A Danish version of the Oral Health Impact Profile-14 (OHIP-14): Translation and cross-cultural adaptation.

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Abstract

Background

In Dentistry, Oral Health Related Quality of life instruments provide a measure of gains in oral function as well as psychological well-being. Such subjective measures can be assessed by the Oral Health Impact Profile-14 (OHIP-14). However, a translated and validated Danish version of OHIP-14 is not available yet. Hence, the questionnaire can not be used in Denmark. The purpose of this study was to translate and cross-culturally adapt the original English version of Oral Health Impact Profile-14 (OHIP-14) into a Danish version (OHIP-14-DK). In addition, to investigate its applicability among adolescents and adults undergoing orthodontic treatment in Denmark, as well as to assess its internal consistency, reliability, and test-retest reliability.

Methods

The English version of OHIP-14 was translated into Danish following a standard protocol of cross-cultural adaptation. Stages I – IV: translation phase to eventually generate an "OHIP-14-DK" pre-final version. Stage V: pre-testing phase. A random sample of 22 orthodontic patients (mean age 24.7 years, SD ±14.8; 14 females, 8 males) were selected at Aarhus University, Section of orthodontics, Denmark. All patients self-completed the OHIP-14-DK and were thereafter interviewed. To measure reliability, all patients completed the same questionnaire again after 1-2 weeks interval. Reliability was assessed by Cronbach's alpha coefficients, Spearman's correlation coefficient, and ICC.

Results

The initial and back translations were very similar: OHIP-14-DK proved to have a good level of equivalence with no errors or deviations in the translation, relevant to orthodontic patients, fitting the Danish culture, and understood by individuals as young as 12 years old. The distribution of responses verified that all questions relate to their domains. Therefore, no final adjustments were required for the tested version. Cronbach's alpha ranged between 0.75-0.84 indicating an adequate to good reliability. Spearman's correlation coefficient was 0.77 for the OHIP total score. The obtained ICC value for the mean rating was 0.91 (95% confidence interval: 0.78-0.96).

Conclusions

OHIP-14-DK fits the Danish culture, applicable among adolescents and adults undergoing orthodontic treatment in Denmark. Proved to be face and content valid with good internal consistency, excellent reliability, and strong stability. Study registration case no. 1-10-72-148-19

Keywords: Orthodontics, OHIP-14, Oral health related quality of life, translation, cross-cultural adaptation, Danish.

Background

Advances in health care are clearly visible, and technology permeates every aspect of health care, transforming it into a human-machine interface. Nevertheless, as much as it is important for health care clinicians to obtain good health care standards with modern technology, it is highly important to incorporate the patient's own subjective evaluation of their well-being, by assessing individuals evaluation of physical health, and its influence on their life; how health or disease affects them.

However, the health paradigm is not flawless. A population's health is usually measured directly by the presence or absence of disease, life expectancy, or causes of death. However, there is not much highlight on the impact health status has on quality of life (QoL). In 1995, the WHO recognized the importance of evaluating and improving people's QoL (1). Therefore, the awareness of Health Related Quality of Life (HRQoL) has grown since then, and the use of health status measures is becoming fundamental and widely used. HRQoL is an acknowledged index of treatment effectiveness; it is a multi-dimensional concept that focuses on the QoL in relation to an individual's health status and indicators of well-being. The health domain ranges from negatively valued aspects of life, including death, to the more positively valued aspects, such as the role of function or happiness (2).

While the use of HRQoL measures is well established in the medical field, their use in dentistry is still not widespread (3). In dentistry, objective measures of oral disease or malocclusion reflect only the end-point of the disorder or the malocclusion process and do not reflect any insight of the impact that oral disorders have on the individuals' function, psychosocial well-being, and QoL. The need to develop patient-based measures of oral health status was first recognized by Cohen and Jago in 1976 (4), who indicated a lack of data related to psychosocial impact of oral health problems at that time. Oral Health Related Quality of Life (OHRQoL) measures provide an evaluation of gainsin function as well as psychological well-being. Their use offers several practical applications for research, public health, and clinical practice. Among others, health measure outcomes help in promoting health, evaluating the effectiveness and efficiency of health care systems, and serving as a medical audit (3). Orofacial function and health are important aspects of an individual's general health and QoL (5).

Until two decades ago, there was a virtual absence of indices to measure QoL related to oral health. At present, there is an impressive range of OHRQoL instruments (6), yet, methodological developments in this area are still ongoing. Moreover, when a questionnaire is to be used in a different setting than the original measure, there needs to be a process of adaptation for its use in a different setting, recognized as the "cross-cultural adaptation of self-reported measures" (7). Cross-cultural adaptation is the process of preparing a questionnaire for use in another setting, starting by looking into language (translation) and cultural adaptation issues, aiming to reach equivalence between the original source and the target versions of the questionnaire. Besides the linguistic translation part, all items must also be culturally adapted to maintain the content of validity of the instrument across different cultures. Therefore, cross-cultural adaptation consists of two components: translation of the specific instrument and adaptation to the idiom, cultural context, and lifestyle.

Oral Health Impact Profile–49 (OHIP–49), described by Slade and Spencer in English language in Australia, is a self-reported OHRQoL questionnaire, designed to assess QoL related to people's perception of the social impact of oral disorders on their well-being (8), and has been used in several populations (9, 10). OHIP–14 is a short-form of the original OHIP–49, but it retains the original conceptual dimensions. It is reliable and valid (8, 11), and has almost 1000 citations in Scopus. It is a useful instrument for use in a clinical setting (12) and is exponentially used in many populations. However, Denmark lacks a translated and cross-culturally adapted Danish version of the OHIP–14. Hence, the questionnaire cannot be used in Denmark.

The purpose of this study was to translate and cross-culturally adapt the original English version of OHIP–14 into a Danish version (OHIP–14-DK). In addition, to investigate its applicability among adults and adolescents undergoing orthodontic treatment in Denmark, and to assess its internal consistency, and test re-test reliability.

Methods

This study was performed between September and October 2018 in Denmark at Aarhus University, Department of Dentistry and Oral Health, Section of Orthodontics. This type of study is exempt from Ethical approval in Denmark (Scientific Ethical Committee for central Jutland, Denmark, case no. 1–10–72–148–19).

Following the guidelines for the process of cross-cultural adaptation of self-reported measures proposed by Beaton et al. (7), the process of translation and cross-cultural adaptation consisted of five stages. Stages I –IV involve the translation process, whereas stage V is the pre-testing phase performed to ensure quality in the translated Danish version by targeting the population. Figure I shows the process of this study.

Stage I: Initial translation

An initial forward translation was performed by two bilingual native speakers (Danish mother tongue), who independently translated the English questionnaire version into Danish (T1, T2). Translators were to place emphasis on conceptual rather than literal equivalence, and the choice of wording and phraseology was to be simple, clear and compatible with a reading level of age 12 and above. Both translators were of different backgrounds: One was a language expert with no medical or clinical background (naïve translator) and not aware of the concepts being targeted, while the other was a health professional and aware of the concepts. Both were not familiar with the questionnaire. Each translator enclosed a written report of the translation containing challenging phrases and uncertainties, as well as considerations for their decisions.

Stage II: Synthesis of the translations

Working from the original English questionnaire and the two forward translations (T1, T2), a comparison was performed, and discrepancies were resolved in a discussion together with a written report, yielding one common translation (T–12).

Stage III: Back translation

To ensure a consistent translation of the original questionnaire, the common translation (T–12) was translated back into English language by two other independent translators (orthodontists), who were bilingual native speakers (Danish mother tongue, proficient in English language) (BT1, BT2). Neither of them had knowledge of the original version, nor were aware or informed of the concepts explored. Both were completely blind to the original English version. Each of them produced a written report of the translation completed.

Stage IV: Expert committee

An expert committee consisting of two dentists, the forward and backward translators, compared all translated and back-translated versions (T1, T2, T–12, BT1, and BT2), together with their corresponding written reports, with the original English version. Challenges and conceptual equivalences were resolved, yielding a pre-final version "OHIP–14-DK" ready for field-testing. Among others, the committee discussed wording options that could clarify an item and made sure of equivalence in four areas (13); semantic, idiomatic, experiential, and conceptual equivalence. After debating individual differences in translation, documenting alternatives and decisions, an adjustment of four minor wording changes, relevant to the idiomatic equivalence, was applied. Adjustments took into account Danish language usage and conceptual equivalences, with the desire to avoid disagreement in relation to the original OHIP–14. As the general recommendation for questionnaires is to be understood by a 12-year old, the pre-final version was evaluated for its readability level using an electronic readability test tool (https://www.webfx.com/tools/read-able/).

Before executing stage V, 10 individuals (colleagues at the Section of Orthodontics: secretaries and dental assistants), volunteered to read the pre-final Danish version and give their opinion, to identify any misunderstandings or ambiguous wording which could reveal deviations in the translation.

Stage V: Test of the pre-final version

As a final stage of the adaptation process, the translated version was tested to ensure quality in the content validity within the targeted population (conceptual equivalence to the original questionnaire).

The pre-final Danish version of OHIP–14-DK was administered to a random sample of 22 patients aged 12 years and above, receiving orthodontic treatment at the Section of Orthodontics at the time of testing the translated Danish version. All patients were native Danes. Patients were approached at the dental chair during their regular orthodontic treatment visit by one researcher (A.G), were given a standard oral explanation of the questionnaire, agreed to participate, and then each patient self-completed the questionnaire. Responses to each item were scored on a five-point Likert scale (never to very often: 0 =

never, 1 = hardly ever, 2 = occasionally; 3 = fairly often; 4 = very often). Afterwards, the same researcher immediately interviewed each patient individually (probing technique), focusing on what he/she thought was meant by each item and the chosen response, to assess whether there were any difficulties in understanding any item or wording in the questionnaire. In addition, all patients completed the questionnaire on two different occasions with an interval of 1−2 weeks.

Scoring method and data analysis

The number of negative impacts was recorded as present for any item if the reported answers were "fairly often" or "very often" (≥3 on the Likert scale), while a positive impact was determined by the reported answers "never", or "hardly ever", or "occasionally". The percentage of patients reporting a negative impact on one or more items was calculated using the simple-count method (11). The item response score for each item was multiplied by its relevant weight and summed to produce sub-scale scores. The weighted total OHIP−14 score was calculated by summing the weighted score of each subscale (weighted-standardized method).

Data collection and management were performed using Research Electronic Data Capture (REDCap) tool hosted at Aarhus University (14, 15).

Statistical analyses were performed using the Stata Statistical Software (StataCorp. 2017, version 15, College Station, TX). Descriptive statistics were computed. The negative and positive impacts were described using frequency distribution.

The internal consistency of the OHIP−14-DK was explored using Cronbach's alpha. The stability in the pattern of response of the test re-test was assessed using Spearman's correlation coefficient. Consistency of agreement was measured using Intraclass Correlation Coefficient (ICC) (16), computed using the "two-way mixed effects model", with one rater (k = 1), across 22 subjects.

Results

The translation and back-translation were very similar. Discrepancies were resolved, with only minor changes performed. The 10 volunteers approved the pre-final version "OHIP−14-DK" (see appendix A). Thus, no changes were necessary; supporting the committee's face validity. The pre-testing demonstrated that the Danish version had a good face and content validity. As the interviews confirmed that the questions were acceptable without inducing reluctance or hesitation, no adjustments were needed; the version proved to have a good level of equivalence, to be relevant to orthodontic patients, fitting the Danish culture, and comprehended by adults and adolescents as young as 12 years old, with all questions relating to their domains.

The readability test (see appendix B) showed that the pre-final version had an average level of about 8 and was easily comprehended by a 13 to 14 years old (8th grade).

All 22 patients (Table 1) self-completed the 14-item questionnaire, with no missing answers, with a responsiveness rate of 100%. Out of the 308 responses, 14 responses (4.5 %) represented negative impacts due to "fairly often" or "very often" for one or more items; 3.5 % (11 responses) reported "fairly often" (score = 3), and 1 % (3 responses) "very often" (score = 4).

Table 1. Sample characteristics: distribution of participants according to number, gender, and age.	
n	22
Mean age (years) ± SD	24.7 ± 14.8
Range (years)	12.9 - 58.4
Gender	
F	14
M	8

Reliability

Cronbach's alpha and Spearman's correlation coefficients are provided in Table 2. The values of Cronbach's alpha ranged between 0.75–0.84, indicating an adequate to good internal consistency of the subscales when used in this setting. Spearman's correlation coefficient was 0.77 for the OHIP total score. The ICC value was 0.91.

Table 2. OHIP-14 domains with means, standard deviations (SD), and 95% confidence intervals (CI). Internal consistency (Cronbach's alpha) and Spearman's correlation coefficient.				
Subscale	Mean ± SD	CI	Internal consistency (Cronbach's alpha)	Spearman's correlation coefficient
Functional limitation	0.3 ± 0.40	0.10 - 0.46	0.84	0.82
Physical pain	1.4 ± 0.93	0.99 - 1.82	0.80	0.62
Psychological discomfort	1.2 ± 0.95	0.76 - 1.60	0.75	0.83
Physical disability	0.7 ± 0.69	0.39 - 1.01	0.83	0.74
Psychological disability	0.9 ± 0.83	0.54 - 1.28	0.77	0.80
Social disability	0.6 ± 0.72	0.31 - 0.95	0.77	0.62

Handicap	0.4 ± 0.60	0.17 - 0.71	0.80	0.81
OHIP-14 total score	5.5 ± 3.70	3.90 - 7.20	0.82	0.77

Discussion

There is a great demand for QoL measures across different cultures. This study handles the translation and cross-cultural adaptation of a previously validated OHIP−14 (English) into the language and cultural context of a Danish population.

The OHIP−14 consists of 14 items to capture measures of seven domains: functional limitation, physical pain, psychological discomfort, physical disability, psychological disability, social disability, and handicap. OHIP−14 is internationally the most widely available OHRQoL instrument. Health status measures or self-satisfaction measures need to be adapted for use in multinational and multicultural research. It has been translated into 24 different languages (17), overcoming cultural boundaries, for example, in Arabic, Chinese, Dutch, French, German, Greek, Hebrew, Hindi, Persian, Romanian, Swedish, Serbian, Sinhalese, Scottish, Turkish, and Vietnamese. The guideline recommended by Beaton et al. was followed to adapt the OHIP−14 cross-culturally, (7). We did not encounter notable difficulties in this translation and adaptation process.

The OHIP weights reflect the relative severity of the items. However, the unweighted scores (simple scoring method) is considered by others to be a straightforward method (18, 19). Indeed, calculation of weights and score responses can be cumbersome and time-consuming if handled manually. In this study, the questionnaire was digitized, all data was entered and manipulated through RedCap, which made the calculation feasible, automatic, and less time-consuming. Therefore, we used the original method of calculating OHIP scores (11). For the second evaluation, all patients received the questionnaire through their personal email. In this study, we did not consider adapting the weights of scores to the cultural context; we accepted the original weights. We do not believe this would have affected the instrument as the final version did not differ much from the original one; items were the same, and no additional wording or items were introduced.

In a newly translated questionnaire version, comprehensibility is of major importance. Colleagues present at the Section, who were not undergoing orthodontic treatment, were considered as a useful first step for an additional face validity before pre-testing (20). Afterwards, we involved our orthodontic patients in the pre-testing, as they can judge comprehensibility, relevance, and completeness, especially as they represent the typical target of such a questionnaire. Ideally, between 30 and 40 subjects should be tested (7), which is consistent with the number reached, combining the first step (10 subjects) and the pre-testing (22 subjects). Other authors believe that 15−30 subjects are sufficient (21). Our sample size was thus appropriate.

Spearman's correlation coefficients showed a strong correlation indicating that the OHIP–14-DK is reproducible on different occasions. The ICC estimate for a single measurement indicated "excellent" reliability.

OHIP–14 has been used in many fields of dentistry but, it is not so common within orthodontics: only one study recently assessed the perception of patients wearing vacuum-formed retainers using this tool (22), while other studies reported its use in orofacial pain patients (23, 24), prosthodontic patients (25), periodontal patients (26). A systematic review and meta-analysis (27) concluded that OHIP–14 scores were significantly lower after receiving treatment for malocclusion and that individuals without malocclusion/orthodontic treatment need had scored lower compared to those with such a condition. In this study, our selected orthodontic population had a range of malocclusion and were under treatment. They showed a mean OHIP–14 total score of 5.5 points, which supports the fact that malocclusion has a significant impact on the patient's emotional and social well-being (28–31). This might imply that orthodontic patients have a hard time adapting their social life with their brackets or orthodontic treatment in general. Further research is needed in the orthodontic field regarding QoL. As to our knowledge, this has not been assessed in Denmark.

In a literature review, Guillemin et al. (13) stated that a standardized approach to cross-cultural adaptation of OHRQoL instruments does not exist. The authors proposed to set a guideline composed of five steps for translation and cross-cultural adaptation of OHRQoL measures. Studies that culturally adapted a measure used different methodologies. In addition, authors often did not give the readers essential information to comprehend the strength of the translation. However, what is essential and what is supplementary for this process is still not clear: whether reliability, validity, and sensitivity should also be considered in the cross-cultural adaptation process is a matter of controversy. The aspects of validity considered in this study were face and content validity; this was undertaken to ascertain the appropriateness and relevance to content, ensuring feasibility, readability, and clarity of language to the participating audience.

The use of OHRQoL measures should be considered in every orthodontic practice as it has the ability to disclose the patients' perceptions of functional, psychological, and social aspects. As the OHIP–14 has been cross-culturally adapted in this study, generating an OHIP–14-DK version, it can be used in a Danish speaking population. However, further testing should be conducted on the psychometric properties of this adapted version.

Conclusions

- OHIP–14-DK fits the Danish culture, applicable among adolescents and adults undergoing orthodontic treatment in Denmark. Proved to be face and content valid. However, its psychometric properties still need to be tested.
- OHIP–14-DK showed good internal consistency, excellent reliability, and strong stability.

List Of Abbreviations

- QoL: Quality of life
- HRQoL: Health Related Quality of Life
- OHRQoL: Oral Health Related Quality of Life
- OHIP−49: Oral Health Impact Profile−49
- OHIP−14-DK: Danish version of OHIP−14

Declarations

Authors' contributions:

A. G. conceived the idea and the study was supervised by M. A.C and P.M. C.

A. G. carried out the study and collected the data. Data analyses and writing of the manuscript was done by A. G. in consultation with M. A. C. and P.M. C.

All authors read and approved the final manuscript.

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Additional Files

Additional file 1: Appendix A. OHIP–14-DK.

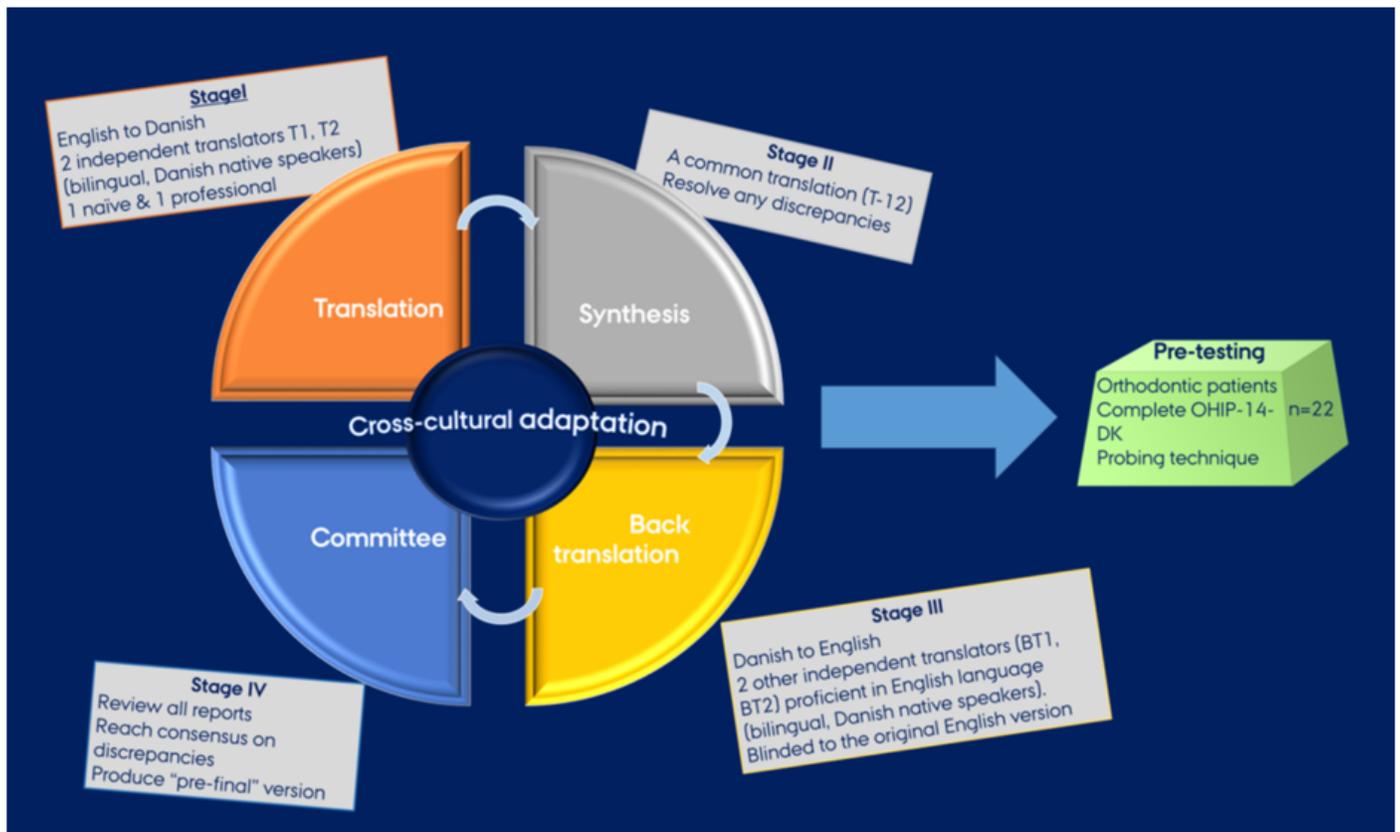Additional file 2: Appendix B. Readability test results.

Figures

Figure 1

The process of translation and cross-cultural adaptation.

Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- Additionalfile1AppendixAOHIP14DK.pdf
- Additionalfile2AppendixB.pdf