

# Quality of Life and Its Importance in Orthodontics

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**Abstract.** *Over the last 10–15 years, the terms quality of life (QOL) and health-related quality of life (HRQL) have been seen increasingly in medical literature. Much of the orthodontic treatment that is undertaken is justified on the basis of improving health-related quality of life. With this in mind, studying HRQL in orthodontic patients has the potential to provide information about treatment needs and outcomes, and may also facilitate improved care. Clinicians should therefore be aware of some of the ways in which health-related quality of life may be assessed.*

*The first part of this review article looks at the general concepts of health-related quality of life, whilst the second section focuses on dentistry and orthodontics.*

**Index words:** Quality of life, Health-related quality of life, Orthodontics.

## Introduction

Quality of life (QOL) may be defined as 'a person's sense of well-being that stems from satisfaction or dissatisfaction with the areas of life that are important to him/her' (Becker *et al.*, 1993). It is not a new concept, much of the pioneering work was undertaken by Thorndike as early as 1939, however, it is a rapidly expanding area with over 1000 new articles indexed each year under the heading 'quality of life' (Muldoon *et al.*, 1998). The term 'quality of life' became a key word in the Medline Computer Search System as recently as 1977, since which time the interest in this field has increased enormously. Between 1966 and 1974, only 40 references to quality of life were found; however, this had increased to over 10,000 between 1986 and 1994 (Wood-Dauphinee, 1999).

Health contributes to quality of life and the true impact of health and disease on quality of life is known as health-related quality of life (HRQL). Historically, HRQL measures were developed for a number of reasons including: measuring positive definitions of health; comparison of health systems; needs assessment and assessment of outcomes following intervention. HRQL has become increasingly important as researchers have realized that traditional outcome measures are of little interest to the patient and that some form of 'real life' outcome measure is required in the current health climate (Dijkers, 1999). To fully evaluate any healthcare intervention requires outcome measures of importance to the patient, as well as the clinician. In the past, performance measures in health care have tended to focus on areas which can be quantified readily (i.e. number of treatment episodes). The 1997 White Paper, the New NHS (Secretary of State for Health, 1997), proposed that this concept should be replaced by one that looks at health improvements in terms of fairer access to care, quality and outcomes of treatment, and the views of patients themselves.

Increasingly, clinicians are expected to show accountability with respect to effectiveness of treatment and

efficient use of resources. This places increased emphasis on patient-based outcome measures including changes in health-related quality of life. This may be particularly important in those interventions that are perceived as 'cosmetic' or 'elective'.

## Health-related quality of life and health care outcomes

HRQL measures have become the popular way of assessing treatment needs and outcomes in the following situations (Jenkinson *et al.*, 1993):

- (1) clinical trials;
- (2) regular monitoring of patient care;
- (3) improving doctor–patient interactions;
- (4) between illness comparisons, i.e. to compare health gains achieved in treating different patient groups as a method of priority setting;
- (5) evaluation of different methods of organising and financing health care services.

One of the underlying assumptions of HRQL research is that, in addition to relieving clinical symptoms and prolonging survival, a primary objective of any intervention is the enhancement of quality of life and well-being (Berzon, 1998). As recently as 1987, it was noted that 'few surgical trials consider quality of life variables as outcome measures ... Unless quality of life effects are quantified and reported in trials, they will be ignored or undervalued in health policy decisions' (O'Young and McPeck, 1987). The authors looked at six well known and respected general surgery journals for the year beginning 1981, and of 99 therapeutic trials, 97 per cent made no mention of quality of life or health-related quality of life. They cautioned that work was required to develop appropriately designed quality of life studies and the last decade has seen many advances in this area.

When investigating acute medical conditions, measures such as symptom resolution, return to baseline health and mortality are accepted outcome measures. However, when considering chronic conditions, outcome measures are more difficult to establish, and enhancement of HRQL

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becomes an important issue (Brown, 1999). Quality of life as an outcome indicator has been added to social and health service programme development in recent years. In 1992, the Department of Health proposed that health status and HRQL should be incorporated into outcome assessment along with survival rates, symptoms and complications, the experiences of patients and their carers, and the costs and use of resources. The necessity of showing good quality treatment outcomes has become increasingly important in recent years and the standardized self-report survey is emerging as the most appropriate method to do this (Ware, 1993).

Despite the lack of a universally agreed definition, there is agreement that HRQL should include those areas of concern to individual patients (Brown and Gordon, 1999; Jenkinson *et al.*, 1999). Health-related quality of life is assumed to encompass many elements of an individual's life that are not accessible to the doctor and it may, therefore, be argued that the patient is the best person to judge their own HRQL. A number of different models have been proposed. For most models, the patient serves as their own control, therefore, a primary strategy has been to look at changes in HRQL due to illness or medical intervention (Schipper *et al.*, 1996).

It is generally accepted that HRQL includes a number of domains. There is a wide range of potential domains and not all of them are relevant to all studies, but where possible, those that are relevant should be looked at. For example, Spilker (1996) proposed the following domains:

- (1) physical status;
- (2) psychological status and well-being;
- (3) social interactions;
- (4) economic and/or vocational status and factors;
- (5) religious and/or spiritual status.

Despite major research efforts to date in the field of HRQL, there remains work for the future. There are several conceptual models that have been developed although, as yet, there is no universally agreed model. A number of theoretical foundations have been used in the development of oral HRQL measures. For example, Locker (1988) cited an adapted version of the World Health Organisation model in which the concepts move from a biological to a behavioural and then to a social level of analysis (WHO, 1980, cited in Locker, 1988). Improvements in this area would make it easier for researchers to select the appropriate instrument for their population group.

The future is also likely to see more condition-specific measures and individualized measures such as the Schedule for the Evaluation of Individual Quality of Life – SEIQoL (O'Boyle *et al.*, 1992) and the Patient Generated Index (Ruta *et al.*, 1994). In addition, widespread incorporation of HRQL measures into hospital databases should be aimed for. A number of HRQL are currently incorporated into databases (i.e. for head and neck cancer), but in the future, it should be feasible to expand on this.

### Measuring quality of life

The purpose of an HRQL instrument is not just to measure the presence and severity of disease symptoms, but also to show the impact of the illness and/or the intervention on that individual and, in some cases, to study unmet patient

needs (Berzon, 1998; Bennett and Phillips, 1999). The measurement of HRQL is far from easy and there are a number of issues that continue to cause problems for researchers working in this field. The first problem is that there is little agreement on the definition of quality of life (Brown and Gordon, 1999; Dijkers, 1999). This is compounded by the fact that many studies are carried out with little thought for the most appropriate instrument and without establishing a research question. Each instrument has a specific focus and level of sensitivity and the appropriate choice needs careful thought. The issues are further complicated by the fact that many of the instruments are cumbersome and more appropriate for research than in a clinical setting. In addition, it is debatable as to what should be included and whether different sections should be weighted. Recent years have seen the development of many more instruments with some measuring specific aspects and others measuring 'global' quality of life. The difficulties in developing new instruments are compounded by the fact that there is no gold standard with which to compare (EuroQol Group, 1990).

Modes of administration of HRQL instruments include: direct interview; telephone interview; self-completion questionnaires; and surrogate responders, if the individual is unable to answer the questions themselves for any reason (Guyatt *et al.*, 1993). The most popular method is, almost without exception, the patient-completed questionnaire.

Brown (1999) proposed the following guidelines for clinicians undertaking studies to measure HRQL.

*Correct choice of instrument.* Is it appropriate for the study group in question? Is a generic or condition-specific instrument required? Is the instrument sufficiently responsive?

*Timing of QOL measurement.* Ideally, this should not be too close to the intervention that the patient confuses changes in their QOL with effects of the intervention.

*Frequency of measurement.* Is the measurement once only, cross-sectional or part of a longitudinal study?

There are two main groups of instruments that may be used. Both approaches have their strengths and weaknesses, and there are advantages to using both instruments in a research study (Ware, 1993; Garratt *et al.*, 1996; Table 1).

*Generic measures.* Provide a summary of HRQL and may generate a single index measure or a health profile.

*Specific measures.* Focus on a particular condition, disease, population or problem, and are devised to measure patients' perceptions of the outcomes of health care interventions or to assess health needs.

There are advantages and disadvantages to both methods, but condition-specific measures are particularly useful in the assessment of oral health-related quality of life (OHRQL) where generic measures may not be sufficiently responsive to show changes as a result of oral disease or dental intervention. In addition, generic measures include a wide range of questions, some of which will be irrelevant, particularly in orthodontics where the patients are fit and well, with no physical deficit.

TABLE 1 Comparison of generic and condition-specific measures

|                           | Strengths   | Weaknesses  |
|---------------------------|---|---|
| <b>Generic</b>            | Single instrument<br>Comparisons across different interventions or conditions is possible<br>May be useful when condition-specific measures are not available<br>Detects differential effects on different aspects of health status | May not focus adequately on area of interest<br>May not be sufficiently responsive<br>Some questions will be irrelevant<br>Some generic instruments are excessively long  |
| <b>Condition-specific</b> | Clinically sensible<br>More responsive<br>More acceptable to patients as they cover only relevant areas<br>Usually shorter than generic measures  | Does not allow cross- condition comparisons<br>May be limited in terms of populations and interventions<br>Developmental process (reliability, validity testing) is time consuming<br>More expensive to develop, administer and score |

(Adapted from: Guyatt *et al.*, 1993; Bennett and Phillips, 1999).

### Generic instruments

There are two main types of generic instruments (Camilleri-Brennan and Steele, 1999). The first is the health profile in which a separate score is given to each domain, for example, the Short-Form 36-item Health Survey (SF-36). The other type of generic measures are the health indices where scores generated from all answers are added up to give a single number or index, for example, the Rosser Index or the Quality of Well-Being Scale. Generic measures do have uses in comparisons across populations and may have scope for use in economic evaluation, but they have limited ability to capture the effects of certain interventions.

Two of the most widely used generic instruments are the SF-36 and the EuroQol. The SF-36 was developed as part of the Medical Outcomes Study which was carried out in Boston, Chicago and Los Angeles during 1986–87. The aim of the study was to enhance the methods used for the monitoring of patient outcomes in practice and research settings (Ware and Sherbourne, 1992; McHorney *et al.*, 1993). It is a practical measure to use due to its short length and it has undergone extensive psychometric testing in many countries including the USA and the UK. The EuroQol was developed by a multidisciplinary group from five European centres, and was designed as a simple device which could be used alongside other measures to enable comparison of results obtained in different disease groups and different settings and countries (EuroQol Group, 1990; Kind, 1996). Other generic measures include the General Health Questionnaire (Goldberg and Williams, 1988), the Sickness Impact Profile (Bergner *et al.*, 1981) and the Spitzer Quality of Life Index (Spitzer *et al.*, 1981).

### Specific instruments

Specific instruments may be divided into four groups (Camilleri-Brennan and Steele, 1999):

- (1) condition or disease-specific—see below;
- (2) domain specific—focus on one domain, e.g. depression or anxiety;
- (3) population specific—focus on one population group;

- (4) symptom specific—focus on one type of symptom, e.g. pain.

Specific measures are designed for use in clinical situations and their narrow focus means that they are potentially more responsive to small, but clinically important, changes in health. Condition-specific are the most commonly used of these measures. A number of condition-specific quality of life measures have been developed for conditions as diverse as inflammatory bowel disease (Guyatt *et al.*, 1989), rhinoconjunctivitis (Juniper and Guyatt, 1991), epilepsy (Baker *et al.*, 1993), chronic airflow limitation (Guyatt *et al.*, 1999) and chronic liver disease (Younossi *et al.*, 1999). A recent paper also described the initial stages in the development of a condition-specific measure for patients undergoing orthognathic treatment (Cunningham *et al.*, 2000).

Whichever instrument is selected, it should be consistent with the concept of health-related quality of life. It should collect data that can be assessed reliably and validly, the data should exhibit sensitivity to change over time, the instrument should be relatively short, and the data should account for most of the variance in a subject's rating of his/her well-being (Guyatt *et al.*, 1989; Berzon, 1998).

### Oral health and health-related quality of life

'Oral health is a standard of health of the oral and related tissues which enables an individual to eat, speak and socialize without active disease, discomfort or embarrassment and which contributes to general well-being.' (Department of Health, 1994)

Oral disease has traditionally been studied using clinical indices such as the DMF index or CPITN. These indices, whilst remaining important in clinical practice, are a measure of existing or past dental disease and may in some situations be used to provide an indication of treatment need. However, they give no indication of the functioning of the individual or the social and psychological impact of the disease (Locker, 1988).

The importance of health-related quality of life has seen widespread acceptance in medicine although oral health status has only been seen in these terms in the last 10 to 15 years. This is despite the fact that oral health was first

considered in terms of quality of life during World War II when the presence of six opposing teeth was used as an indicator of oral functioning and well-being and was used to assess suitability for service (Hatch *et al.*, 1998). Oral diseases and conditions are highly prevalent and the consequences are not only physical, but also economic, social, and psychological. They seriously impair quality of life in a large number of individuals and may affect various aspects of life including function, appearance, and interpersonal relationships (Gift and Redford, 1992).

Traditionally, there has been a tendency to treat the oral cavity as an autonomous anatomical landmark, which happens to be located within the body and, as such, the oral cavity has been seen as separate to the body and the individual. This approach is now being questioned and has given rise to new concepts. Locker (1997) challenged the distinction often made between general and oral health, and introduced the issue that our focus should be, not on the oral cavity itself, but on the individual and the way in which the oral condition affects health, well-being, and quality of life.

Gift and Atchison (1995) presented one of the keynote papers in the field of oral health in which they aimed to improve the understanding of the interaction between oral health, oral health-related quality of life, and systemic health. They also noted that measurement of oral health-related quality of life poses many of the same problems as for general health. They proposed that oral health-related quality of life derives from three approaches: the oral cavity as the outcome (this assumes that a pain free oral cavity is the ideal); the effect of the condition of the oral cavity on the rest of the body; and the effects of systemic health and HRQL on the oral cavity and OHRQL. Gift and Atchison (1995) stressed the need to conceptualize oral health as an integral part of general health and to consider the contribution of oral health to overall HRQL. Oral health-related quality of life encompasses multidimensional domains as for HRQL. These include: survival of the individual and the dentition; absence of disease or symptoms; appropriate physical functioning as associated with chewing, swallowing etc.; absence of discomfort or pain; emotional functioning associated with smiling; social functioning associated with normal roles; perceptions of excellent oral health; satisfaction with oral health; and absence of social or cultural disadvantages due to oral status. These domains also show complex inter-relationships.

The need for a comprehensive approach to study the social and psychological impact of oral disease was first realized in the late 1980s when Reisine *et al.* (1989) used a battery of previously validated scales to determine the impact of several common, but serious dental conditions (for example, temporomandibular joint pain) on quality of life. Their findings indicated that a number of patients were affected in their home, work, social, and leisure activities as a result of their dental condition. Since this early work, the growing recognition of the importance of quality of life in the field of dentistry has led to the development of a number of oral health-related quality of life instruments (Corson *et al.*, 1999).

The predominant measurement focus in dentistry remains disease and there are still many more research findings related to function and the ageing population than in other areas (Gift, 1997). The best known of the instru-

ments used in assessment of oral health-related quality of life is the Oral Health Impact Profile—OHIP (Slade and Spencer, 1994; Slade, 1997, 1998). The original version of the scale comprised 49 items divided into seven domains, but a recent study produced a short-form OHIP containing only 14 items (Slade, 1997). The OHIP is designed to determine perceptions of the social impact of oral disorders and it has been widely used, although mainly on patients over 60 years of age. Other instruments include the Social Impacts of Dental Disease, which was one of the first socio-dental indicators (Cushing *et al.*, 1986); the Geriatric Oral Health Assessment Index (Atchison, 1997); the Dental Impact Profile (Strauss, 1997); the Oral Health-Related Quality of Life Measure (Kressin, 1997); the Dental Impact of Daily Living—DIDL (Leao and Sheiham, 1996); and the Subjective Oral Health Status Indicators—SOHSI (Locker and Miller, 1994). However, the majority of these indices were developed for use with an older population and are likely to have very limited use with orthodontic patients.

A recent paper (Allen *et al.*, 1999) compared the OHIP with the SF-36 in three groups of patients: edentulous patients seeking implants; edentulous patients seeking conventional dentures; and dentate patients. The SF-36 failed to discriminate between the groups and all sub-scale scores were within the range of normative data for UK adults. The OHIP did, however, discriminate between the three groups and the authors postulated that it could be used as a means of identifying those patients who would benefit from implant treatment. This reinforced the concept that condition-specific instruments are likely to be more useful than generic instruments in oral HRQL.

Recent years have also seen a number of papers in the field of head and neck oncology. Rogers *et al.* (1999) studied papers in the literature, which looked at health-related quality of life in patients with head and neck cancer. They provided an overview of instruments that had been used in oral cancer research (although several of these measured only depression or anxiety rather than quality of life). The paper stressed that although there is a great wealth of information on health-related quality of life, there is very little information relating to head and neck oncology. This supports the findings that quality of life research is less well developed in the fields of dentistry and maxillofacial surgery than in other fields of medicine.

There is very little doubt that oral health is an integral part of general health and contributes to overall health-related quality of life. The oral cavity contributes to HRQL at both biologic and social psychological levels, and when oral health is compromised, overall health and HRQL may also be adversely affected (Gift and Atchison, 1995).

### **Orthodontics and health-related quality of life**

There is still little research in the field of orthodontics and HRQL. A recent Medline search found only 11 papers under the key words 'quality of life' and 'orthodontics'; however, some of these papers also related to orthognathic treatment. The decision as to whether malocclusion and orthodontic treatment fit into the classic concept of health and disease is a difficult one. Orthodontic treatment is different to most other medical interventions in that it aims to correct variation from an arbitrary norm (O'Brien *et al.*, 1998). One of the reasons frequently stated for undertaking

orthodontic treatment is improvement in aesthetics and subsequent enhancement of psycho-social well being, however, even that is open to some debate (Shaw *et al.*, 1986).

O'Brien *et al.* (1998) considered the rationale for health-related quality of life assessment in orthodontics and noted that the majority of measures which have been developed in the field of dentistry are not applicable to orthodontic patients, primarily because most orthodontic conditions are asymptomatic and relate to aesthetics, rather than features such as pain or discomfort. This means that research into outcomes of orthodontic treatment has tended to concentrate on traditional indices and measurements (for example, PAR scores or cephalometric measures before and after treatment) or measures of morbidity (for example, root resorption following treatment). These clinical indicators are still of importance but require supplementation with HRQL measures for two main reasons (Bennett and Phillips, 1999): first, the HRQL outcome does not necessarily correlate with objective findings and, in addition, patients' ratings of outcome may not correlate with those of clinicians. It is for these reasons that self-report HRQL instruments should be used as it is then the patient's own views/feelings which are being measured.

Quality of life changes have been studied more in relation to orthognathic surgery than orthodontic treatment *per se* (Kiyak *et al.*, 1986; Flanary *et al.*, 1990; Cunningham *et al.*, 1996; Hatch *et al.*, 1998; Bennett and Phillips, 1999). It seems reasonable to assume that orthognathic treatment is associated with improvements in HRQL, indeed most patients would not pursue treatment if this were not the case. However, as with conventional orthodontics, the quantitative evidence is still lacking. Bennett and Phillips (1999) proposed that a combination of condition-specific and generic measures are required in the assessment of orthognathic patients and it is likely that future research will focus on the development of appropriate instruments. A recent study has taken the first steps towards this by developing a condition-specific quality of life measure for those patients requesting orthognathic treatment (Cunningham *et al.*, 2000).

Given that many orthodontic patients are children/young adolescents, there may be some potential barriers to the use of HRQL measures. This is particularly so with generic measures that may be lengthy, unduly complex and contain items, which appear irrelevant to the respondent. For these reasons, the greater use of condition-specific measures with a small number of relevant items should be pursued. The issue is further complicated by the fact that most treatment is undertaken during adolescence when the individual is undergoing major life changes anyway and it is difficult to identify which changes are solely due to orthodontic treatment (O'Brien *et al.*, 1998). Despite these difficulties, a number of studies have now shown that it is feasible to develop HRQL measures for use in orthodontics and that valid and reliable data can be collected. These measures are likely to be of importance in the future in order to investigate treatment need and outcomes.

## Conclusions

Oral health is an integral part of general health and contributes to HRQL. A comprehensive understanding of the

effects of orthodontics on HRQL is essential and we must be able to show that benefits are derived from treatment. It can be argued readily that change in HRQL is the ideal measure of outcome and that it should be a patient-derived measure of change.

HRQL assessment is recommended in orthodontics for a number of reasons: to study treatment need and outcomes; to provide evidence to the National Health Service that treatment should be funded; and as part of clinical trials, which have the potential to improve the quality of care. With the possibility that allocation of resources in the future may be influenced by such data, the profession can no longer afford to ignore these concepts.

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