Turkish Adaptation of Dentine Hypersensitivity Experience Questionnaire (DHEQ)

Saffet Başaran[1] and Cigdem Celik[2]

[1]Research Assistant, Baskent University, Faculty of Dentistry, Department of Restorative Dentistry; [2]Professor, Baskent University, Faculty of Dentistry, Department of Restorative Dentistry

Objective: The Dentine Hypersensitivity Experience Questionnaire (DHEQ) is a valid and reliable instrument for oral health-related quality of life (OHRQoL) studies. This study aimed to assess the Turkish version of the DHEQ and determine the effects of degree of DH, sex, and age on OHRQoL. ***Materials:*** The study participants were 251 DH patients (age 18–78 years; 68.5% female) who completed the Turkish version of the DHEQ. The reliability of the instrument was assessed in terms of internal consistency, using item-total correlations and Cronbach's alpha and test-retest reliability using intra-class correlation coefficients (ICCs) among 51 patients who repeated the DHEQ following a 2-week interval. Construct validity was determined based on exploratory factor analysis (EFA). Convergent validity was tested through correlating DHEQ total and subscale scores with the global rating of oral health and effect on life overall. Discriminative validity was tested by comparing the total and subscale scores against the degree of sensitivity. ***Results:*** Patients with more severe hypersensitivity showed higher DHEQ scores and greater OHRQoL impairment. Female and older (>40 years) patients had significantly greater OHRQoL impairment. Cronbach's alpha exceeded 0.70, indicating good internal consistency reliability. The ICC values were >0.60 for the overall scale and each subscale of the DHEQ, signifying good to excellent test-retest reliability. ***Conclusion:*** The results suggested that the Turkish version of the DHEQ is appropriate for assessing the OHRQoL among people with dentine hypersensitivity.

Keywords: *Quality of life, hypersensitivity, reliability, validity*

Introduction

Dentine hypersensitivity (DH) is an epidemic oral distress characterized by short, sharp pain. This pain arises from exposed dentine in response to stimuli—typically thermal, evaporative, tactile, osmotic, or chemical—that cannot be ascribed to any other form of dental defect or pathology (Canadian Advisory Board, 2003) This pain generating phenomenon has been described by hydrodynamic theory (Orchardson and Gillam, 2006) (Ayad et al., 2009). The exposure of dentine tissue following gingival recession or tooth wear has been found to trigger DH (Orchardson and Gillam 2006). The prevalence of DH has been reported to be up to 74% (Irwin and McCusker 1997, Gillam et al., 1999). DH distresses patients' oral health-related quality of life (OHRQoL), their physical health, social functions, and psychosocial wellbeing (Boiko et al., 2010). Thus, there is a need to make a comprehensive assessment of the impact of DH on patients' daily life. OHRQoL is a multidimensional construct, quantifying the extent to which oral disorders affect functions, psychosocial wellbeing, sense of self, expectations, and satisfaction with care (Locker and Allen 2007).

The Oral Health Impact Profile (OHIP) is commonly used in OHRQoL research (Slade and Spencer, 1994). However, the OHIP may not be effective in quantifying the specific problems of particular oral diseases nor in distinguishing such diseases from other effects. This type of generic measure is likewise unable to provide an accurate assessment of the links between specific oral conditions and OHRQoL (Locker and Allen, 2007; Wong et al., 2007). More recently, condition-specific instruments, such as the OHIP-aesthetic have been introduced (Wong et al., 2007; Bekes et al., 2009). Bekes et al., (2009) found OHIP-49 to be insensitive to the particular impacts related to DH. These findings suggest that the effects of specific oral conditions, such as DH, are not captured by generic measures.

The Dentine Hypersensitivity Experience Questionnaire (DHEQ), a specific OHRQoL measure for DH, was developed by Boiko et al., (2010) and it showed excellent reliability and validity. In China, He et al., (2012) reported that the DHEQ showed satisfactory psychometric properties. It has also been demonstrated that the DHEQ is longitudinally reliable, valid and capable of identifying differences in the efficacy of DH treatments (Baker et al. 2014).

DHEQ was developed in United Kingdom (Boiko et al., 2010). Before implementing such an instrument in Turkey, it is necessary to undertake cross-cultural adaptation which requires a rigorous psychometric testing stage to attain equivalence between the original and adapted versions of the questionnaire (Beaton et al., 2000). The aim of the present study was to evaluate the cross-cultural adaptation of the DHEQ and test its reliability and validity among a group of Turkish patients. This study also aimed to investigate the influence of degree of DH, sex, and age on OHRQoL.

Correspondence to: Dr. Cigdem Celik, Baskent University, School of Dentistry, Department of Restorative Dentistry 82. St. No: 26 06490 Bahcelievler Cankaya, Ankara, Turkey. E-mail: celikc@baskent.edu.tr; Telephone: +90-312-2030000; Fax: +90-312-2466615

Methods

Study Population

Patients who reported to Baskent University, Faculty of Dentistry between January - June 2015 with a complaint of tooth sensitivity were examined for DH. The exclusion criteria comprised patients with any orthodontic appliances, communication or cooperation difficulties, gross oral pathology, advanced periodontal disease with mobility greater than grade I, extensive or defective restorations, pulpitis, caries, cracked enamel, or removable partial denture abutments. The patients were informed about the purpose of the study and written informed consent was obtained from all patients. In total, 251 patients aged 18–78 years with at least one tooth with DH participated. This study was approved by Baskent University Institutional Review Board (Project no: D-KA14/20).

Each patient received a clinical assessment of an air blast hypersensitivity test using the Schiff Cold Air Sensitivity Scale (Schiff et al., 1994). The clinical evaluation was performed using a 1-s blast directly applied to the cervical area of teeth from a distance of 1 cm. The dental units' cold air output was 60 ± 5 psi pressure and $70 \pm 3°F$ temperature. The scoring was: 0, subject does not respond to air stimulus; 1, subject responds to air stimulus, but does not request discontinuation of stimulus; 2, subject responds to air stimulus and requests discontinuation or moves from stimulus; and 3, subject responds to air stimulus, considers stimulus to be painful, and requests discontinuation of the stimulus.

The questionnaire was self-completed by the patients in the waiting room. Patients with any questions were able to consult one of the research group upon request. If any missing responses were encountered, the patient was excluded from the research. The patients' age and gender were recorded. The test-retest reliability was evaluated in 51 patients, who were selected using a computer-generated randomized table to make a second visit 2 weeks after completing the DHEQ. These patients did not receive any clinical intervention during this 2 weeks period.

The long form of DHEQ with 48 items was used (Boiko et al., 2010). The items that asked participants to describe their sensations and the three visual analogue scales to record the intensity, bothersomeness and intensity of pain were assessed separately. The impact subscales comprise five domains of functional restriction (4 items), adaptation (12 items), social impact (5 items), emotional impact (8 items), and identity (5 items). Participants respond to the items on these domains on a seven-point Likert scale coded: 1, strongly disagree; 2, disagree; 3, agree a little; 4, neither agree nor disagree; 5, disagree a little; 6, disagree; and 7, strongly disagree. DHEQ contains a global oral health rating with responses on a five-point Likert scale (from 'excellent' to 'very poor'). Four further items recorded the effects of sensations in their teeth on life overall, with responses on a five-point Likert scale (from 'not at all' to 'very much').

Translation and Cross-Cultural Adaptation of DHEQ

The DHEQ was translated to Turkish using the forward-backward process (Del Greco et al., 1987).

1. First, the DHEQ was translated into Turkish by two independent translators, who were fluent in English and Turkish and had background knowledge of dentistry.
2. The DHEQ was back-translated from Turkish to English by a professional translator, who was familiar with the dental literature. The translated and back-translated versions were compared and discussed by an expert committee, consisting of two dental specialists. A preliminary Turkish DHEQ was then produced.
3. The preliminary Turkish DHEQ was pilot-tested on a convenience sample of 30 patients.
4. After completing the Turkish DHEQ, pilot participants were interviewed about any difficulties encountered with the questions or their understanding of them. Then, issues were discussed with a specialist in the Turkish language and literature, and the final version of the Turkish DHEQ was developed.

Statistical Analysis

Item impact for each of the scale items was calculated as a mean score multiplied by the percentage of patients who reported a DH effect as "somewhat agree," "agree," or "strongly agree."

Reliability

Internal consistency reliability was assessed using item-total correlations and Cronbach's alpha. Test-retest reliability was assessed as intra-class correlation coefficients (ICCs) using the data from the 51 patients who repeated the DHEQ after 2-weeks. Item-total correlations of >0.2 and Cronbach's alpha of >0.70 were considered acceptable for comparisons between groups (Kline, 2000; Bland &Altman, 1997).

Validity

Exploratory factor analysis was used to evaluate construct validity using a trial version of Mplus (Muthen & Muthen 1998-2007). The parsimony-adjusted index was the root mean square error of approximation. The comparative indices were the Tucker-Lewis and comparative fit indices. Factor loadings of >0.40 were considered to be significant. Convergent validity was tested by correlating the DHEQ total and subscale scores with the global oral health rating and a summary measure of the effect on life overall. Discriminative validity was determined by comparing the difference in the total and subscale scores with the degree of DH measured as the mean Schiff Cold Air Sensitivity score. The Mann-Whitney test, Student's t test, analysis of variance, and Kruskal-Wallis test were employed to make comparisons between groups in post hoc tests with a significance level of 0.05 in SPSS for Windows 11.5 (SPSS Inc. Chicago, IL, USA).

Results

In all, 251 patients (mean age, 40.7 ± 13.7 years; age-range, 18–78 years; 68.5% female, 31.5% male) took part.

Table 1 summarises the scores for the pain visual analogue scales, global oral health rating, and scale of effect on life overall. The total DHEQ score, extent, and subscale scores among the 251 patients appear in Table 2.

The items reported most frequently in the DHEQ were "avoiding contact with certain teeth|" (84%), "problems with eating ice cream" (83%), and "irritating sensations" (79%) and the item impacts ranged from 20.5 to 418.1.

Table 1. Pain, global oral health ratings, and effect on life overall in 251 patients with DH

Scale/rating	Number of items	Range	Mean score (SD)
Visual analogue scale (VAS)			
Intensity	1	1–10	4.98 (2.27)
Bothersomeness	1	1–10	5.61 (2.37)
Tolerability	1	1–10	4.85 (2.25)
Global oral health rating	1	1– 6	3.95 (0.89)
Effect on life overall	4	0–14	6.85 (2.97)

SD, standard deviation

Table 2. Total, extent, and subscales scores among 251 patients with DH

	Number of items	Mean (SD)	Range
Total score	34	106.21 (29.40)	35–176
Extent	34	17.31 (8.35)	0–34
Subscales			
Restrictions	4	13.47 (4.34)	4–21
Adaptation	12	40.51 (11.54)	12–61
Social impact	5	13.31 (5.90)	5–28
Emotional impact	8	27.86 (7.89)	8–42
Identity	5	11.03 (5.36)	5–28

SD, standard deviation

All item-total correlations exceeded 0.39 and alphas if item deleted exceeded 0.95. The internal consistency and test-retest reliability of the subscales appear in Table 3. Cronbach's alpha for the total impact score of the DHEQ was 0.95 and for the subscales ranged from 0.80 for "restrictions" to 0.91 for "adaptation." All the subscales exceeded the minimum reliability standard of 0.70. The corrected item-total correlations for the DHEQ ranged from 0.339 to 0.753 and were higher than the recommended minimum correlation of 0.20. Therefore, there was no necessity to remove any item from the scale. The ICCs calculated for the 51 patients who repeated the test after a 2-week interval were 0.73 for the total score and ranged from 0.61 to 0.86 for the subscales indicating good to excellent test-retest reliability (Bartko, 1966).

The construct validity of the 41 items of the DHEQ subscale was analyzed using exploratory factor analysis in terms of compliance with the seven constructs of pain, restrictions, adaptation, social impact, emotional impact, identity, and impact on life overall. DHEQ was found to be acceptable for the seven-factor measurement model: comparative fit index, 0.822; Tucker-Lewis index. 0.961; and root mean square error of approximation, 0.112. In factor analyses for the subscales all items had factor loadings of >0.40.

Total and subscale scores of the DHEQ showed positive correlations with global oral health ratings and effect on life overall, indicating good convergent validity (Table 4). Kruskal-Wallis test was used to analyze the discriminative validity. Mean total and subscale DHEQ scores correlated with the Schiff Cold Air scores.

Table 4. Convergent validity of the Dentine Hypersensitivity Experience Questionnaire (DHEQ): correlations between subscale scores and global oral health rating and effect on life overall

Subscale	Global oral health rating	Effect on life overall	P value
Total score	0.318	0.726	**<0.001**
Subscales			
Restrictions	0.253	0.588	**<0.001**
Adaptation	0.268	0.596	**<0.001**
Social impact	0.300	0.585	**<0.001**
Emotional impact	0.272	0.709	**<0.001**
Identity	0.227	0.509	**<0.001**

Higher restrictions, adaptation subscales, and total impact scores were observed among female than male patients (Female mean= 99.96 (sd=28.19), Male mean = 84.79 (22.12), p<0.05). However, scores were similar across gender groups for emotional impact, social impact, and identity. Total impact score and subscale scores (restriction, adaptation, social and emotional impact) were higher for patients aged >40 years (>40 mean=108.96 (sd=27.40), <40 Mean=89.11 (sd=22.39), p<0.05). Identity subscale scores were similar across the age groups.

Discussion

The DHEQ is one of the few disease-specific OHRQoL measures. It aims to capture the particular impacts of DH on daily life. The purpose of the present study was to perform a cross-cultural adaptation of the original DHEQ and evaluate the reliability and validity of the Turkish version.

Table 3. Internal consistency and test-retest reliability of the individual subscales

Subscale	Number of items	Cronbach's alpha	Interclass correlation coefficient (95% CI)	P value
Total score	34	0.954	0.729 (0.570–0.835)	<0.001
Subscales				
Restrictions	4	0.796	0.817 (0.702–0.891)	**<0.001**
Adaptation	12	0.911	0.860 (0.767–0.917)	**<0.001**
Social impact	5	0.860	0.838 (0.733–0.904)	**<0.001**
Emotional impact	8	0.886	0.615 (0.413–0.760)	**<0.001**
Identity	5	0.849	0.789 (0.659–0.874)	**<0.001**

Thus, this research investigated the relationships between the degree of DH, gender and age with OHRQoL in a group of Turkish patients. The results demonstrate the utility of applying the Turkish version of the DHEQ to measure the biopsychosocial impact of DH in Turkey.

The DHEQ was translated according to the criteria proposed by Del Greco et al., (1987). Questionnaires must be comprehensible and meaningful to participants, the responses must be similar to the original one and any distortion from the source culture needs to be minimised (Del Greco et al., 1987, Sardenberg et al., 2011; Flaherty et al.,1998). Al Castro et al., (2008) stated that word modifications should consider social and cultural differences. However, during the translation process care was taken to ensure semantic equivalence.

We evaluated the reliability by considering internal consistency and test-retest reliability. For internal consistency, Cronbach's alpha exceeded 0.70 for all measures and the corrected item-total correlations were all well above the recommended level of 0.2, demonstrating that the Turkish version of the DHEQ has good internal reliability. Cronbach's alpha for the total DHEQ score was higher than with the original English version (Boiko et al. 2010); this finding is similar to those of He et al., (2012) and Baker et al., (2014). Higher alpha values can be achieved by adding correlated items. If items are not correlated, the value of alpha is reduced. A coefficient alpha of 0.7 is acceptable for new scales, although Bland and Altman (1997) recommended minimum values of 0.9. DeVellis (2003) stated that alphas over 0.9 reflects the presence of redundant items and indicate that the questionnaire should be shortened. A period of 1–2 weeks is often considered appropriate to assess test-retest reliability. The interval should be long enough to prevent recall, but short enough to ensure that clinical changes have not occurred (Terwee et al., 2007). The ICC values for the overall scale and each subscale indicated good to excellent agreement. The ICC for the whole scale was 0.73, which is lower than that for the original English and Chinese validations (Boiko et al., 2010; He et al., 2012; Baker et al., 2014). The high ICCs suggest that DHEQ is sufficiently stable to be used to distinguish levels of impact in the treatment of DH, although longitudinal data are required to confirm this. Overall, our results indicated that the DHEQ is a reliable and stable instrument for assessing the quality of life for DH.

All the DHEQ items had factor loadings of >0.40 for factor analysis; this finding fulfilled the criterion that predictive items must have relatively high loadings (He et al., 2012) and bear a strong relationship to their factors.

Convergent validity reflects the extent to which two measures capture a common construct. It was indicated by significant correlations between the total and subscale scores and both global ratings of oral health and the subscale for effect on life overall. These correlations were higher than those obtained with in the two English validations (Boiko et al., 2010, Baker et al., 2014). These correlations with overall well-being ratings indicated that the instrument is able to identify the general effects of DH on participants' lives.

Higher total and subscale DHEQ scores were observed among patients with a more severe hypersensitivity in the Schiff test. That is, the OHRQoL varied inversely with the severity of DH. Similar discriminatory validity was observed in relation to the degree of hypersensitivity and DHEQ scores by He et al., (2012).

The total DHEQ scores of older patients (>40 years) were higher than those of younger patients. Bekes et al., (2009) reported that older people (>40 years) had significantly more OHRQoL problems than younger those who were younger. Similar to those findings for the general population, the difference between younger and older patients was observed to be close to significance in the present study.

Female participants experienced greater OHRQoL impairment than males, whereas Bekes et al., (2009) found that females had lower OHIP scores than males. The reasons for this difference are not yet clear, but may be related to females's better health care and oral hygiene awareness, which would make them more aware of DH (Addy 1990). Furthermore, females have been found to be more sensitive to pain; which may be another reason for gender differences in DH impairment (Que et al., 2010).

In population studies, it may be impractical to include a large number of items owing to the burden on investigators and respondents. Shorter questionnaires offer certain advantages (Machuca et al. 2014). However, eliminating items in results in reduced detail that may impede measurements of change. When planning to use an OHRQoL questionnaire as an outcome measure, it is important to ensure that its responsiveness is fully understood (Allen 2015). Baker and colleagues' (2014) longitudinal study found the DHEQ to be highly responsive to changes in functional and personal experiences of DH, improvement in quality-of-life status brought about by anti-sensitivity treatments of differing efficacies.

The present study supports the findings of earlier research (Boiko et al., 2010, He et al., 2012, Baker et al., 2014) that shows that the DHEQ to be a reliable and valid measure of the experience of DH. The DHEQ detects the nuanced effects related to DH, and can be used in clinical studies. However, the present study carries the limitation of having been conducted in a single clinic. Thus, the results are not representative of the general population (Foster Page et al., 2005). The responsiveness of the DHEQ to any dental treatment was not assessed and longitudinal studies are planned to examine this property. Finally, the original version of DHEQ has 48 items and it can take a long time to complete. The short form of DHEQ (Machuca et al., 2014) could be validated in Turkish patients.

Conclusion

The Turkish version of the DHEQ is a reliable and valid measure, and is appropriate to assess the OHRQoL of patients with DH complaints. Patients with more severe hypersensitivity reported greater OHRQoL impairment. Females and older patients (>40 years old) had greater OHRQoL impairment.

Acknowledgments

References

Addy, M. (1990): Etiology and clinical implications of dentine hypersensitivity. *Dental Clinics of North America* **34,** 503-514.

Allen, F. (2015): The importance of subjective assesments of dentine hypersensitivity. In: *Dentine Hypersensitivity:Developing a person-centered approach to oral health.* Ed. Robinson, P.G. pp77-86. London: Elsevier.

Ayad, F., Ayad, N., Zhang, Y. P., DeVizio, W., Cummins, D. and Mateo, L. R. (2009): Comparing the efficacy in reducing dentine hypersensitivity of a new toothpaste containing 8.0% arginine, calcium carbonate, and 1450 ppm fluoride to a commercial sensitive toothpaste containing 2% potassium ion: an eight-week clinical study on Canadian adults. *Journal of Clinical Dentistry* **20**, 10-16.

Baker, S.R., Gibson, B.J., Sufi, F., Barlow, A. and Robinson, P.G. (2014): The Dentine Hypersensitivity Experience Questionnaire: a longitudinal validation study. *Journal of Clinical Periodontology* **41**, 52-59.

Bartko, J.J. (1966): The intraclass correlation coefficient as a measure of reliability. *Psychological Reports* **19**, 3-11.

Beaton, D.E., Bombardier, C., Guillemin, F. and Ferraz, M.B. (2000): Guidelines for the process of cross-cultural adaptation of self-report measures. *Spine* **25**, 3186-3191.

Bekes, K., John, M.T., Schaller, H.G. and Hirsch, C. (2009): Oral health-related quality of life in patients seeking care for dentine hypersensitivity. *Journal of Oral Rehabilitation* **36**, 45-51.

Bland, J.M. and Altman, D.G. (1997): "Cronbach's alpha". *British Medical Journal* **314,** 572.

Boiko, O.V., Baker, S.R., Gibson, B.J., Locker, D., Sufi, F., Barlow, A.P. and Robinson, P.G. (2010): Construction and validation of the quality of life measure for dentine hypersensitivity (DHEQ). *Journal of Clinical Periodontology* **37**, 973-980.

Castro, R.A., Cortes, M.I., Leão, A.T., Portela, M.C., Souza, I.P., Tsakos, G., Marcenes, W. and Sheiham, A. (2008): Child-OIDP index in Brazil: cross-cultural adaptation and validation. *Health and Quality of Life Outcomes* **15**, 6:68.

Del Greco, L., Walop, W. and Eastridge, L. (1987): Questionnaire development: 3. Translation. *Canadian Medical Association Journal* **136**, 817-818.

DeVellis, R.F. (2003): *Scale Development: Theory and Application*, 2nd Edn; Thousand Oaks, CA:Sage.

Flaherty, J.A., Gaviria, F.M., Pathak, D., Mitchell, T., Wintrob, R., Richman, J.A., Birz, S. (1988) Developing instruments for cross cultural psychiatric research. *Interamerican Journal of Psychology* **21**, 1-24.

Kline, P. (2000): *The Handbook of Psychological Testing*. London: Taylor & Francis.

Muthén, L.K., Muthén, B.O. (1998-2007): *Mplus User's Guide*, 5th Edn; Los Angeles: CA.

Foster Page, L.A., Thomson, W.M., Jokovic, A. and Locker, D. (2005): Validation of the Child Perceptions Questionnaire (CPQ 11-14). *Journal of Dental Research* **84,** 649-652.

Gillam, D. G., Seo, H. S., Bulman, J. S. and Newman, H. N. (1999) Perceptions of dentine hypersensitivity in a general practice population. *Journal of Oral Rehabilitation* **26**, 710-714.

He, S. L., Wang, J. H. and Wang, M. H. (2012): Development of the Chinese version of the Dentine Hypersensitivity Experience Questionnaire. *European Journal of Oral Sciences* **120**, 218-223.

Canadian Advisory Board on Dentine Hypersensitivity. (2003): Consensus-based recommendations for the diagnosis and management of dentine hypersensitivity. *Journal of Canadian Dental Association*, **69**, 221-226.

Irwin, C. R. and McCusker, P. (1997): Prevalence of dentine hypersensitivity in a general dental population. *Journal of the Irish Dental Association* **43**,7-9.

Locker, D. and Allen, F. (2007): What do measures of 'oral health-related quality of life' measure? *Community Dentistry and Oral Epidemiology* **35**, 401-411.

Machuca, C., Baker, S. R., Sufi, F., Mason, S., Barlow, A. and Robinson, P.G. (2014): Derivation of a short form of the Dentine Hypersensitivity Experience Questionnaire. *Journal of Clinical Periodontology* **41**, 46-51.

Orchardson, R. and Gillam, D.G. (2006): Managing dentine hypersensitivity. *Journal of the American Dental Association* **137**, 990-998, 1028-1029.

Que, K., Ruan, J., Fan, X., Liang, X. and Hu, D. (2010): A multi-centre and cross-sectional study of dentine hypersensitivity in China. *Journal of Clinical Periodontology* **37**, 631-637.

Sardenberg, F., Oliveria A.C., Paiva, S.M., Auad, S.M., Vale, M.P. (2011): Validity and reliability of the Brazilian version of the psychosocial impact of dental aesthetic questionnaire. *European Journal of Orthodontics,* **33**, 270-275.

Schiff, T., Dotson, M., Cohen, S., De Vizio, W., McCool, J. and Volpe, A. (1994): Efficacy of a dentifrice containing potassium nitrate, soluble pyrophosphate, PVM/MA copolymer, and sodium fluoride on dentinal hypersensitivity: a twelve-week clinical study. *Journal of Clinical Dentistry* **5**, 87-92.

Slade, G. D. and Spencer, A. J. (1994): Development and evaluation of the Oral Health Impact Profile. *Community Dental Health* **11**, 3-11.

Terwee, C. B., Bot, S. D., de Boer, M. R., van der Windt, D. A., Knol, D. L., Dekker, J., Bouter, L. M. and de Vet, H. C. (2007): Quality criteria proposed for measurement properties of health status questionnaires. *Journal of Clinical Epidemiology* **60**, 34-42.

Wong, A. H., Cheung, C. S. and McGrath, C. (2007): Developing a short form of Oral Health Impact Profile (OHIP) for dental aesthetics: OHIP-aesthetic. *Community Dentistry and Oral Epidemiology* **35**, 64-72.