European Journal of Orthodontics 33 (2011) 270–275
doi:10.1093/ejo/cjq066
Advance Access Publication 16 August 2010

Validity and reliability of the Brazilian version of the psychosocial impact of dental aesthetics questionnaire

Fernanda Sardenberg*, Ana Cristina Oliveira**, Saul M. Paiva*, Sheyla Márcia Auad* and Miriam P. Vale*

Departments of *Pediatric Dentistry and Orthodontics and **Social and Preventive Dentistry, Faculty of Dentistry, Federal University of Minas Gerais, Belo Horizonte, Brazil

Correspondence to: Fernanda Sardenberg, Rua Joaquim Lírio, 67/302 - Praia do Canto, Vitória, ES, 29055-460, Brazil. E-mail: fesardenberg@hotmail.com

SUMMARY Oral health-related quality of life (OHRQoL) is an important aspect of health outcomes and its assessment should be made using validated instruments. The psychosocial impact of dental aesthetics questionnaire (PIDAQ) is an OHRQoL instrument that assesses the psychosocial impact of dental aesthetics was developed and validated for use on young adults.

The aim of the present study was to assess the reliability, validity, and applicability of the PIDAQ for young adults in Brazil. After translation and cross-cultural adaptation, the questionnaire was completed by 245 individuals (124 males and 121 females) aged 18–30 years from the city of Belo Horizonte, Brazil. In order to test discriminant validity, the subjects were examined for the presence or absence of malocclusion based on the dental aesthetic index criteria. Dental examinations were carried out by a previously calibrated examiner [weighted kappa = 0.64–1.00, intraclass correlation coefficient (ICC) = 0.78–1.00]. Internal consistency measured by Cronbach's alpha of the subscales was between 0.75 and 0.91 and test–retest reliability was assessed using the ICC, which ranged from 0.89 to 0.99 for dental self-confidence and social impact, thereby revealing satisfactory reliability.

Discriminant validity revealed that subjects without malocclusion had different PIDAQ scores when compared with those with malocclusion. The results suggest that the Brazilian version of the PIDAQ has satisfactory psychometric properties and is thus applicable to young adults in Brazil. Further research is needed to assess these properties in population studies.

Introduction

The living conditions, concerns, and expectations of individuals and their ideological, economic, legal, and political perceptions regarding their position within society are important aspects to conceptualizing quality of life (QoL), which is a multidimensional concept that can only be satisfactorily addressed when individuals are evaluated biologically and socioculturally [Guyatt, 1993; Testa and Simonson, 1996; World Health Organization (WHO), 1997; Corless *et al.*, 2001; Oliveira and Sheiham, 2004]. QoL also involves a dimension related to health, as processes of health and disease as well as physical, psychological, emotional, and mental well-being are perceived based on individual experience (WHO, 1997; Finckenberg *et al.*, 1998; Moura-Leite *et al.*, 2008).

In this context, the oral health-related quality of life (OHRQoL) questionnaire is used to determine individuals' impressions regarding their own health, as it assesses the impact of oral conditions on QoL (Cons *et al.*, 1986; Allison *et al.*, 1999; Locker *et al.*, 2002; Klages *et al.*, 2004, 2005; Brown and Al-Khayal, 2006; Broder, 2007; Broder *et al.*, 2007). A number of studies have demonstrated the negative impact oral disorders can have on the daily living of individuals and their families using sociodental indicators developed to assess OHRQoL (Locker *et al.*, 2002; Oliveira and Sheiham, 2004; Feitosa *et al.*, 2005; Marques *et al.*, 2006).

Measuring OHRQoL is important in investigating the aetiology of disease, contributing to prevention, quantifying the distribution of disease in different populations, aiding the allocation of healthcare resources (at a population level), estimating treatment need, and measuring the impact of oral conditions on daily living (Guyatt, 1993; Corless *et al.*, 2001; Locker *et al.*, 2002; Oliveira and Sheiham, 2004; Marques *et al.*, 2006).

Individuals with malocclusion (particularly in the anterior region) may require orthodontic treatment in order to improve oral health, dental function, and aesthetics, resulting in an improvement in QoL. Orthodontic treatment traditionally focuses on normative criteria, despite the fact that the psychosocial dimension has equal importance (Cunningham *et al.*, 1996, 2000, 2002; Cunningham and Hunt, 2001; Klages *et al.*, 2004, 2005, 2006; O'Brien *et al.*, 2006; Munizeh and Mubassar, 2008). The psychosocial impact of dental aesthetics questionnaire (PIDAQ) is an English language instrument that addresses aspects of OHRQoL

specifically related to orthodontics. This self-rating instrument was designed to assess the psychosocial impact of dental aesthetics in young adults (Klages *et al.*, 2006).

Most self-perception measures regarding oral health status have been developed in English-speaking countries and may be subject to the influence of culture and prevalent health concepts in those countries. In order for an instrument to be used in other contexts and countries, it must undergo translation, cross-cultural adaptation, and validation. Therefore, the aim of the present study was to carry out cross-cultural adaptation of the PIDAQ to the Brazilian Portuguese language and test the reliability and validity of this version.

Subjects and methods

Description of the PIDAQ

The PIDAQ is a specific questionnaire for assessing the psychosocial impact of dental aesthetics in young adults aged 18–30 years. The instrument was developed on a sample of university students who were asked about previous orthodontic treatment and then completed the PIDAQ (Klages *et al.*, 2006). Self-rating and interviewer rating of the dental aesthetic appearance were carried out using the Aesthetic Component of the Index of Orthodontic Treatment Need. The interviewer examined the subjects' anterior teeth using a modification of the dental aesthetic index (DAI).

The PIDAQ is a psychometric instrument composed of 23 items that uses negatively and positively worded items, divided into one positive and three negative domains, structurally composed of four subscales: aesthetic concern (AC; 3 items), psychological Impact (PI; 6 items), social impact (SI; 8 items), and dental self-confidence (DSC; 6 items). A five-point Likert scale is used, ranging from 0 (no impact of dental aesthetics on QoL) to 4 (maximal impact of dental aesthetics on the QoL) for each item. The response options are as follows: 0 = not at all; 1 = a little; 2 = somewhat; 3 = strongly; and 4 = very strongly (Klages *et al.*, 2006).

Description of the DAI

The DAI developed in USA is an orthodontic index based on aesthetic aspects of occlusion that have the potential for causing psychological or social dysfunction. The DAI scores vary from acceptable dental appearance to extreme deviation (Cons *et al.*, 1986). As a cross-cultural index, the WHO adopted the DAI for orthodontic treatment need assessment (WHO, 1997).

Translation and cross-cultural adaptation of the PIDAQ

Based on standard recommendations, translation and cross-cultural adaptation of the PIDAQ were initially carried out by two independent translators (a Brazilian fluent in English and a native English speaker fluent in Portuguese) with experience in health questionnaire translation (Herdman *et al.*, 1997, 1998; Streiner and Norman, 2005). The assessment of the versions was performed in a 'double-blind' manner in relation to the translator and the back translator (Figure 1). The translation panel consisted of researchers, two translators, and three dentists, all fluent in both Portuguese and English (Figure 1). The original and back-translated versions were compared by a committee composed of a group of specialists with knowledge regarding QoL assessment and fluency in the English language. This committee made comments and offered suggestions so that the back-translated items would come as close as possible to those in the original questionnaire. The assessments made by the committee were reviewed during a consensus meeting (Figure 1).

For determination of conceptual equivalence, a committee of three experts in QoL and oral health assessed the relevance of the items in the Brazilian Portuguese version in comparison with the original English language version. The committee evaluated whether the areas covered by the original instrument regarding the concepts of interest would be relevant and pertinent to the cultural context to which the PIDAQ was being adapted (Figure 1).

Pilot study

The Brazilian PIDAQ version was then pilot tested on a convenience sample of 30 volunteers (16 females and 14 males), aged 18–30 years, recruited from the Integrated

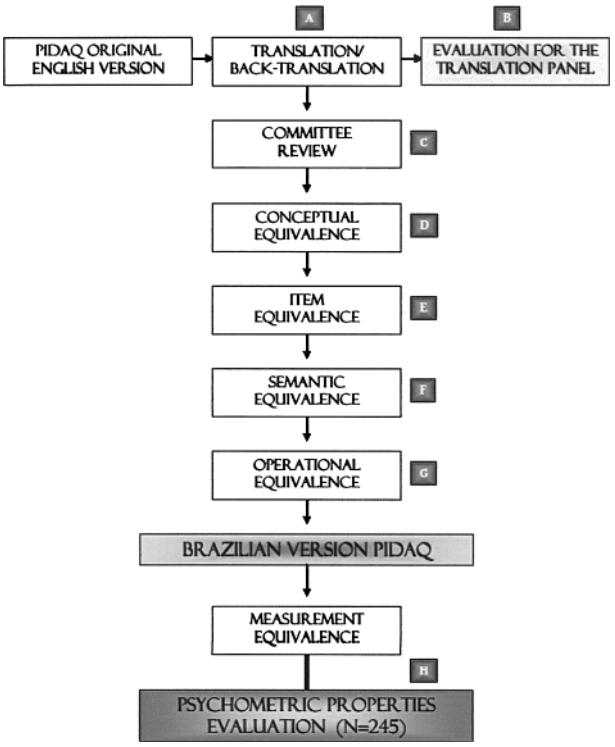

Figure 1 Flow chart of the cross-cultural validation steps.

Primary Care Clinic, Faculty of Dentistry, Federal University of Minas Gerais, Belo Horizonte, Brazil. Attention was given to the meaning of the words in the different languages in order to obtain similar effects of respondents from different cultures. In order to identify possible difficulties in the understanding of the questionnaire, interviews were conducted by one investigator (FS) after the administration of the questionnaire. A synthesis version was developed as a result of this process (Figure 1).

In order to assess the transference of meaning between the original and the translated versions, two native English-speaking individuals, who were not previously involved in the study, performed the back translation into English of the synthesis version. The two back-translated English versions proved nearly identical. To determine semantic equivalence, three experts in QoL and oral health [fluent in both languages (English and Portuguese) and with no prior knowledge of the study] compared the back-translated English version with the original English language version (Figure 1). The aim of this step was to achieve a 'similar effect' from respondents who speak English and Portuguese (Herdman *et al.*, 1997; Locker *et al.*, 2002).

In order to assess the possibility of maintaining the operational characteristics of the original instrument in the translated version and whether the instructions, mode of administration, and measurement methods were similar to the original English version, a second pilot test was carried out with a different convenience sample of 30 volunteers (17 females and 13 males), aged 18–30 years, recruited from the same Integrated Primary Care Clinic (Figure 1).

Assessment of validity and reliability of the Brazilian version of the PIDAQ

The validity and reliability assessments of the Brazilian version of the PIDAQ were carried out in the city of Belo Horizonte, Minas Gerais, Brazil. For the assessment of the psychometric properties of the instrument (Figure 1), 245 young adults aged 18–30 years, with a mean age of 24 years (standard deviation = 0.21), were included. Gender was evenly distributed, with 124 males (50.6 per cent) and 121 females (49.4 per cent). The subjects were recruited from the Centre for Graduate Education (CGE) and the Centre for Technical Education (CTE), which are educational units of the Military Police Academy of Minas Gerais, Brazil. All individuals read and signed terms of informed consent prior to participation. The study received approval from the Ethics Committee of the Federal University of Minas Gerais (ETIC 109/08).

The following were the exclusion criteria—intellectual and/or physical inability to answer the questionnaire: presence of carious lesions with cavities, missing or fractured teeth, moderate to severe fluorosis (dark areas) or pigmented spots in the anterior region, and previous orthodontic treatment (WHO, 1997).

Statistical analysis

The 245 young adults completed the Brazilian version of the PIDAQ questionnaire in the CGE and CTE classrooms. They were then examined for malocclusion based on the DAI, which assesses the relative social acceptability of dental appearance. Examinations were conducted by one investigator (FS) who had been previously trained and calibrated in the use of the index [weighted kappa = 0.64–1.00 and intraclass correlation coefficient (ICC) = 0.78–1.00 for malocclusion].

The subjects were separated into four groups based on the predefined DAI categories: scores of 13–25 represented 'normal or minor' malocclusions with slight or no treatment need; scores of 26–30 'definite' malocclusions with treatment elective; scores of 31–35 'severe' malocclusions with treatment highly desirable; and scores of 36 and higher 'very severe or disabling' malocclusions with treatment considered mandatory (Cons *et al.*, 1986).

The Statistical Package for the Social Sciences (version 15.0, SPSS Inc., Chicago, Illinois, USA) was used for data analysis. Information was coded in a data bank. Descriptive analyses were performed (mean, median, standard deviation, analysis of total and individual PIDAQ domain scores to generate PIDAQ total, and domain scores for each participant). Internal consistency of the Brazilian PIDAQ was tested using Cronbach's alpha coefficient (Cronbach, 1951) for the subscales. Test–retest reliability was assessed by calculating the ICC with a two-way random effects model for the PIDAQ score using data from 242 subjects who responded to the questionnaire a second time after a two week interval. Discriminant validity was tested by comparing the DAI categorized groups and each domain of the PIDAQ. As the PIDAQ scores were not normally distributed, the non-parametric Kruskal–Wallis test was used to evaluate differences in median scores between groups. The level of significance was set at 5 per cent.

Results

The results of the panel of specialists demonstrated the existence of conceptual equivalence between both languages. Defining the concepts of interest, experts in QoL established that the subscales of the original instrument were relevant and pertinent to the Brazilian context for which it was adapted. In terms of item and operational equivalence, the instrument exhibited good comprehension of the items by Brazilian young adults between 18 and 30 years of age, suggesting that the questionnaire may be administered to these subjects in the same format as the original. After a few changes in the grammatical structure of the questionnaire, semantic equivalence was achieved through the transfer of the meaning of concepts contained in the original instrument to the translated version, thereby giving rise to a similar response among respondents in both cultures.

A total of 109 individuals (44.5 per cent) were diagnosed with normal or minor malocclusions (DAI score: 13–25); 89 (36.3 per cent) exhibited definite malocclusions (DAI score: 26–30); 30 (12.2 per cent) had severe malocclusions (DAI score: 31–35); and 17 (6.9 per cent) had very severe or disabling malocclusions (DAI score: 36 or higher).

Forty per cent of the young adults reported ACs; 41.2 per cent PI; 48.2 per cent SI; and 49.0 per cent an impact on DSC.

Reliability

Cronbach's alpha for the subscales ranged from 0.75 for AC to 0.91 for DSC, thus indicating acceptable to excellent internal consistency. Test–retest reliability was assessed using the ICC, which was 0.89–0.99 for DSC and SI, respectively. On this occasion, 242 young adults responded to the questionnaire a second time after a two week interval for the assessment of test–retest reliability (Table 1).

Discriminant validity

There was a statistically significant difference in median scores for DSC and PI among the groups, as categorized by the DAI criteria (Table 2).

Discussion

Instruments designed to measure patients' OHRQoL are often in the form of questionnaires. In order to use foreign instruments in other cultural contexts and different languages, these instruments need to be translated, cross-culturally adapted, and validated. Guidelines have been established for cross-cultural adaptation in order to ensure that the translated versions are valid and comparable in international studies (Sperber, 2004; Peters and Passchier, 2006). In the present research, the methodology used for translation of the questionnaire was carefully conducted, following the criteria proposed by Guillemin *et al.* (1993). The back-translated version was very similar to the original, thereby demonstrating equivalence of the English and

Table 1 Reliability statistics for subscales (n = 242).

Variable	Number of items	Cronbach's alpha	Intraclass correlation coefficient (95% confidence interval)*
Aesthetic concern	3	0.75	0.95 (0.93–0.96)
Psychological impact	6	0.79	0.98 (0.97–0.99)
Social impact	8	0.83	0.99 (0.98–0.99)
Dental self-confidence	6	0.91	0.89 (0.01–0.97)

*Two-way random effects model: $P < 0.001$ for all values.

Table 2 Discriminant validity: subscale scores for young adults according to dental aesthetic index categorization.

Psychosocial impact of dental aesthetics questionnaire	Malocclusion category								P value*
	Normal or minor (n = 109)		Definite (n = 89)		Severe (n = 30)		Very severe or handicapping (n = 17)		
	Mean ± SD	Median (interquartile range)	Mean ± SD	Median (interquartile range)	Mean ± SD	Median (interquartile range)	Mean ± SD	Median (interquartile range)	
Aesthetic concern	1.7 ± 2.7	0.0 (2.0)	1.9 ± 2.3	1.0 (3.5)	2.2 ± 2.7	1.0 (3.0)	2.9 ± 3.3	2.0 (3.0)	0.079
Psychological impact	3.9 ± 3.9	3.0 (5.0)	4.4 ± 3.9	4.0 (5.0)	6.7 ± 5.0	6.5 (8.0)	6.5 ± 4.9	5.0 (8.0)	0.005
Social impact	3.5 ± 4.6	2.0 (5.0)	3.5 ± 4.2	2.0 (5.0)	5.2 ± 5.3	4.0 (10.0)	6.5 ± 7.5	2.0 (10.5)	0.211
Dental self-confidence	15.4 ± 6.3	16.0 (9.5)	13.7 ± 6.4	14.0 (11.0)	11.1 ± 6.1	10.0 (9.5)	9.2 ± 5.6	8.0 (10.0)	0.000

*Kruskal–Wallis test.

Portuguese versions of the instrument. The cross-cultural adaptation was conducted according to the Universalist model (Herdman *et al.*, 1998).

The psychometric properties of the Brazilian version of the PIDAQ were similar to those of the original instrument proposed by Klages *et al.* (2006). The present study provides evidence of the reliability and validity of the Brazilian Portuguese version of the PIDAQ. The questionnaire demonstrated acceptable validity and reliability, thus indicating its use in young adult populations of a similar age in Brazil.

The internal consistency of the Brazilian Portuguese version of the PIDAQ proved satisfactory to good internal reliability, given that Cronbach's alpha coefficient ranged from 0.75 for AC to 0.91 for DSC. For the purpose of group comparisons, a reliability value of 0.7 or above is considered acceptable (Kline, 1993; Bland and Altman, 1997). Compared with the original instrument, which presented a lower value for SI (α = 0.86) and a higher value for DSC (α = 0.91; Klages et al., 2006), the Brazilian version instrument achieved similar results for these domains.

Test–retest reliability was assessed using the ICC. The results demonstrated the excellent stability of the instrument ranging from 0.89 for DSC to 0.99 for SI. The ICC is considered excellent if greater than 0.74 (Nunnally and Bernstein, 1994).

Instruments designed to assess OHRQoL, such as the Oral Health Impact Profile and Child Perceptions Questionnaire for 11- to 14-year-old children (long and short forms), have been validated in Brazil in the Portuguese language (De Oliveira and Nadanovsky, 2005; Goursand *et al.*, 2008; Torres *et al.*, 2009). These instruments were designed to assess the impact of oral conditions on the daily living of children, adolescents, and adults and their psychometric properties have been deemed satisfactory, as has the PIDAQ in the present study.

A significant relationship was found In the present study between different degrees of aesthetic impairment (DAI categorization) and the subscales—DSC ($P < 0.00$) designed to assess the impact of dental aesthetics on the emotional state and PI ($P < 0.05$) referring feelings of inferiority and unhappiness when an affected individual compares him/herself with others perceived to have better dental aesthetics. Similar to the original instrument, the strongest statistical effects were observed in the DSC scale domain that has items specifically related to malocclusion (e.g. 'I find my tooth position to be very nice'), and a lower level was found in the SI scale.

No statistically significant association was found in the AC scale, probably due to the fact that 80.9 per cent of the individuals did not require orthodontic treatment.

Satisfaction with physical appearance is very personal because individuals react differently in relation to their own physical appearance. These differences can be explained by the so-called self-consciousness, which comprises two subcomponents: private and public self-consciousness (Klages and Zentner 2007). It is possible that the present sample had low self-consciousness, since no statistically significant difference was found between DAI categories especially for SI and AC scales. Low public self-consciousness could reduce the social sensitivity and perceptions of their appearance.

The present study had relatively small numbers of participants in the 'very severe or disabling category'. However, PIDAQ showed satisfactory properties in discriminating individuals with malocclusion in a sample where the majority of subjects have normal or minor and/or definite malocclusion. This suggests that the instrument might be capable of discriminating subjects with more severe degrees of malocclusion.

The measurement of OHRQoL using measures specifically designed to evaluate malocclusions has the potential to provide an insight into the psychosocial impact of dental appearance on an individual's sense of well-being (Cunningham *et al.*, 2002; Bos *et al.*, 2003; Klages *et al.*, 2006). Therefore, an important aspect of such tools is their ability to represent, in numerical form, an individual's perception. However, it should be borne in mind that QoL is a construct and, as such, cannot be fully operationalized or directly measured. Thus, it is important to associate, whenever possible, the normative need observed by the dentist with the subjective need perceived by the patient because professional evaluations of occlusion do not always coincide with patients' perceptions (Peres *et al.*, 2002). This was shown in the original study, where the differences in PIDAQ scores among subjects with different degrees of interviewer-rated dental appearance were lower than the results based on self-assessment.

Conclusion

The present assessment of conceptual, semantic, and item equivalence demonstrated adequate equivalence between the original and Brazilian versions of the PIDAQ as well as satisfactory acceptability of the cross-culturally adapted instrument. This study provides evidence supporting the validity of the Brazilian Portuguese version of the PIDAQ as a useful measure for assessing the psychosocial impact of dental aesthetics related to malocclusion, suggesting that it may be recommended as an OHRQoL assessment tool for young adults in Brazil.

The assessment of measurement equivalence and psychometric properties of the Brazilian version and the original PIDAQ questionnaire is an essential task. This will be carried out as a component of a population study aiming to determine which individuals need treatment and possible causes of disease (to assist in prevention) as well as to assess the distribution of disease in populations in order to assist in the allocation of public resources.

Funding

Research Assistance Foundation of the State of Minas Gerais (FAPEMIG), Brazil.

References

Allison P J, Locker D, Feine J S 1999 The relationship between dental status and health-related quality of life in upper aerodigestive tract cancer patients. Oral Oncology 35: 138–143

Bland J M, Altman D G 1997 Statistics notes: Cronbach´s alpha. British Medical Journal 314: 572

Bos A, Hoogstraten J, Prahl-Andersen B 2003 Expectations of treatment and satisfaction with dentofacial appearance in orthodontic patients. American Journal of Orthodontics and Dentofacial Orthopedics 123: 127–132

Broder H L 2007 Children's oral health-related quality of life. Community Dentistry and Oral Epidemiology 35: 5–7

Broder H L, McGrath C, Cisneros G J 2007 Questionnaire development: face validity and item impact testing of Child Oral Health Impact Profile. Community Dentistry and Oral Epidemiology 35: 8–19

Brown A, Al-Khayal Z 2006 Validity and reliability of the Arabic translation of the child oral-health-related quality of life questionnaire (CPQ11-14) in Saudi Arabia. International Journal of Paediatric Dentistry 16: 405–411

Cons N C, Jenny J, Kohout F J 1986 DAI: the dental aesthetic index. College of Dentistry, University of Iowa, Iowa City

Corless I B, Nicholas P K, Nokes K M 2001 Issues in cross-cultural quality-of-life research. Journal of Nursing Scholarship 33: 15–20

Cronbach L J 1951 Coefficient alpha and the internal structure of tests. Psychometrika 16: 297–334

Cunningham S J, Hunt N P 2001 Quality of life and its importance in orthodontics. Journal of Orthodontics 28: 152–158

Cunningham S J, Hunt N P, Feinman C 1996 Perceptions of outcome following orthognathic surgery. British Journal of Oral and Maxillofacial Surgery 34: 210–213

Cunningham S J, Garrat A M, Hunt N P 2000 Development of a condition-specific quality of life measure for patients with dentofacial deformity: I. Reliability of the instrument. Community Dentistry and Oral Epidemiology 28: 195–201

Cunningham S J, Garrat A M, Hunt N P 2002 Development of a condition-specific quality of life measure for patients with dentofacial deformity: II. Validity and responsiveness testing. Community Dentistry and Oral Epidemiology 30: 81–90

De Oliveira B H, Nadanovsky P 2005 Psychometric properties of the Brazilian version of the Oral Health Impact Profile—short form. Community Dentistry and Oral Epidemiology 33: 307–314

Feitosa S, Colares V, Pinkham J 2005 The psychosocial effects of severe caries in 4-year-old children in Recife, Pernambuco, Brazil. Cadernos de Saúde Pública 21: 1550–1556

Finckenberg M E, DiNucci J, McCune S L, Chenette T, McCoy P 1998 Commitment to physical activity and anxiety about physique among college women. Perceptual and Motor Skills 87: 1393–1394

Goursand D *et al.* 2008 Cross-cultural adaptation of the Child Perceptions Questionnaire 11-14 (CPQ11-14) for the Brazilian Portuguese language. Health and Quality of Life Outcomes 6: 2

Guillemin F, Bombardier C, Beaton D 1993 Cross-cultural adaptation of health-related quality of life measures: literature review and proposed guidelines. Journal of Clinical Epidemiology 46: 1417–1432

Guyatt G H 1993 The philosophy of health-related quality of life translation. Quality of Life Research 2: 461–465

Herdman M, Fox-Rushby J, Badia X 1997 'Equivalence' and the translation and adaptation of health-related quality of life questionnaires. Quality of Life Research 6: 237–247

Herdman M, Fox-Rushby J, Badia X 1998 A model of equivalence in the cultural adaptation of HRQoL instruments: the universalist approach. Quality of Life Research 7: 323–335

Klages U, Zentner A 2007 Dentofacial aesthetics and quality of life. Seminars in Orthodontics 13: 104–115

Klages U, Bruckner A, Zentner A 2004 Dental aesthetics, self-awareness, and oral health-related quality of life in young adults. European Journal of Orthodontics 26: 507–514

Klages U, Bruckner A, Guld Y, Zentner A 2005 Dental esthetics, orthodontic treatment and oral health attitudes in young adults. American Journal of Orthodontics and Dentofacial Orthopedics 128: 442–449

Klages U, Claus N, Wehrbein H, Zentner A 2006 Development of a questionnaire for assessment of the psychosocial impact of dental aesthetics in young adults. European Journal of Orthodontics 28: 103–111

Kline P 1993 The handbook of psychological testing. Routledge, London

Locker D, Jokovic A, Stephens M, Kenny D, Tompson B, Guyatt G 2002 Family impact of child oral and oro-facial conditions. Community Dentistry and Oral Epidemiology 30: 438–448

Marques L S, Ramos-Jorge M L, Paiva S M, Pordeus I A 2006 Malocclusion: esthetic impact and quality of life among Brazilian schoolchildren. American Journal of Orthodontics and Dentofacial Orthopedics 129: 424–427

Moura-Leite F R, Ramos–Jorge M L, Bonanato K, Paiva S M, Vale M P, Pordeus I A 2008 Prevalence, intensity and impact of dental pain in 5-year-old preschool children. Oral Health and Preventive Dentistry 6: 295–301

Munizeh K, Mubassar F 2008 Assessment of psychosocial impact of dental aesthetics. Journal of the College of Physicians and Surgeons Pakistan 18: 559–564

Nunnally J C, Bernstein I R 1994 Psychometric theory. McGraw-Hill, New York

O'Brien K, Wright J L, Conboy F, Macfarlane T, Mandall N 2006 The child perception questionnaire is valid for malocclusions in the United Kingdom. American Journal of Orthodontics and Dentofacial Orthopedics 129: 536–540

Oliveira C M, Sheiham A 2004 Orthodontic treatment and its impact on oral health-related quality of life in Brazilian adolescents. Journal of Orthodontics 31: 20–27

Peres K G, Traebert E S A, Marcenes W 2002 Differences between normative criteria and self-perception in the assessment of malocclusion. Revista de Saúde Pública 36: 230–236

Peters M, Passchier J 2006 Translating instruments for cross-cultural studies in headache research. Headache 46: 82–91

Sperber A D 2004 Translation and validation of study instruments for cross-cultural research. Gastroenterology 126: Suppl. 1S124–S128

Streiner D L, Norman G R 2005 Health measurement scale: practical guide to their development and use. Journal of Epidemiology and Community Health 59: 250–251

Testa M A, Simonson D C 1996 Assessment of quality-of-life outcomes. The New England Journal of Medicine 334: 835–840

Torres C S *et al.* 2009 Psychometric properties of the Brazilian version of the Child Perceptions Questionnaire (CPQ11-14)—short forms. Health and Quality of Life Outcomes 7: 43

World Health Organization (WHO). 1997 Oral health surveys. Basic methods. WHO, Geneva