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Psychometric properties of the Brazilian version of the Oral Health Impact Profile–short form

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Abstract – *Objective:* The aim of the study is to evaluate the measurement properties of the Brazilian version of the short form of the Oral Health Impact Profile (OHIP14). *Methods:* Data were obtained from a cross-sectional study designed to assess the impact of toothache on quality of life during pregnancy. The sample consisted of 504 postpartum women (mean age 24 years; SD 6.2), most of whom had unsolved dental problems and belonged to low-income families. The questionnaire was administered in the form of interviews by two trained interviewers who also performed clinical examinations. Reliability was assessed in terms of internal consistency and stability. Construct validity was evaluated based on comparison of the total scores among groups according to: self-perceived and normative oral health care needs, self-perceived general and oral health status, presence of carious lesions and tooth loss. It was also hypothesized that the scores of OHIP14 and Oral Impacts on Daily Performances (OIDP) would correlate with each other. *Results:* Both test–retest stability and internal consistency, as measured by the intra-class correlation coefficient (0.87) and by Cronbach's alpha (0.91), proved to be adequate. Construct validity was confirmed as the correlation between OHIP14 scores with self-perceived general and oral health were in the expected direction, and the differences in scores of the groups formed according to the selected attributes were significant at values of $P \leq 0.05$ (Mann–Whitney test). Moreover, the correlation coefficient between OIDP and OHIP14 was 0.76 (r_s). *Conclusion:* The Brazilian version of OHIP14 has good psychometric properties, which are similar to those of the original instrument.

Key words: oral health; quality of life; questionnaires; validity

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The assessment of the effect of oral diseases and conditions on social functioning can be of great value to researchers, health planners and oral health care providers. Many instruments were designed to measure the impact of oral health on quality of life. Among them, the Oral Health Impact Profile (OHIP) and its short form, OHIP14, are used very widely. OHIP was developed in Australia by Slade and Spencer (1) and its short form was published in 1997 (2). The items included in both instruments are grouped into seven subscales: functional limitation, physical pain, psychological discomfort, physical disability, psychological disability, social disability and handicap (2, 3). The subscales are based on a conceptual framework suggested by Locker (4) and derived from the World Health Organization (WHO) International Classification of Impairments, Disabilities and Handicaps (5). OHIP and OHIP14 are more frequently used in cross-sectional and longitudinal studies designed to assess the impacts of oral conditions in elderly populations (6, 7). In 2000, OHIP was used in a cross-sectional study of adolescents (8) and 1 year later, it was used in a clinical trial designed to assess the improvement in oral health-related quality of life (OHRQoL) following treatment with dental implants (9). In 1999, a study undertaken in Canada compared OHIP item weights generated by an Australian sample with those generated by a sample of

English-speaking Canadians and another of French-speaking Canadians, showing that the instrument presented a reasonable degree of cross-cultural consistency (10). More recently, a Chinese (11), a German (12) and a Sinhalese (13) version of OHIP and OHIP14 were generated by processes of varying degrees of refinement. In these three versions, the results relating to the psychometric properties of the translated instruments were comparable with those obtained by Slade and Spencer (1). Until now, the measurement equivalence of OHIP in populations with a Latin background has not been reported. Hence, this paper aims to fill an important gap in the literature regarding the cross-cultural validation of a widely used instrument designed to assess OHRQoL, by describing the psychometric properties of the Brazilian version of the OHIP14.

Methods

The data on which this paper is based were obtained as part of a cross-sectional study designed to assess the prevalence and impact of toothache on the everyday activities of women during pregnancy. This study was approved by the ethics committees of the participating institutions and consent was obtained from each subject.

A consecutive sample of pregnant women admitted to a Public Maternity Hospital, was invited to participate. From 6 January to 27 February 2002, records of the hospital's obstetric centre were reviewed every day in order to identify women who had registered to give birth. These women were approached by one of the two interviewers who explained the objectives of the research to them and sought their consent. Those who agreed took part in a detailed face-to-face interview and clinical examination during the postpartum period, before leaving the hospital.

Oral Health Impact Profile-14 was included in the questionnaire as a measure of the social impact of problems that may compromise oral health. Subjects were asked if they had very often (coded 4), fairly often (coded 3), occasionally (coded 2), hardly ever (coded 1) or never (coded 0), experienced any of the problems assessed by the 14-item OHIP in the previous 6 months. In order to minimize the possibility of memory playing an important role in the process of choosing the answers (i.e. recalling only the first or last response options presented by the interviewer), the interviewers showed a card to the respondents with the five possible answers to OHIP questions typed on it and read them aloud. OHIP scores were calculated by the additive method, with the response codes for the 14 items constituting the measure being summed up. Consequently, the OHIP14 scale ranged from 0 to 56 with higher scores indicating poorer OHRQoL. This method was chosen because it performs better than the simple count method but similar to the more complex weighted-standardized method in terms of discriminating between groups (14, 15).

Besides OHIP14 items, the questionnaire included socio-demographic data such as age, educational level, marital status, employment and economic status. Economic status categorization was derived from economic classification criteria developed by the Brazilian Advertising Association (16). The questionnaire also included items designed to allow the assessment of the construct validity of the Brazilian version of OHIP14 that are listed in Appendix 1. Self-perceived general and oral health status were assessed by means of an ordinary scale having scores ranging from 1 to 5, so that the responses indicating good conditions and no problems carried the highest scores. The opinion of the participants regarding their need for dental treatment was also elicited.

All oral examinations were performed the same day as the questionnaire was administered, using portable lamps. The examiners used WHO criteria to register decayed, missing and filled teeth (17). The presence of removable prostheses was also recorded. Examinations were conducted by one experienced dentist and a senior dental student. Both of them had been calibrated in a 2-h discussion session and trained over 4 days.

The translation process

A preliminary Brazilian version of OHIP14 was obtained by the following translation process. One bilingual individual, whose first language was Portuguese, translated the original OHIP14 from English to Portuguese; then, another bilingual individual, whose first language was English, did the reverse translation. Both translators worked independently and the translator responsible for the back translation of the questionnaire did not have access to its original version. Once these translations were complete, a comparison between the original English and the back-translated version was made by a panel comprising of two translators and three experts familiar with

the instrument. This preliminary Brazilian version of OHIP14 was submitted to pilot-testing on a convenience sample of 18 young adult patients (mean age: 29 years) attending a public health care centre. The participants were asked to express their opinion on how easy it would be for the Brazilian people in general to understand, and feel at ease, with the language used in the questionnarie. Then, the pilot version of the instrument was analysed by a panel comprised of the same experts who participated in the previous phase and a third translator. This panel produced the final version of the Brazilian OHIP14 (18). For the purpose of the present investigation, this version of the instrument was evaluated in terms of face and content validity by a panel composed of three experienced female dentists. Later on, it was pilot-tested on a sample of 19 puerperal women with a social background similar to that of the subjects who would take part in the main study, after which further modifications were made. This modified version is the one that we tested and reported in this study (Appendix 2).

Reliability

Reliability was assessed by tests of internal consistency and stability. The degree of homogeneity of the scale was assessed by Cronbach's coefficient α. Cronbach's α is a summary statistic, which captures the extent of agreement between all possible subsets of questions. We also assessed item–total score correlation and inter-item score correlation (19).

Stability was evaluated using the test–retest approach. The intraclass correlation coefficient (ICC) was calculated based on the repeated interview of a sub-sample of 65 participants chosen among those who reported having experienced toothache during the previous 6 months. The two interviews were conducted by different interviewers (inter-examiner reliability). The time interval between the two interviews ranged from 1 to 3 days and the second interviewer was not aware of the results of the first interview.

Validity

The ability of OHIP14 to detect OHRQoL outcomes was assessed by examining the association between scores derived from this measure and a number of variables designed to indicate, both objectively and subjectively, the oral and psychosocial status of the study population.

The convergent validity of OHIP14, a type of construct validity, was assessed by means of its association with the pattern of dental attendance (regular, at least once a year; irregular, less than once a year), tooth loss (yes, <28 teeth present; no, ≥28 teeth present), untreated dental caries presence (yes or no) and the normative dental treatment needs (yes or no) assessed by the examiners. Construct validity was also evaluated by examining the association between OHIP scores and the responses to the general and oral health self-ratings (very good, good, fair, poor and very poor) and the perceived dental treatment needs (yes or no). Concurrent validity, a type of criterion validity, was assessed by the correlation of OHIP14 and OIDP scores, which is another measure of OHRQoL.

As a result of the skewed distribution of the OHIP scores, nonparametrical statistical tests were used. The Mann–Whitney test was used to verify the statistical significance of differences between groups. Spearman's correlation coefficient (r_s) was used to assess the degree of association between scores on OHIP14 and OIDP, as well as the degree of association between health self-ratings and OHIP14 scores.

Results

After submitting the original Brazilian version of OHIP14 to the panel of experts and pilot-testing it, we came to the conclusion that two items should be modified so that the questionnaire would fit our purpose better. First of all, we observed that the word 'teeth' had to be added to the item that dealt with the experience of 'pain in the mouth' because many subjects reported that they did not consider 'toothache' a type of 'pain in the mouth'. Secondly, during the pilot test, when we asked the subjects if they 'had been self-conscious because of their teeth, mouth or dentures', more than a third replied with another question: 'Do you want to know if I have been worried about my teeth?' So, we decided that we should replace the item 'been self-conscious' by 'been worried', as this expression appeared to be more familiar to the target population.

Nonparticipation rates were low. Overall, 607 pregnant women were admitted to the maternity hospital during the data collection phase of the study. Most of the losses in the study were due to discharge from the hospital before the researchers were able to contact the potential participant. Only

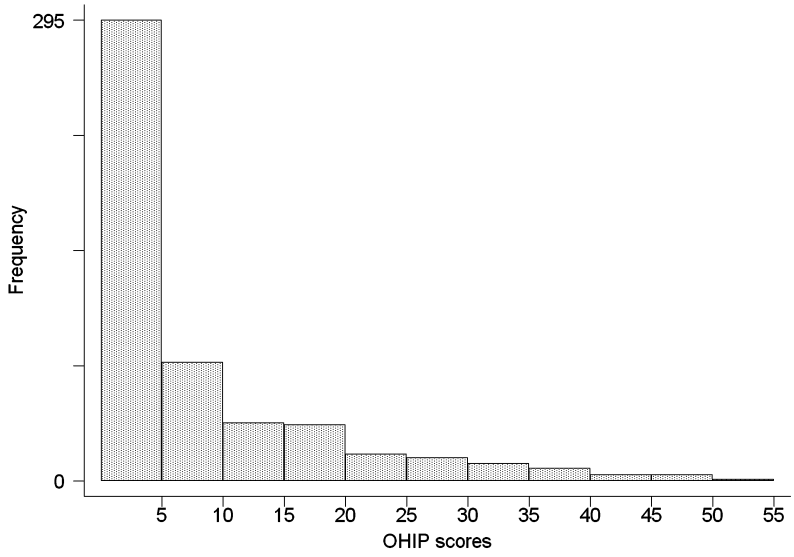

Fig. 1. Frequency distribution of additive OHIP14 scores ($n = 504$).

one woman refused to participate. The total sample consisted of 504 subjects. The subjects represented a disadvantaged group of young women (mean age 24 years; SD 6.2 years). Sixty-four per cent of the subjects were not employed, 86.0% belonged to economic class C or D (mean family income between US$419 and 812/month) and 50.0% reported having completed ≤7 years of school. Seventy per cent of the participants were married or living with someone, 17.6% lived with a relative and the remainder were single. Compared with the group lost to the study, women interviewed were more likely to have lower educational status and babies with lower birth weight.

The mean number of permanent teeth present in the study population was 26 (SD 5.6). Fifty-four per cent of the participants had at least 28 teeth. Untreated dental caries was diagnosed in 60.7% of the participants but calculus was less prevalent (22.6%). Twelve per cent of the women examined wore some kind of removable prosthesis but only two wore both upper and lower complete dentures.

Oral Health Impact Profile scores ranged from 0 to 55.0 (median 3.0; mean 7.4; SD 10.2). The distributions of the scores were skewed with 40.5% of participants reporting all items 'hardly ever' (1) or 'never' (0) (Fig. 1).

Reliability

Internal consistency for the 14 items was excellent ($\alpha = 0.91$, lower limit 95% CI 0.90) and could not be improved by the deletion of any individual question. Nevertheless, the level of homogeneity within the seven subscales ranged from poor to substantial (Table 1). The items of the scale were moderately correlated with each other and showed good correlation with the total score (Table 2). Reproducibility of the total score as assessed by ICC (0.87) was very good.

Table 1. Internal consistency of OHIP14 and of its seven subscales measured by Cronbach's alpha coefficient

Subscales	Cronbach's α (lower limit 95% CI)
Functional limitation	0.55 (0.48)
Physical pain	0.73 (0.69)
Psychological discomfort	0.69 (0.64)
Physical disability	0.76 (0.73)
Psychological disability	0.47 (0.39)
Social disability	0.66 (0.61)
Handicap	0.66 (0.61)
OHIP14 (14 items)	0.91 (0.90)

Validity

Oral Health Impact Profile scores were significantly higher for the following groups as hypothesized: subjects who perceived a need for dental treatment compared with those who did not; subjects who rated their oral health as fair, poor or very poor compared with those who rated their oral health as good or very good; subjects who reported going to the dentist less frequently than once a year compared with those who reported visiting the dentist for a checkup at least once a year; subjects who had <28 teeth compared with those who had ≥28 teeth; subjects who had untreated caries compared with those who did not and subjects with normative dental needs compared with those without them (Table 3). Correlation coefficients between scores on OHIP14 and self-perceived general and oral health status were −0.16 ($P < 0.001$) and −0.62

Table 2. OHIP14 Item-scale and inter-item correlation coefficients

Item	Item-scale correlation	Average inter-item correlation
1 – Had trouble pronouncing any words	0.50	0.44
2 – Felt sense of taste has worsened	0.48	0.44
3 – Had painful aching	0.66	0.42
4 – Found it uncomfortable to eat any foods	0.66	0.42
5 – Been self-concious	0.57	0.43
6 – Felt tense	0.77	0.41
7 – Diet has been unsatisfactory	0.75	0.42
8 – Had to interrupt meals	0.66	0.42
9 – Found it difficult to relax	0.75	0.42
10 – Been a bit embarrassed	0.44	0.45
11 – Been a bit irritable	0.62	0.43
12 – Had difficulty doing usual jobs	0.65	0.43
13 – Felt life less satisfying	0.62	0.43
14 – Been totally unable to function	0.58	0.43

($P < 0.001$) respectively. Similarly, there was a significant association between OIDP and OHIP scores ($r_s = 0.76$, $P < 0.001$).

Discussion

This study was primarily designed to estimate the impact of toothache on a sample of the general population of pregnant women who had delivered their babies at public health care facilities in the city of Rio de Janeiro. Hence, the socioeconomic profile of the study population was similar to that of young women who commonly use the Brazilian public health system in that city. Nevertheless, it should not be considered a representative sample of the Brazilian population. Thus, we advise caution in relation to the generalizability of our results. Taking into consideration Brazil's vast cultural diversity, we suggest testing the instrument before using it in other settings. The low level of education of the participants determined the administration of OHIP14 in the interview format because its use as a self-complete questionnaire might have left us with very little useful data (19). The same approach was adopted by the researchers who developed the Chinese and Sinhalese versions of OHIP14 (11, 13). The application of the questionnaire in the interview format may not have compromised the generalizability of our results, as the psychometric properties of OHIP14 appear to be unrelated to the method of administration (20). We felt that choosing the interview method would not reduce, significantly, the ease with which the questionnaire might be used, as training of the interviewers was limited to instructing them to read the questions and answers aloud, as written, and showing the participants the response cards. We believe that the conditions under which the present study was undertaken contributed to confirm the usefulness of the instrument in diversified settings. Based on

Table 3. Mean and median OHIP14 values in groups with and without dental treatment needs, tooth loss, untreated dental caries, favourable self-rating of oral health and regular dental visits

Variable	OHIP14 scores, mean (SD) [median]	Mann–Whitney test (*P*-value)
Perceived dental treatment needs		
Yes ($n = 412$)	8.5 (10.7) [4.0]	<0.001
No ($n = 92$)	2.3 (5.5) [0]	
Self-rating of oral health		
Fair, poor or very poor ($n = 54$)	15.4 (11.5) [13.0]	<0.001
Good or very good ($n = 450$)	4.3 (7.7) [1.5]	
Pattern of dental attendance		
Irregular ($n = 370$)	8.1 (10.5) [4.0]	<0.01
Regular ($n = 134$)	5.2 (8.9) [2.0]	
Tooth loss		
Yes ($n = 232$)	9.0 (11.4) [4.0]	<0.05
No ($n = 272$)	5.9 (8.9) [2.0]	
Untreated dental caries		
Yes ($n = 306$)	9.3 (11.3) [4.5]	<0.001
No ($n = 198$)	4.4 (7.4) [2.0]	
Normative dental treatment needs		
Yes ($n = 348$)	9.1 (11.1) [4.0]	<0.001
No ($n = 156$)	3.6 (6.5) [2.0]	

our results, researchers, health administrators and dentists can be confident that OHIP14 can be understood by less-educated younger subjects in developing countries as well as by older subjects in developed countries (2).

Taking into consideration the fact that we were interested in assessing the impact of toothache on the OHRQoL of women during pregnancy, we felt that the modification of the question about the experience of pain in the mouth was needed in order to allow us to capture the full extent of the impact of dental pain in our sample. OHIP49 contains a question dealing specifically with the experience of toothache. Slade (2) selected the items to be included in OHIP14 by using the statistical method of least squares regression. For that reason 'toothache' was not chosen as it contributed less than other items of the same conceptual dimension to the total R^2 of the model derived by this method. When Locker and Allen (21) developed an alternative short form of OHIP using the item-impact method, 'toothache' had the third highest impact score within its respective subscale, thus prompting them to suggest that there could be situations in which investigators should consider increasing the number of items in the short form of OHIP. We did not feel comfortable with adding another item to the original Brazilian version of OHIP14 but we decided that we could improve the content validity of the instrument by adding 'toothache' to the 'pain in the mouth' question. When we compared the answers given by the participants to this item of the OHIP with the answers given to the question that dealt with the experience of pain because of problems in the mouth, teeth or dentures, we still had a 7.6% rate of false-negative responses, i.e. by people who had toothache according to this specific question in the interview, but did not report it when answering the OHIP14.

We introduced another modification in the Brazilian version of OHIP14 by replacing the expression 'been self-conscious' by 'been worried'. In fact, 'been worried' corresponds to one of the items of OHIP49 and in the process of developing a Chinese version of OHIP14, using the same methodology used by Slade (2) to generate the English-language OHIP14, Wong et al. (11) selected the item 'been worried' but not 'been self-conscious'. The same happened when Locker and Allen (21) produced their alternative form of OHIP14 by the item-impact method.

Based on the literature and on the results of the statistical analysis conducted, we find that the modifications to the Brazilian version of OHIP14 mentioned above did not threaten the validity of the instrument but rather resulted in a questionnaire more appropriate to the purpose of our investigation and to the population to which it was applied (21).

Information about the psychometric properties of the English-language OHIP14 is scarce but a couple of studies have shown that its validity and reliability are similar to that of OHIP49 which has well-established properties (2, 22).

The stability of the Brazilian OHIP14 was good and similar to that of the Chinese OHIP14 but slightly lower than that of the German version of the instrument. It is important to note that, as the reliability of a measure is intimately linked to the population to which it is applied (19), the value of the reliability coefficient obtained reflects the homogeneity of our study population with respect to the impact of oral problems on OHRQoL. Therefore, one can expect that if the same questionnaire is to be applied to a more heterogeneous group of subjects, a greater reliability coefficient can be obtained. On the contrary, as our results are consistent with those found by others (2, 11), it is reasonable to suggest that the test–retest reliability of OHIP14 might be improved by the introduction of items that would result in average scores further from the minimum possible (19), thus reducing its floor effect which limits its ability to discriminate between groups (2, 11, 20). Another point worth noting is that, during the interviews, a few respondents were in doubt if they should answer 'never' or 'hardly ever' when a given impact was experienced once or twice during the period of reference. Considering the acute nature of oral problems more often experienced by younger subjects, it might be useful to add to OHIP14 the response option 'once/twice' as done by Jokovic et al. (23) in the 'Child Oral Health Quality of Life Questionnaire (COHQoL)'. In future research it would be interesting to test if adding that response option to OHIP14 would contribute to the improvement of the reliability of the instrument when applied to samples of younger subjects.

The internal consistency of the Brazilian OHIP14 was slightly better than the internal consistency of the Chinese version but similar to that of the German, the British and the Sinhalese versions. More importantly, the translation of the questionnaire into Portuguese preserved the homogeneity of the original English-language scale (2). How-

ever, the alpha values of the subscales were lower for the Brazilian version of OHIP14 than for the German and the Chinese versions. The most remarkable differences were identified in the following subscales: functional limitation, psychological disability, social disability and handicap. The fact that these subscales did not reach the minimum recommended alpha coefficient of 0.7 (19) suggests that it may be advisable to develop a *de novo* version of the Brazilian OHIP14, using different methodologies (2, 21) to determine if other subsets of items could provide better measurement properties. For example, by examining the item-scale correlations it was possible to infer that 'felt sense of taste has worsened' and 'been a bit embarrassed' were particularly problematic items. Both items were not selected by Locker and Allen (21) when they generated a different English-language version of OHIP14 by using the item-impact methodology. Thus, selecting a subset of items from OHIP49 based on their frequency and importance in another sample of young adults might lead to a Brazilian version of OHIP14 with more homogeneous subscales.

All hypotheses concerning construct and criterion validity of the Brazilian OHIP14 were confirmed. The measure proved to be useful to discriminate between groups of individuals with better (no caries, tooth loss or treatment needs) and worse oral health (presence of caries, experience of tooth loss and with treatment needs). Irregular users of dental services could also be identified. Self-ratings of health status and perceived dental treatment needs were associated with OHIP14 scores confirming its construct validity. The stronger correlation with perceived oral health than with perceived general health supports the specificity of the index. Moreover, its high and significant correlation with another instrument designed to assess the impact of oral problems on OHRQoL (OIDP) contributed to a favourable evaluation of its concurrent validity.

In conclusion, the Brazilian version of OHIP14 presented psychometric properties similar to the English-language original. The low level of internal consistency obtained for the subscales functional limitation, psychological disability, social disability and handicap, suggests that it may be useful to conduct further research in order to evaluate if a Brazilian short form of OHIP containing different items would result in more homogeneous subscales. Results of the present study add to the current view that the short form of the OHIP is a valuable tool for international research as it is cross-culturally reliable and valid.

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Appendix 1

List of elements included in the questionnaire and in the clinical examinations

1– Pain due to problems in the mouth, teeth or dentures, in the previous six months
2 – Perceived dental treatment needs
3 – Self-rating of oral health
4 – Self-rating of general health
5 – Pattern of dental attendance
6 – Tooth loss
7 – Untreated dental caries
8 – Normative dental treatment needs

Appendix 2

Brazilian version of the short-form of the Oral Health Impact Profile (OHIP14) evaluated by the present study

Nos últimos seis meses, por causa de problemas com seus dentes, sua boca ou dentadura:
1 – você teve problemas para falar alguma palavra?
2 – você sentiu que o sabor dos alimentos tem piorado?
3 – você sentiu dores em sua boca ou nos seus dentes?
4 – você se sentiu incomodada ao comer algum alimento?
5 – você ficou preocupada?
6 – você se sentiu estressada?
7 – sua alimentação ficou prejudicada?
8 – você teve que parar suas refeições?
9 – você encontrou dificuldade para relaxar?
10 – você se sentiu envergonhada?
11 – você ficou irritada com outras pessoas?
12 – você teve dificuldade para realizar suas atividades diárias?
13 – você sentiu que a vida, em geral, ficou pior?
14 – você ficou totalmente incapaz de fazer suas atividades diárias?

Response options: Nunca (0), Raramente (1), Às vezes (2), Repetidamente (3) e Sempre (4).