatment to determine the extent of change that can be attributed to the treatment in terms of patient well-being and quality of life.[17,18]

Oral Impacts on Daily Performance - OIDP

The index "Oral Impacts on Daily Performance" (OIDP) is one of the shortest. It aims to assess what the authors call "the latest impacts." The impact of oral conditions on the individual's ability to perform eight daily activities is assessed: Eating and enjoying the food, speaking clearly, performing oral hygiene, sleeping and relaxing, smiling, laughing and showing teeth without embarrassment, maintaining a stable emotional condition, properly performing jobs at work or in social settings, enjoying contact with people.[1]

The frequency with which the individual is affected or displays a negative impact on these functions is assessed by a time scale called "Frequency Scale," stratified as follows: Never in the past six months, less than once a month, once or twice a month, once or twice a week, three to four times a week, every day or almost every day. This scale has a score ranging from zero (never in the past six months) to five (every day or almost every day). "Perceived Severity" is also rated. It is a score used by respondents to grade how much trouble that specific function causes in the individual's daily life, ranging from five (very severe) to zero (none).[1]

The final score of each activity is obtained by multiplying the value on the frequency scale by the value in the perceived severity scale. The total OIDP score is obtained by adding up all the scores on the frequency and perceived severity scales and dividing the resulting value by the maximum possible score (8 performances x5 in the frequency range, x 5 on the scale of perceived severity = 200) and subsequently multiplying it by 100 to reach a percentage value.[2]

This test was evaluated in a pilot study with 501 patients, 35-44 years of age. Internal consistency showed adequate reliability (Cronbach's alpha=0.65), and test-retest reliability demonstrated that the index—applied in 47 individuals at three-week interval—was stable, resulting in a kappa coefficient that ranged from 0.95 to 1.0. The OIDP features good psychometric properties and a consistent theoretical basis, allowing the assessment of behavioral impacts on daily performance, unlike other questionnaires, which assess the perceived impact dimensions.[2]

The key advantages of the OIDP consist in the fact that it is easily understood by respondents and swiftly completed. Therefore, it has been translated into other languages and used in different cultures.[2]

In Brazil, the OIDP was employed to assess the impact of dental pain on 504 women during pregnancy and showed increasing negative impact on quality of life in pregnant women who had more carious lesions, fewer teeth, who visited the dentist less frequently, and who perceived the need for treatment.[24] The OIDP was also used to measure the impact on quality of life of 1,675 Brazilian adolescents relative to the standard measurement of their malocclusions and showed no difference between standard view and perceived impact, i.e., the psychosocial effects, as

measured by the OIDP, when the same malocclusion is assessed.[25]

In a case-control study using OIDP with 279 cases and 558 controls, Bernabé et al[4] showed that orthodontic treatment significantly improved OHRQoL in Brazilian adolescents. These patients were significantly less likely to have impacts on physical, psychological and social problems in their daily lives, related to the presence of malocclusions, than patients with no history of orthodontic treatment.

The CHILD-OIDP[11] was launched in 2004 by adapting the OIDP model for 11-12 year-old children. It evaluates the impact of oral health issues on the same eight daily activities using pictures to illustrate the questions.

The index was evaluated in 1,100 children aged 11-12 years old and proved reliable and valid, as the values it yielded highly correlated with the perceived need for dental treatment. Cronbach's alpha was 0.82. CHILD-OIDP (test-retest) stability was tested in 90 children and showed kappa = 0.91.[11]

Dental Impacts on Daily Life - DIDL

The Dental Impacts on Daily Living (DIDL) index evaluates psychosocial problems and, consequently, quality of life according to oral health conditions using five quality of life dimensions: Comfort (related to gingival health and absence of food impaction), appearance (individual's self-image), pain, performance (ability to perform normal daily activities and social interactions), and dietary restrictions (in biting and chewing).[16]

The DIDL is a questionnaire with 36 items that aims to obtain scores for each dimension as well as an overall score that assesses the overall impact of all dimensions. The dimensions score is obtained by adding the values of each item (question) that make up a dimension, for example, the four items or questions that comprise the "Appearance" dimension. The result is then divided by the number of items comprising the scale, which in this case is 4. The impacts are interpreted as positive if the final value is +1, and negative if it is –1, and not altogether negative when the final value is zero.[16]

The dimensions are given weights proportional to the impact perceived by the respondent using a visual scale graded 1-10 with dimensions positioned side by side. Spearman's correlation test was used to evaluate how the determination of weights for the dimensions contributes to the final result, comparing the DIDL scores with and without weights. The results suggested that some patients rated as dissatisfied (score below zero) in the version without weights were actually less severely impacted when they were assigned weights.[16]

The total score is obtained by calculating the score of each dimension (the sum of items divided by the number of items that make up the scale), and these scores are assigned weights by the interviewees. The dimensions are then added up, yielding a total score.[16]

The instrument was tested on a convenience sample of Brazilian individuals where their stability (test-retest) and internal consistency were assessed using the questionnaire (0.87 and 0.85, respectively) and the scale (0.78 and 0.59, respectively), yielding positive results.[16] The major advantages of this index is its flexibility in producing or eliminating data (individual items, dimensions or total score) and the possibility of assigning weights to the dimensions, reflecting the true importance of each dimension in the life of the individual.

Geriatric Oral Health Assessment Index - GOHAI

The Geriatric Oral Health Assessment Index (GOHAI), developed through research with North American senior citizens, was specifically designed to evaluate oral functional problems in elderly populations and assess the degree of psychosocial impact associated with oral diseases.

It may also be used to evaluate the functional and psychosocial effectiveness of dental treatment.[3]

The GOHAI consists of 12 items that assess pain, discomfort and changes in function. Four of these items are geared towards psychosocial functions such as dissatisfaction with oral health and appearance. The questionnaire score is obtained with a Likert scale of six levels, always (5), very often (4), often (3), sometimes (2), rarely (1) never (0). Only the total score is calculated by adding the scores of the 12 items, ranging from zero to sixty.[3]

The index was tested in 1755 individuals aged at least 65 years who received health care, and showed adequate consistency, with a Cronbach's alpha of 0.79. This study also showed that individuals with a greater number of natural teeth achieved more positive results in the GOHAI.[3]

When it was applied in 280 Hispanics, with a mean age of 39 years, the GOHAI yielded excellent internal consistency results (Cronbach's alpha=0.83), demonstrating that it can be used reliably in young adults.[9]

The GOHAI was used to test a government program to foster oral health in Florida, evaluating 200 senior residents. Two years after completing dental treatment, 119 patients underwent a retest, which allowed researchers to note a 2.3-point mean improvement in the impact, starting from a baseline (set in pretreatment tests) of 52.3 (SD=9.0)[9].

Currently the GOHAI is used reliably in elderly and young adults and has been translated and adapted into many languages and cultures.[9]

The Child Oral Health Quality of Life Questionnaire - COHQOL

The Child Oral Health Quality of Life Questionnaire (COHQOL) was designed to adapt to modern concepts of child health and be applicable to children between six and fourteen years of age with a wide variety of facial and orofacial disorders.[14] Its goal is to incorporate the perceptions of children and their parents, attuned to children's cognitive and emotional development. To this end, separate assessments are made.

The Parental/Caregiver Perception Questionnaire (PPQ) comprises 31 questions and aims to evaluate the impact of children's oral conditions seen from their parents' perspective. The PPQ was considered reliable in the evaluation of 231 caregivers (Cronbach's alpha = 0.94) and stable when retested at 79, with interclass correlation coefficient of 0.85.[14]

Due to a large variability in child perception across different ages three other questionnaires are available which are similar to the Child Perceptions Questionnaire (CPQ), with 36 questions each, and each specific to one age group only: between 6 and 7 years, between 8 and 10 years and between 11 and 14 years. The perception questionnaires were assessed in 123 children aged 11-14 years, divided into three clinical groups (pediatric, orthodontic and orofacial). All three constructs are divided into three main areas, i.e., social confidence and well-being, oral and social self-image, and concern for oral health.[14] Positive correlation was found between the results, the perception of oral health ($p=0.013$) and overall well-being ($p<0.001$). The reliability and stability tests (test-retest) were performed on 65 children, with satisfactory results, Cronbach's alpha and interclass correlation coefficient were 0.91 and 0.90, respectively, showing that the COHQOL scale designed for children aged 11-14 was valid and reliable.[14]

The CPQ for children aged 8-10 years was based on the 11-14 years CPQ and had its validity and reliability tested in 68 children. The authors noted a positive correlation between the results and the perception of oral health and general well-being ($p<0.001$), with Cronbach's alpha and interclass correlation coefficient of

0.89 and 0.75, respectively, showing that this scale is also valid and reliable. The CPQ for children 6-7 years of age has not yet been tested for validity and reliability.[14]

The CPQ is ideal for measuring the quality of life of children as it is relatively short and features parallel measurements for caregivers and for children, thereby capturing the impact on quality of life from both perspectives.[14]

Early Childhood Oral Health Impact Scale - ECOHIS

The design of the Early Childhood Oral Health Impact Scale (ECOHIS) was based on the 36 items that comprise the COHQOL[14] questionnaire. ECOHIS is focused on evaluating quality of life related to oral health in preschool children.[29] Of the 13 questions that compose the index, 9 are designed to measure the impact on children and 4 to measure the impact on the family.

The questionnaire was tested for validity and reliability in a sample of 167 American caregivers of children five years of age. Correlation was found between ECOHIS scores and overall health condition ($p<0.05$) and oral health status ($p<0.001$) of children evaluated according to the perception of interviewed parents. The authors also observed a correlation between the scores of the child and family subscores ($p<0.001$), with Cronbach's alpha equal to 0.87, showing satisfactory reliability.[29]

In 2006, a cross-cultural translation of ECOHIS into Portuguese[29] was performed. Internal consistency for the 13 items of the questionnaire, tested on a sample of 80 children and their families was high (Cronbach's alpha=0.80). A positive correlation was also noted between ECOHIS scores and general health ($p<0.01$), and oral health status ($p<0.01$) for children, as measured by the perception of respondents. The stability test (test-retest) was conducted with 50 female caregivers with a mean age of 32.1 years, and 50 children. Interclass correlation coefficient (ICC) for the ECOHIS questionnaire was 0.98. ICC child subscale was 0.98 and ICC respondent subscale (children's next of kin) was 0.97. Therefore, the Portuguese version of ECOHIS was considered reliable and stable.[29]

The ECOHIS' most remarkable advantage is that it is a short and easy-to-apply questionnaire. Age groups, however, should be strictly observed since it is designed for children whose maturity and cognitive, emotional, social and linguistic development are at the preschool stage.[29]

Oral Health Impact Profile – OHIP

Oral Health Impact Profile (OHIP) was developed and tested in Australia as an indicator of perceived need in order to enhance understanding of oral health-related behaviors by measuring the discomfort, dysfunction and self perceived impact of oral diseases on the daily activities of adults and seniors, thereby complementing traditional[27] epidemiological indicators. Its 49 items are divided into seven subgroups or dimensions: Functional limitation, physical pain, psychological discomfort, physical disability, psychological disability, social disability and handicap in performing daily activities that collectively indicate the "social impact" of each disease.[27] These sub-scales are in a hierarchical order of increasing impact on the individual's life, and are based on a concept suggested by Locker (1988),[18] which is derived from the Classification of Impairments, Disabilities and Handicaps of the World Health Organization (WHO).[30] The questions are rated using the five-level Likert scale (always [4], often [3], sometimes [2], rarely [1], and never [0]).

The index was assessed in a sample of 122 individuals aged 60 years or older. The internal reliability of six subgroups was high (Cronbach's alpha coefficient = 0.70-0.83) and low only for the disability subscale (0.37) while test-retest reliability, performed on 46 of individuals sampled

for each dimension of the questionnaire (ICC of 0.42 to 0.77 for the dimensions), showed stability. There was also a positive correlation between OHIP scores and general health status and oral health ($p<0.05$).[19]

The authors noted that the OHIP was able to detect an association previously observed between social impact and perceived need for treatment,[22,27] besides being the most commonly used sociodental instrument in use, translated and adapted into many languages and cultures.[18,20]

A systematic review of literature on the use and performance of OHIP concluded that the instrument is sensitive enough to capture changes in the impact of oral conditions. However, there is little scientific evidence to recommend the use of the OHIP instrument in isolation, be it in planning or assessing oral health services. Its use should be considered complementary to traditional objective indicators.[22]

The short form of the OHIP-49 questionnaire (OHIP-14) was developed using epidemiological data from a sample of 1,217 South Australians with a mean age of 60 years.[28] The author concluded that fourteen questions were effective in determining the same patterns of variation in clinical and socio-demographic factors that were observed using the forty-nine questions, in addition to comprising the seven subgroups, neatly and hierarchically distributed every couple of questions, suggesting that the reduced version of the instrument is useful to quantify the levels of impact with good reliability, validity and accuracy.[18,22] The internal reliability of the OHIP-14 was high according to Cronbach's alpha ($\alpha=0.88$) and its variance was 94% compared to the OHIP-49.[28]

To adapt the OHIP-14 to the cultural context of Brazil and the Portuguese language, a cross-cultural translation was performed. The validation showed psychometric properties similar to those measured in the original situation. The properties of the Brazilian version of OHIP-14 were evaluated in a cross-sectional study, which concluded that this version has similar properties to the original version and is therefore a valid tool for international research.[24]

Most studies on the impact of oral diseases on quality of life focused on adults. This may be due to the fact that the impact on this group is more evident owing to an accumulation of diseases and their effects on oral tissues. Broder et al[5] spearheaded the use of the OHIP in adolescents aged 12 to 17 years. The authors concluded that OHIP-14 may be an important, sensitive screening tool to identify people with high levels of oral health impacts in a given community, even in younger individuals.

The impact of orthodontic treatment on the quality of life of adolescents between 15 and 16 years of age was evaluated in a Brazilian study that used OHIP and OIDP. The results showed that patients treated orthodontically showed significant improvement in quality of life compared to those never treated or undergoing orthodontic treatment.[25]

Another Brazilian study used OHIP-14 to evaluate quality of life in 92 patients (mean age of 13.2 years) who sought orthodontic treatment, and in 102 patients who did not, and concluded that individuals seeking treatment experience a significantly more negative impact on their quality of life, regardless of the severity of their malocclusion and their esthetic condition, as assessed by an orthodontist.[13]

The OHIP-14 was also used to assess the impact of treatment on 117 ortho-surgical patients (mean age of 24 years), and demonstrated improvement in quality of life in terms of oral health, with significant reduction in OHIP values after treatment. Presurgical orthodontic treatment also led to significant improvement in patients' quality of life.[10]

A prospective study assessed the OHRQoL of 250 chinese patients in periods of one week, one month, three months, six months and after the orthodontic treatment, using the OHIP-14.

The study showed significant worsening in OHRQoL during treatment periods, with the worst phase in the first week. The most significantly affected dimensions were: physical pain, psychological discomfort and psychological disability. Authors concluded that patients exhibited a significant gain in its OHRQoL after removing braces when compared with their pretreatment stage and also with their treatment stages.[6]

However, a sistematic review[17] showed that scientific evidence levels of available articles in literature about the effects of orthodontic treatment are relatively low since most studies are cross-sectional. Moreover, the issues discussed were primarily related to the relationship between malocclusions and OHRQoL, and there is still no controlled study that links the oral health-related quality of life and the orthodontic treatment prospectively, showing its effects and consequences.

To Bernabé et al[4], Feu et al[13] and Liu, McGrath and Hägg,[17] there is a negative impact on OHRQoL in adolescents with malocclusion, but the role of psychological, physical and social impact in that is still no well understood, probably due to large individual variation with which it manifests itself.

Although OHIP was originally designed to assess impact on groups and populations it can likewise measure impact on individuals and be incorporated into daily care as an aid in individualizing treatment planning.[27]

Orthognathic Quality of Life Questionnaire – OQLQ

Patients with severe dentofacial deformities may require a comprehensive ortho-surgical treatment, and providing better quality of life is an objective of this kind of intervention. Patients are often young, which limits the use of most existing tools, such as OHIP. Based on this, the instrument known as the Orthognathic Quality of Life Questionnaire - OQLQ was created in order to analyze the impacts and benefits of the ortho-surgical treatment in patients' quality of life. The development and reliability of this instrument was described and validated by Cunningham, Garratt and Hunt[8] in 2002.

The great importance of using more specific questionnaires is their sensitivity in capturing impacts related to the individuals condition and their smaller interaction with confounding factors, such as patients general health.[4,17,20] Therefore, to evaluate ortho-surgical patients, it is better to use a questionnaire with adequate sensitivity and specificity as the Orthognathic Quality of Life Questionnaire.[8]

Choi et al[7] prospectively evaluated 36 ortho-surgical Class III patients to measure changes in OHRQoL, measured by the OQLQ and the OHIP-14. Patients were evaluated at the initial period (before treatment begins), six weeks after surgery, six months after surgery and after orthodontic treatment. Authors observed a progressive reduction in OQLQ rates at all evaluated times when compared with baseline assessment. The OHIP-14, however, had a significant reduction only six weeks and six months after surgery. Ortho-surgical treatment has been considered effective, producing significant psychosocial and functional gains for the patients.

DISCUSSION

The literature is in general agreement that the use of indicators of quality of life is an essential component in dental research and clinical studies, especially those that evaluate prevention and treatment options that seek to improve the health of individuals.[3,14,17,18,29] In Orthodontics, recent studies showed significant positive effects in the OHRQoL in treated patients.[4,6]

Functional improvement is not the primary motivation of many individuals who receive treatment.[4,6,17] From a sociological standpoint, the need and desire to convey a culturally acceptable image and the desire to achieve esthetic dentistry standards are the main reasons

for seeking orthodontic treatment, and it is precisely these kinds of motivation that subjective indexes, such as the OHIP, evaluate.

According to the literature, dissatisfaction and demand for orthodontic treatment are related to increasing age, the use of derogatory nicknames and embarrassment associated with malocclusions. Therefore, self-esteem is closely linked to demand for treatment.[10,12,13,18,26] This demand can be construed, in the patient's view, as a quest to recover their self-esteem and satisfaction in living socially.

Although the desire to improve dental and/or facial appearance is the main reason for seeking orthodontic treatment,[12,15] this quest is not usually related to malocclusion severity, as demonstrated in a study by Feu et al[13] but to a general desire shared by individuals and families alike to improve their esthetics and self-esteem, often with unrealistic expectations. This fact once again underscores the importance of being aware of the actual motivation behind the search for orthodontic treatment in order to avoid future disappointment and misunderstandings as regards treatment outcome.

Today's society has changed its way of thinking and acting over the past few years driven by new patterns of behavior and esthetics, which are now part and parcel of the concept of quality of life for most of its members.[20] Therefore, how can orthodontists ignore the major demand generators of today? And how can they plan a treatment without being aware of the patients' view of their own problem?

In actuality, no scientific evidence exists to recommend the use of subjective indicators alone in planning orthodontic treatment or assessing the quality of oral health services.[22] The use of such indicators should be complementary to traditional objective indicators, which enable a broader view of diagnosis and treatment goals, involving standard and subjective perceptions, which are equally important to the patient's quality of life.

CONCLUSIONS

The study of quality of life in orthodontic patients is of paramount importance if one is to understand the impact of malocclusions on daily life, especially in terms of functional limitations and psychosocial well-being. The use of indicators of quality of life hand in hand with standard indicators for diagnosis of malocclusions allows orthodontists to identify which patients can benefit most from orthodontics. As a result, strategy and expenditure planning can be implemented with greater effectiveness.

In private settings, the in-depth diagnostic capabilities acquired through the introduction of quality of life indexes ensure invaluable gains for the professional-patient relationship by broadening the understanding of which factors lead patients to seek treatment. Planning has therefore become individualized and based not only on the characteristics of the patient's malocclusion but also on the factors that exert the worst impact on their everyday life. As a result, expectations regarding treatment outcome become perfectly clear to both patients and professionals.

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