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Derivation and validation of the short version of the Malaysian Oral Health Impact Profile

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Abstract – *Objectives:* This paper describes the development of a short version of the Malaysian Oral Health Impact Profile. *Methods:* The 45-item OHIP(M) was shortened using a method known as the 'item frequency method'. Here, the two most frequently reported items from each of the seven OHIP(M) subscales were chosen to form the short version, designated as the S-OHIP(M). Field testing was conducted to assess the effect of different modes of administration (mail versus interview) of the short form and to test its measurement properties (reliability and validity). A total of 206 respondents completed the questionnaire. In order to carry out test–retest analysis, a second administration was carried out 15 days after the first administration on a selected subsample. *Results:* The mail questionnaire had a lower response rate and a higher percentage of missing data than the interview administered questionnaire. However, the mail mode of administration resulted in higher scores than interview. Cronbach's alpha was 0.89 and the ICC was also 0.89. All hypotheses developed to assess validity were confirmed. *Conclusion:* The S-OHIP(M) was found to be valid and reliable and appropriate for use in the cross-sectional studies in Malaysian adult populations.

Key words: oral health-related quality of life; psychometric methods; reliability; shortening; validity

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There is an increasing interest among dental clinicians and researchers in the use of oral health-related quality of life (OHRQoL) measures in population-based and clinical studies of oral disorders. There are number of such measures available. Most of them are in a form of multi-item scales and consist of questions that address problems relative to conceptually distinct dimensions of health and wellbeing (1). In dentistry, these measures have been used in oral health surveys, as outcome measures in clinical trials and in the evaluation of dental care programmes for special-care populations (1).

Although the focus of the Ministry of Health of Malaysia has shifted from being disease oriented to emphasizing wellness and the maintenance of the quality of life of the population, a measure of OHRQoL appropriate for use in Malaysia has not been available. Consequently, we adapted the Oral Health Impact Profile (OHIP) for the Malaysian population because the OHIP is the one of the most sophisticated measures currently available. The OHIP was originally developed in Australia by Slade and Spencer (2), and contains 49 items grouped into seven domains; namely functional limitation, physical pain, psychological discomfort, physical disability, psychological disability, social disability and handicap. However the Malaysian version of OHIP, which is called L-OHIP(M) contains 45 items grouped into the same seven domains as the original version.

Although the original OHIP has a short form (3), we decided to adapt the long form of the OHIP because it provides more comprehensive data and it allows us to explore the problem of oral health in the Malaysian population. However, a long measure is not appropriate for use in some settings. Locker and Allen (1) identified four reasons as to

why a long measure may need to be shortened: (1) a measure that takes long time to complete and score may not be feasible in clinical settings; (2) a long questionnaire increases the cost of administration and data management, (3) respondent burden may mean that it cannot be used in studies of some segments of the population, such as the frail elderly population, and (4) item nonresponse is higher with long questionnaires and may lead to a loss of a substantial proportion of cases or problems arising from the necessity to impute missing data. Thus, the aim of this study was to develop a short form of the OHIP(M) and to test its performance in a cross-sectional study of Malaysian adults.

Methods

Derivation of short form of the OHIP(M)

The short version of the OHIP(M) was developed following the cross-cultural adaptation of the long form of OHIP (4). The original English-language OHIP was translated into the Malay language using a forward–backward technique. However, since translation alone did not ensure that the Malay-language version was culturally appropriate, we conducted qualitative interviews with 36 patients recruited from dental clinics to establish its conceptual equivalence and content validity. These interviews concerned the ways in which the patients' oral health problems impacted on daily life. In addition, the English-language OHIP or the Malay translation was administered to check for the relevance and clarity of the items. Based on the translation process and the results of these interviews, a Malaysian version of the OHIP that contained 45 items was produced. Seven items from the original OHIP were excluded because they were ambiguous when translated, were similar in meaning to other items or were judged not to be relevant by the respondents. Three new items describing problems experienced by the interviewees were added. At this stage, we also produced a short form. This contained 14 items selected using the 'item frequency method'. This method was developed by the authors. This method was based on an assumption that the items were considered as important when they were frequently reported by the patients. It reflects the patients' collective opinion of the importance of the items selected. As such the method can be considered as an 'expert-based' approach, where patients were the experts (1). In order to maximize content coverage, the two most commonly reported items from each of the seven subscales were included. The Malay- and English-language versions of these items are shown in Table 1. The long Malaysian OHIP was designated as the L-OHIP(M) and the short version as the S-OHIP(M).

Instrument evaluation

Two modes of administration, mail and interview, were assessed and the measurement properties in terms of reliability and validity of the S-OHIP(M) were tested. As the S-OHIP(M) was intended to be a descriptive and discriminative measure, data were obtained by means of a cross-sectional study.

The participants for this study were a subsample of participants in the Malaysian National Oral Health Survey of Adults (NOHSA, 2000). For this study the Selangor state, one of the 14 states in Malaysia, was chosen as the sampling area. This state has nine districts. A sample of Selangor state was identified from the NOHSA database. Those who below 18 years by the year 2002, were removed from the sample. They were then divided into two groups: mail and interview. For the purpose of convenience (logistic and administrative), one of the districts, i.e. Petaling district, was used as the sampling frame for the interview group and all the other eight districts were used for the mail group. The sample for both interview and mail group was randomly selected from the sampling frame. Because of resource constraints, only a small number of the sample was used for the interview group.

For those in the mail group, a set of questionnaires together with an introductory letter and a prepaid stamped return envelope was sent to the participants. In order to identify the respondents, a number, which was assigned to the respondent, was stamped on the return envelope. A pen was enclosed to show appreciation of their participation.

Participants were asked to complete the questionnaire and return it to the sender using the envelope enclosed. To maximize returns, the steps outlined by Dillman (5) were followed. Seven to 10 days after the first mailing, a postcard was sent to thank those who had returned the questionnaire, and reminding the others of the study's importance. The card also indicated, to those who had missed the original, where they could obtain another copy. Three weeks later, a second letter was sent to those participants who had still not

Table 1. Items selected for the S-OHIP(M)

Functional limitation	Pernahkah anda mengalami kesukaran mengunyah sebarang makanan disebabkan masalah gigi, mulut atau gigi palsu anda? (Have you experienced difficulty chewing any food because of problems with your teeth, mouth or dentures?)
	Pernahkah anda merasakan yang masalah gigi, mulut atau gigi palsu anda menyebabkan nafas anda berbau? (Have you felt problems related to your teeth, mouth or dentures cause bad breath?)
Physical Pain	Pernahkah anda mengalami rasa tidak selesa untuk makan sebarang makanan disebabkan masalah gigi, mulut atau gigi palsu anda? (Have you experienced discomfort eating any food because of problems with your teeth, mouth or dentures?)
	Pernahkah anda mengalami tompok-tompok putih yang pedih (Ulser) di dalam mulut? (Have you experienced ulcers in your mouth?)
Psychological discomfort	Pernahkah anda merasa tidak selesa disebabkan makanan terlekat di celah gigi atau gigi palsu anda? (Have you felt discomfort due to food getting stuck in between your teeth or dentures?)
	Pernahkah anda merasa malu disebabkan masalah gigi, mulut atau gigi palsu anda? (Have you felt shy because of problems with your teeth, mouth or dentures?)
Physical disability	Pernahkah anda mengelak daripada memakan makanan tertentu disebabkan masalah gigi, mulut atau gigi palsu anda? (Have you avoided eating certain foods because of problems with your teeth, mouth or dentures?)
	Pernahkah anda mengelak daripada senyum disebabkan masalah gigi, mulut atau gigi palsu anda? (Have you avoided smiling because of problems with your teeth, mouth or dentures?)
Psychological disability	Pernahkah tidur anda terganggu disebabkan masalah gigi, mulut atau gigi palsu anda? (Has your sleep been disturbed because of problems with your teeth, mouth or dentures?)
	Pernahkah tumpuan anda terganggu disebabkan masalah gigi, mulut atau gigi palsu anda? (Has your concentration been disturbed by problems with your teeth, mouth or dentures?)
Social disability	Pernahkah anda mengelak daripada keluar berjalan-jalan disebabkan masalah gigi, mulut atau gigi palsu anda? (Have you avoided going out because of problems with your teeth, mouth or dentures?)
	Pernahkah anda mengalami masalah untuk menjalankan kerja-kerja harian anda disebabkan masalah gigi, mulut atau gigi palsu anda? (Have you experienced problems in carrying out your daily activities because of problems with your teeth, mouth or dentures?)
Handicap	Pernahkah anda terpaksa mengeluarkan perbelanjaan yang tinggi disebabkan masalah gigi, mulut atau gigi palsu anda? (Have you had to spend a lot of money due to problems with your teeth, mouth or dentures?)
	Pernahkah anda merasa kurang yakin dengan diri anda disebabkan masalah gigi, mulut atau gigi palsu anda? (Have you felt less confident of yourself due to problems with your teeth, mouth or dentures?)

returned the questionnaire. A second copy of the questionnaire and a return envelope were also included. If there was no response 1 month from the date the second questionnaire was sent, a participant was regarded as a non-respondent.

Household interviews were carried out for the interview group by trained interviewers. The interviewers were trained by the investigator on how to conduct the interview. In order to obtain better response from the respondent as well as to make them aware of the study, 1 month before the interviews started, an introductory letter regarding the study from the Dean of the dental faculty of University Malaya was sent to all respondents. Subsequently, an interviewer went to each respondent's residence to conduct the interview. The interviewer read each question to the respondents. In cases where the respondent was not available, an appointment card was left at the house, asking him/her to contact the interviewer so that an appointment could be made. However, if he/she did not get back to the interviewer within 1 week, a second visit to the respondent's house was made. The respondent was regarded as a nonrespondent after two visits were made. For convenience, the interviews were carried out on an area-by-area basis.

In order to carry out test–retest analysis, a second administration was carried out. Fifteen days after the first administration of the questionnaire, the second administration was carried out on a selected subsample. For the mail questionnaire, the sample was selected based on those who had returned the questionnaire within 2 weeks from the time that the questionnaire was first posted to them. For the interview questionnaire, 14 days after the first interview, the second interview was conducted. At this stage, an additional question asking whether their oral health has changed since the first administration was added. The dental status of the respondents was collected as a self-reported, where respondents were asked to answer whether they had their original teeth or they had lost all their teeth.

Data management

Before analysis was performed, data were first cleaned by running the frequency distribution for each item and verified that only valid ranges of numbers were used. If there were invalid codes, the original questionnaire was used to determine the correct answer. Two procedures were applied in the case of missing data: total exclusion and mean item imputation (6). If more than 20% of the items (two or more) were coded as missing (blank entries or 'don't know' responses), then the questionnaire was excluded from the reliability and validity analyses. In cases where <20% of items were coded as missing (blank entries or 'don't know' responses), then the item value was imputed using the mean of that particular item.

Scoring

Two methods of scoring were computed: additive scores (ADD) and simple count scores (SC) (7). ADD scores were calculated by summing the response codes for the 14 items and SC scores were calculated by a count of the number of items reported as occurring 'very often' and 'often'. The ADD scores could range from 0 to 56 and the SC scores from 0 to 14. A high score indicated poorer OHRQoL.

Analysis

Appropriate statistical analyses were performed. A *P*-value was set at 0.05. The analyses performed were as follows.

Comparison of the two types of mode administration

The comparison was made by assessing three parameters: response rates, completeness of data and OHIP(M) scores. A questionnaire was considered incomplete if more than 20% (two or more items) of items were left blank or marked 'don't know'. The comparison was made either using the chi-square test or Mann–Whitney test.

Reliability

Two types of reliability were assessed: internal consistency and test–retest reliability. Internal consistency was assessed using Cronbach's reliability coefficient α based on the responses from the first administration. Scores of 0.6 or more indicates good to excellent reliability (8). Test–retest reliability was assessed by calculating intraclass correlation coefficients (ICC) using scores from the repeated administrations of the OHIP(M) (6). The scores of those reporting a change in their oral health over the period between the two administrations were excluded from this calculation. A value of 0.7 was considered as acceptable (9).

Validity

To ensure that the instrument measured what it is supposed to measure, validity tests were carried out. Data from the first administration of this part of the study was used to assess the validity of the instrument. Because there was no 'gold standard', construct validity was assessed. Two types of construct validity test were performed: convergent and discriminative validity.

Convergent validity — This describes how closely a measure is related to other measures of the same construct to which it should be related. The correlation between the global rating of oral health and S-OHIP(M) scores using Spearman's rank correlation test was calculated to assess convergent validity.

Discriminative validity — This is concerned with how well the scale is able to distinguish between groups with known differences. The hypotheses tested were: (1) those who were not satisfied with their oral health would be more likely to have high S-OHIP(M) score than those who were satisfied, (2) those who perceived that they needed dental treatment would be more likely to have higher S-OHIP(M) score than those who did not, and (3) the edentulous subjects and dentate subjects wearing dentures would be more likely to have higher S-OHIP(M) score than those who were dentate not

wearing dentures. Mann–Whitney tests or Kruskal–Wallis test were used to assess the significance of differences between groups.

Results

Respondents

A total of 206 respondents completed the initial questionnaire and 73 respondents completed a second copy after a 2-week interval. Of the 206 respondents, 151 completed the mail questionnaire and 55 were interviewed. However, three of the mail questionnaires were excluded from the analysis because there were more than two items missing. Of the 73 respondents who completed the second copy, 49 completed a mail questionnaire and 24 were re-interviewed.

Comparison of mode of administration – mail versus interview

Table 2 shows the response rate, the percentage of questionnaires with incomplete data and S-OHIP(M) ADD and SC scores by mode of administration. The interview yielded a significantly higher response rate than the mail questionnaire. Only a small number of questionnaires in the mail group had incomplete data and none in the group who were interviewed. It was observed that the mean scores – both ADD and SC scores – were lower for the respondents who were interviewed than for those completing the mailed questionnaire. However, the differences were not significant.

Reliability

Table 3 shows the Cronbach's alpha values and intraclass correlation coefficients (ICC) by mode of administration. The Cronbach's alpha value was 0.89. The mail questionnaires had a higher value than the interview administered questionnaires. A total of 73 respondents completed the S-OHIP(M) for the second time. Forty-nine respondents completed the mail questionnaire and 24 respondents were re-interviewed. To assess the stability of the instrument, the intraclass correlation coefficient (ICC) was calculated. The ICC values were all higher than 0.7 indicating excellent test–retest reliability.

Validity

Table 4 shows that, as hypothesized, the mean OHIP(M) ADD score increased as the respondents' perceived oral health status changed from good to poor. This observation provides evidence of construct validity. Those respondents who perceived a need for dental treatment and were not satisfied with their oral health had significantly higher ADD scores (Table 5). Those who were dentate with no dentures had significantly lower ADD scores than those who were edentulous or dentate and wearing dentures (Table 5).

Discussion

The 14-item Malaysian short form of the OHIP was developed following the cross-cultural adaptation of the original English language OHIP developed in Australia. It was designated as the S-OHIP(M). The main reason for developing a short form was to provide an efficient way of data collection based on the premise that a long questionnaire cannot be used in some research settings and clinical practices even though it provides more comprehensive data. For example, a measure that takes a long time to complete and score may not be feasible in a clinical setting because of the burden placed on patients or clinicians (1).

The selection of the items for the S-OHIP(M) was made based on a assumption that items were important when they were frequently reported by the patients interviewed in the qualitative interview stage of the study. By selecting the two most frequently reported items reported from each domain we aimed to ensure the content validity

Table 2. Response rate, percentage of questionnaires with incomplete data, and OHIP(M) ADD and SC scores by mode of administration

			OHIP(M) scores	
	Response rate, *n* (%)	Incomplete data, *n* (%)	ADD score, mean (SD)	SC score, mean (SD)
Mail	151 (47.5)*	3 (2.0)	11.25 (9.48)	1.16 (2.20)
Interview	55 (63.2)*	0 (0.0)	10.15 (6.69)	0.98 (1.14)
Total	206 (50.9)	3 (1.5)	10.96 (8.81)	1.11 (2.01)

*$P < 0.05$, chi-square test.

Table 3. Cronbach's alphas and ICCs by mode of administration

Reliability	Mail	Interview	Total[a]
Cronbach's alpha	0.91 (n = 148)	0.80 (n = 55)	0.89 (n = 203)
ICC	0.92 (n = 49)	0.91 (n = 24)	0.89 (n = 73)

n, sample size.
[a]Combined mail and interview samples.

Table 4. Mean ADD scores and Spearman's rank correlation coefficients for the S-OHIP(M)

Perceived oral health status	n	Mean ADD score	ρ-value
Very good	11	2.27 (2.37)	0.518*
Good	78	7.11 (5.27)	
Fair	107	13.56 (8.58)	
Poor	7	27.86 (11.39)	

*P-value <0.001.

Table 5. S-OHIP mean score by perceived dental treatment need, satisfaction with oral health and dental status

Global rating	n	ADD score, mean (SD)	P-value
Perceived dental treatment need			
Need treatment	143	13.06 (9.00)	0.000[a]
Do not need treatment	60	5.97 (5.60)	
Satisfaction with oral health			
Yes	118	7.31 (5.70)	0.000[a]
No	85	16.04 (9.71)	
Dental status			
Dentate no denture	160	10.49 (8.86)	0.025[b]
Dentate with denture	34	13.44 (7.24)	
Edentate	9	10.00 (11.31)	

[a]Mann–Whitney test.
[b]Kruskal–Wallis test.

of the short version in terms of coverage. As a large proportion of items comprising the L-OHIP(M) were not selected, the measurement properties of the short form were assumed to be different from those of the long form. Hence, the S-OHIP(M) was treated as a new measure and its reliability and validity tested on a new and independent sample of the target population as recommended by Coste et al. (10).

This study demonstrated that the S-OHIP(M) is internally consistent and reliable, as shown by the Cronbach's alpha and ICC statistics. Similar ICC values were observed for questionnaires administered by mail and interview. This suggests that the S-OHIP(M) is reliable regardless of the mode of administration. A high Cronbach's alpha value also suggests that the items were homogenous in terms of measuring OHRQoL. The results also demonstrated that the S-OHIP(M) was valid in terms of discriminating between groups.

Although the S-OHIP(M) was developed to be used as a descriptive and discriminative measure in population oral health surveys, it may also be appropriate for use in clinical trials and in clinical practice as an evaluative measure. However, in this study, the responsiveness of the measure was not tested because of time and resource constraints. Therefore, responsiveness will be tested in future research in order to determine if it is sufficiently sensitive to change to be used in evaluative studies.

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