M.L. Zucoloto¹, J. Maroco²,
and J.A.D.B. Campos^{1*}

¹Departamento de Odontologia Social, Faculdade de Odontologia de Araraquara, UNESP (Universidade Estadual Paulista), Araraquara, São Paulo, Brazil; and ²Unidade de Investigação em Psicologia e Saúde, ISPA (Instituto Superior de Psicologia Aplicada), Lisboa, Portugal; *corresponding author, jucampos@foar.unesp.br

J Dent Res 93(7):645-650, 2014

ABSTRACT

Objective: Evaluate the validity, reliability, and factorial invariance of the complete Portuguese version of the Oral Health Impact Profile (OHIP) and its short version (OHIP-14). **Methods:** A total of 1,162 adults enrolled in the Faculty of Dentistry of Araraquara/UNESP participated in the study; 73.1% were women; and the mean age was 40.7 ± 16.3 yr. We conducted a confirmatory factor analysis, where χ^2/df , comparative fit index, goodness of fit index, and root mean square error of approximation were used as indices of goodness of fit. The convergent validity was judged from the average variance extracted and the composite reliability, and the internal consistency was estimated by Cronbach standardized alpha. The stability of the models was evaluated by multigroup analysis in independent samples (test and validation) and between users and nonusers of dental prosthesis. **Results:** We found best-fitting models for the OHIP-14 and among dental prosthesis users. The convergent validity was below adequate values for the factors “functional limitation” and “physical pain” for the complete version and for the factors “functional limitation” and “psychological discomfort” for the OHIP-14. Values of composite reliability and internal consistency were below adequate in the OHIP-14 for the factors “functional limitation” and “psychological discomfort.” We detected strong invariance between test and validation samples of the full version and weak invariance for OHIP-14. The models for users and nonusers of dental prosthesis were not invariant for both versions. **Conclusion:** The reduced version of the OHIP was parsimonious, reliable, and valid to capture the construct “impact of oral health on quality of life,” which was more pronounced in prosthesis users.

KEY WORDS: quality of life, oral health, validation studies, weights and measures, dental prosthesis, scales.

DOI: 10.1177/0022034514533798

Received January 15, 2014; Last revision March 21, 2014; Accepted April 8, 2014

A supplemental appendix to this article is published electronically only at <http://jdr.sagepub.com/supplemental>.

© International & American Associations for Dental Research

Psychometric Properties of the Oral Health Impact Profile and New Methodological Approach

INTRODUCTION

Quality of life is a multidimensional construct defined as the perception of individuals regarding their own lives; it is influenced by the culture and values associated with the environment, as well as the objectives, expectations, paradigms, and concerns of the individual. It is a concept sensitive to physical, psychological, social, and environmental changes (“World Health Organization Quality of Life,” 1995).

Quality of life can be explored regarding different aspects—namely, health-related features that can be evaluated from a general health perspective or when considering specific aspects such as oral health.

Considering the importance of oral health in quality of life, Locker (1988) proposed a theoretical model that aims at understanding the complex consequences of oral disease on quality of life. This model includes 5 aspects: functional limitation, pain or discomfort, disability, injury, and handicap. Based on this proposal, oral health–related quality of life started being investigated, taking into account the impacts of oral problems on normal functions and their influence on the individuals’ quality of life and well-being (Baker, 2007).

To operationalize the assessment of this construct, several psychometric scales were developed, such as the Geriatric Oral Health Assessment Index (Atchinson and Dolan, 1990), the Oral Impacts on Daily Performances (Adulyanon and Sheiham, 1977), and the Oral Health Impact Profile (OHIP) (Slade and Spencer, 1994). These tools assess individuals’ perceptions about the impacts of dental problems on their daily lives, considering functionality, aesthetics, psychological aspects, and pain as possible factors interfering in their quality of life. Among these instruments, one of the most used worldwide is the OHIP, originally developed in Australia by Slade and Spencer (1994). The OHIP is composed of 49 items divided into 7 subscales extracted from the model proposed by Locker (1988).

Despite the widespread use of the OHIP-49, the large number of items and the time required to fill it in hinder its use in epidemiologic and clinical studies (Slade, 1997). Thus, some reduced versions, such as the OHIP-14 (Slade, 1997), were developed to address the same concepts as the full version of OHIP but to consume less time. These versions have been adapted and validated for specific clinical conditions, such as temporomandibular disorders (Van der Meulen *et al.*, 2012), prostheses users (Özhayat and Gotfredsen, 2013), and edentulous patients (de Souza *et al.*, 2012), among others.

It should be emphasized, however, that the process of adaptation of an instrument must be careful and thorough and that it is only finalized after assessing the reliability and validity of it when applied to different samples (Anastasi, 1988).

Thus, the validation and reliability analysis of the complete, short, and adapted versions of the OHIP are mandatory aspects and need to be conducted before the instruments' application. Although the analysis of the reliability and validity of the OHIP are commonly found in the literature (Sierwald *et al.*, 2011; Liu, 2012), there are important aspects in the conduction of this validation process, such as the analysis of the items' psychometric sensitivity, as well as factorial, convergent, discriminant, concurrent, and divergent validities, which have been neglected or not included. The lack of these validities can compromise the conclusions drawn from these studies as well as the future use of the instrument.

Knowing that the OHIP is widely used and that it is imperative to complete the validation process before its use, this study was performed to evaluate the validity, reliability, and factorial invariance of the complete Portuguese version of the OHIP and its short version (OHIP-14) when applied to dentistry patients.

MATERIALS & METHODS

The study was approved by the Research Ethics Committee of the Faculty of Dentistry of Araraquara/UNESP (CAAE:0104 0312.5.0000.5416/n°50802) and included only patients older than 18 yr who agreed to sign the informed consent form.

A cross-sectional study with nonprobabilistic sampling design was developed.

A total of 1,162 patients participated in this study—those who visited the clinics of the Faculty of Dentistry of Araraquara/UNESP in the period from September 2012 to April 2013. Of these, 73.1% were female, with a mean age of 40.7 yr (SD = 16.3).

To characterize the sample, sociodemographic information was collected: sex, age, educational level, economic status, and clinical information, such as the type and use of dental prostheses and dental status (completely dentate, partially dentate, or edentulous). Economic status was classified according to the Brazilian Economic Classification Criterion (Associação Brasileira de Empresas de Pesquisa, 2008).

Instrument

The impact of oral health on quality of life was estimated with the full Portuguese version of the OHIP—namely, the OHIP-49 (Pires, 2003). This instrument consists of 49 items arranged in 7 factors: functional limitation, physical pain, psychological discomfort, physical disability, psychological disability, social disability, and handicap. The answers are given in a 5-point Likert scale (0 = never, 1 = rarely, 2 = sometimes, 3 = often, 4 = always); the option “do not know/not applicable” was added. Three questions are specific for patients with dentures (questions 17, 18, and 30) and 3 for dentate patients (questions 12, 13, and 27).

In this study, we also used the Portuguese short version of the instrument, with 14 items—the OHIP-14 (Slade, 1997; Oliveira and Nadanovsky, 2005).

Analysis of Psychometric Properties

The psychometric sensitivity of the OHIP's items was evaluated by measures of central tendency, variability, and shape of the

distribution (Appendix A). It is considered that absolute values of kurtosis (< 7) and skewness (< 3) present no severe deviations from normality and, thus, of psychometric sensitivity (Maroco, 2010).

The content validity ratio was estimated following the proposal by Lawshe (1975). A total of 15 experts in the field of dentistry participated in this stage of the study, rating each OHIP's item concerning its essentiality (“essential,” “useful but not essential,” and “not necessary”). The decision making regarding item significance was based on proposal by Wilson *et al.* (2012), adopting a significance level of 5% (content validity ratio = 0.506).

To test the fit of the data to the factor structure of the instruments originally proposed, a confirmatory factor analysis was performed through the method of maximum likelihood. The indices used to assess the goodness of fit of the model included the ratio of chi-square by degrees of freedom (χ^2/df), comparative fit index (CFI), goodness of fit index (GFI), and root mean square error of approximation (RMSEA) (Kline, 1998; Maroco, 2010). The fit of the models was considered adequate when $\chi^2/df \leq 2.0$, CFI/GFI ≥ 0.90 , and RMSEA < 0.10 for each sample (Maroco, 2010).

The comparison between models was performed by the chi-square difference test ($\Delta\chi^2$). Indices based on the information theory were also used: Akaike information criterion, Browne-Cudeck criterion, and Bayes information criterion. The best model was the one that presented lower values in these indices (Maroco, 2010).

To fit the data to the original factor structure of the OHIP-49 model, it was necessary to remove specific items for patients using complete denture (items 17, 18, and 30). Moreover, as 3 questions were specific for dentate subjects, we chose not to include the edentulous patients in the evaluation of the factor structure of the complete version ($n_{\text{OHIP-49}} = 1042$).

The models' stability was tested in independent samples in 2 stages. First, the sample was randomly divided into 2 equal parts: the “test sample” ($n_{\text{OHIP-49}} = 523$, $n_{\text{OHIP-14}} = 591$) and “validation sample” ($n_{\text{OHIP-49}} = 519$, $n_{\text{OHIP-14}} = 571$). In a second phase, participants were divided into users and nonusers of dental prostheses. Seven patients who did not answer the questions about the use of prostheses in the clinical questionnaire were excluded from this analysis (prosthesis users: $n_{\text{OHIP-49}} = 339$, $n_{\text{OHIP-14}} = 453$; nonusers: $n_{\text{OHIP-49}} = 696$, $n_{\text{OHIP-14}} = 702$). The factorial invariance between the models was estimated by multigroup analysis with the chi-square difference ($\Delta\chi^2$) for the factor weights, covariances between factors, and residuals.

Convergent validity was estimated on the basis of Fornell and Larcker's (1981) proposal, who recommended the calculation of the average variance extracted (AVE) and composite reliability (CR) (Hair *et al.*, 2005; Maroco, 2010). Convergent validity was used to verify if the items of each factor are strongly interrelated. Values of AVE ≥ 0.50 and CR ≥ 0.70 were considered adequate. The discriminant validity was used to assess if the items that reflect one factor are not more strongly correlated with another factor. This evaluation was performed through a correlational analysis, and discriminant validity was considered adequate when AVE_i and $AVE_j \geq \rho_{ij}^2$ (ρ_{ij}^2 : square of the correlation between the factors i and j) (Fornell and Larcker, 1981).

Internal consistency was estimated through Cronbach standardized alpha coefficient, with $\alpha \geq 0.70$ considered adequate. Considering the approximation of the theoretical constructs and the strong correlation between the first-order factors of the OHIP's original models, we chose to test the fit of the data to the second- and third-order hierarchical models for the models that presented adequate fit (Maroco, 2010). The second-order factors were called "physical" (functional limitation, physical pain, physical disability), "psychological" (psychological distress and psychological disability), and "social" (social disability and handicap), while a third-order factor was called "OHIP." Analyses were conducted using SPSS Amos 20 (SPSS Inc., Chicago, IL).

RESULTS

Regarding socioeconomic classification, 3.0% of the participants belonged to class A (monthly income: US\$2,018-\$3,383); 30.4%, class B (\$725-\$1,217); 53.4%, class C (\$402); 13.3%, classes D and E (\$90-\$184). Of the patients, 35.3% were completely dentate, 58.8% partially dentate, and 5.9% edentulous. Among the participants, 39.2% were using some type of dental prosthesis; of these, 24.3% were users of complete denture, 33.2% of removable partial denture, and 42.5% of fixed partial denture.

The summary measures for each item of the OHIP-49 and content validity ratio are presented in Table 1. Items of the OHIP-49 presented skewness and kurtosis values (except item 48), which indicate an approximation to a normal distribution. Items 7, 37, 40, and 42 were classified as nonessential by the judges.

Table 2 presents the GFIs of the factor models (confirmatory factor analysis), convergent validity (AVE/CR), the squared correlation between factors (r^2), and internal consistency (α). The factorial goodness of fit of the 46-item version was poor in all the samples tested, which can be observed by the values of the indices Akaike information criterion, Browne-Cudeck criterion, and Bayes information criterion. An adequate fit of the OHIP-14 was detected in all the samples tested, which is justified by the GFIs. A better fit of the models regarding the OHIP-14 was observed when compared with the 46-item version ($\Delta\chi^2 = 5503.744$, $p < .01$). A better fit of the models was observed when applied to prosthesis users (OHIP-46: $\Delta\chi^2 = 2341.52$, $p < .01$; OHIP-14: $\Delta\chi^2 = 63.75$, $p < .01$). Convergent validity was inadequate in the factors "functional limitation" and "physical pain" for the 46-item version and in the factors "functional limitation" and "psychological discomfort" for the OHIP-14 in all the samples tested (Table 2). Values of CR and α were not adequate between models of the OHIP-14 regarding factors "functional limitation" and "psychological discomfort." The discriminant validity (r^2) was inadequate in the analysis of the 46-item version.

Statistically equivalent factor weights and covariances were observed in the testing and validation samples ($p > .05$), regarding both versions of the scale, attesting for the strong invariance of the models in independent samples (Table 3). The adjusted models for prosthesis users and nonusers were not invariant for the 2 versions of the OHIP ($p < .05$).

Table 1. Summary Measures and Content Validity Ratio of Each Item of the Oral Health Impact Profile-49

Item	Mean	Median	SD	Kurtoses	Skewness	CVR ^a
1	1.73	2.00	1.42	-0.89	0.31	0.87
2 ^b	0.77	0.00	1.25	1.35	1.52	0.60
3	2.08	2.00	1.44	-1.11	0.01	0.60
4	1.41	1.00	1.61	-1.10	0.64	1.00
5	1.27	1.00	1.33	-0.34	0.74	0.87
6 ^b	0.86	0.00	1.30	0.76	1.35	0.73
7	1.85	2.00	1.41	-1.01	0.22	0.47 ^c
8	0.87	0.00	1.34	0.52	1.31	0.87
9 ^b	1.29	1.00	1.31	-0.35	0.72	1.00
10	1.29	1.00	1.36	-0.45	0.75	0.87
11	1.16	0.00	1.40	-0.39	0.90	1.00
12	2.05	2.00	1.30	-0.70	0.14	0.87
13	1.79	2.00	1.22	-0.30	0.39	0.73
14	1.24	1.00	1.35	-0.39	0.78	0.87
15 ^b	1.75	2.00	1.43	-0.99	0.28	0.87
16	1.56	2.00	1.32	-0.55	0.45	0.73
19 ^b	2.50	3.00	1.48	-1.11	-0.41	0.87
20	1.63	2.00	1.60	-1.30	0.39	1.00
21	1.81	2.00	1.57	-1.31	0.24	0.73
22	1.67	2.00	1.58	-1.28	0.37	0.87
23 ^b	1.53	1.00	1.51	-1.11	0.47	0.60
24	0.73	0.00	1.25	1.60	1.64	0.73
25	0.61	0.00	1.14	2.49	1.85	0.60
26	0.70	0.00	1.19	1.86	1.67	0.60
27	1.06	1.00	1.28	0.28	1.03	0.87
28	1.35	1.00	1.37	-0.64	0.64	0.87
29 ^b	1.08	0.00	1.36	-0.07	1.03	0.60
31	1.39	1.00	1.53	-0.95	0.65	0.73
32 ^b	1.09	1.00	1.21	0.16	0.90	0.73
33	0.94	0.00	1.22	0.53	1.14	1.00
34	1.55	2.00	1.38	-0.83	0.43	0.60
35 ^b	1.19	1.00	1.35	-0.41	0.83	0.73
36	1.20	1.00	1.39	-0.46	0.83	0.73
37	0.83	0.00	1.23	1.13	1.43	0.33 ^c
38 ^b	1.36	1.00	1.47	-0.79	0.67	0.60
39	0.74	0.00	1.21	1.53	1.57	0.60
40	0.81	0.00	1.21	0.99	1.38	0.47 ^c
41	0.72	0.00	1.21	1.65	1.61	1.00
42 ^b	0.76	0.00	1.15	1.53	1.47	0.47 ^c
43 ^b	0.62	0.00	1.05	2.90	1.79	0.87
44	0.67	0.00	1.18	2.18	1.75	1.00
45	0.49	0.00	1.00	4.37	2.19	0.60
46	0.65	0.00	1.13	2.32	1.75	0.73
47 ^b	0.68	0.00	1.19	1.94	1.70	0.60
48 ^b	0.34	0.00	0.84	7.89	2.78	0.87
49	0.46	0.00	0.95	4.74	2.24	0.87

The specific items for complete denture users (17, 18, and 30) were excluded from the analysis.

^aContent validity ratio = 0.506 (15 experts, significance level of 5%).

^bItems forming the reduced version Oral Health Impact Profile-14.

^cValues below the minimum significant value.

Hierarchical models were developed just for the reduced version OHIP-14 because of a better and more parsimonious fit to

Table 2. Goodness of Fit Indices of the Confirmatory Factor Analysis, Convergent Validity, Squared Correlation Between Factors, and Internal Consistency for Different Samples

Samples	n	λ	χ^2/df	CFI	GFI	RMSEA	BIC	AIC	BCC	AVE	CR	α	r^2
OHIP-46													
Total	1042	0.51-0.86	5.98	0.87	0.76	0.07	6579.70	6015.73	6026.51	0.46-0.65	0.87-0.91	0.87-0.91	0.32-0.69
Test	523	0.52-0.89	4.47	0.86	0.74	0.07	5066.27	4549.59	4566.36	0.48-0.68	0.88-0.92	0.88-0.92	0.34-0.71
Validation	519	0.42-0.86	2.93	0.84	0.70	0.05	3503.10	6123.37	6193.18	0.43-0.64	0.85-0.90	0.85-0.90	0.28-0.70
Prosthesis	339	0.51-0.86	2.52	0.86	0.74	0.07	3096.22	2660.06	2696.88	0.44-0.60	0.86-0.90	0.86-0.90	0.27-0.68
Nonprosthesis	696	0.55-0.88	4.94	0.85	0.72	0.08	5519.75	5001.58	5018.12	0.45-0.67	0.87-0.92	0.87-0.92	0.33-0.72
OHIP-14													
Total	1162	0.54-0.84	5.07	0.97	0.96	0.06	629.82	381.98	383.26	0.46-0.63	0.63-0.77	0.62-0.77	0.21-0.50
Test	591	0.53-0.83	3.80	0.97	0.96	0.06	538.76	311.09	313.04	0.49-0.63	0.65-0.77	0.61-0.77	0.19-0.48
Validation	571	0.54-0.86	2.50	0.97	0.95	0.06	432.40	237.80	241.72	0.41-0.62	0.58-0.77	0.56-0.76	0.22-0.54
Prosthesis	453	0.43-0.80	2.40	0.97	0.96	0.06	434.17	232.49	235.85	0.39-0.63	0.54-0.77	0.64-0.78	0.18-0.52
Nonprosthesis	702	0.57-0.87	3.54	0.97	0.96	0.06	519.38	296.24	298.38	0.44-0.62	0.60-0.76	0.59-0.76	0.21-0.51

The specific items for complete denture users (17, 18, and 30) were not considered in the analyses.

n, sample size; λ , factor weights range (min-max); CFI, comparative fit index; GFI, goodness of fit; RMSEA, root mean square error of approximation; BIC, Bayes information criterion; AIC, Akaike information criterion; BCC, Browne-Cudeck criterion; AVE, convergent validity; CR, composite reliability; α , internal consistency; r^2 , squared correlation coefficient; OHIP, Oral Health Impact Profile.

Table 3. Multigroup Analysis ($\Delta\chi^2$) Between the Test and Validation Samples and Between Users and Nonusers of Dental Prosthesis

Sample: Model	λ	p	Cov	p	Res	p
OHIP-46						
Test $\times$ validation	27.36	.49	62.18	.05	165.50	<.01
Prosthesis users $\times$ nonusers	91.98	<.01	157.36	<.01	538.07	<.01
OHIP-14						
Test $\times$ validation	10.30	.17	29.64	.38	50.44	<.01
Prosthesis users $\times$ nonusers	18.41	.01	69.45	<.01	188.99	<.01

λ , factor weights; Cov, covariances between factors; Res, residuals; OHIP, Oral Health Impact Profile.

our data for this version. The second- and third-order hierarchical models for the OHIP-14 presented an adequate fit (Figure).

Based on the fitted model, scores for the second- and third-order factors can be best estimated by the following formulae (Appendix B):

Second order: physical, $y = 0.042it2 + 0.072it6 + 0.050it9 + 0.073it15 + 0.120it29 + 0.091it32$; psychological, $y = 0.023it19 + 0.120it23 + 0.118it35 + 0.093it38$; social, $y = 0.140it42 + 0.155it43 + 0.214it47 + 0.165it48$

Third order: OHIP, $y = 0.044it2 + 0.054it6 + 0.038it9 + 0.054it15 + 0.037it19 + 0.104it23 + 0.068it29 + 0.069it32 + 0.099it35 + 0.095it38 + 0.049it42 + 0.050it43 + 0.058it47 + 0.049it48$

DISCUSSION

In this study, the OHIP-14 presented a greater validity in assessing the construct "Oral Health Impact Profile" for this sample.

The original version of the OHIP (Slade and Spencer, 1994) consists of 49 items, with 3 specific for prosthesis users and 3 for dentate patients. Although rarely reported in the literature, there is significant difficulty in adjusting the data arising from

the normative population to the theoretical models originally proposed (Baker *et al.*, 2008), mainly due to the existence of those specific questions. Thus, the OHIP-14 (Oliveira and Nadanovsky, 2005; Slade, 1997) has been the most referred in the literature to assess the impact of oral health on the quality of life in this type of population, given that it does not include the specific questions mentioned above and presents better metric properties.

In the present study, we observed higher values of the GFIs and lower values of the information theory indices in the analysis of the OHIP-14 when compared with the 46-item version, which suggests that the reduced version presents better validity and is more parsimonious (Franchignoni *et al.*, 2010; Oliveira and Nadanovsky, 2005); that is, a greater number of items cannot improve the estimation of the construct assessed. Furthermore, second- and third-order hierarchical models of the OHIP-14 were proposed for the first time, with the intention of presenting a new methodology to estimate the theoretical concept assessed, seeking to improve its accuracy (Appendix C).

Among the methodologies previously proposed for the OHIP are those that consider the sum of the responses of each item (Özhayat and Gotfredsen, 2013), the mean scores for each subscale (Pires *et al.*, 2006), or even the percentage of reported oral

Figure. Second- and third-order hierarchical models for the short version of the Oral Health Impact Profile (OHIP-14). Second order: $\chi^2/df = 5.69$, CFI = 0.96, GFI = 0.95, RMSEA = 0.06. Third-order: $\chi^2/df = 7.67$, CFI = 0.94, GFI = 0.93, RMSEA = 0.08.

health problems in each subscale (Bianco *et al.*, 2010). Based on this fact and on the need to improve the accuracy of the estimates of the measured construct (impact of oral health on quality of life), the use of the second- or third-order algorithm for the calculation of the scores for each subscale and an overall score for the instrument seems to be the most adequate proposal, contributing to a better understanding and comparison of the results obtained.

Moreover, this proposal of a hierarchical measure is necessary because of the lack of consensus in the literature regarding the computation of the OHIP scores in different samples. This proposal can be used in different population contexts, given that it allows estimating the OHIP items' weights individually; therefore, it is more accurate, considering the characteristics of the sample (Appendix A).

Smaller values of the indices of the information theory were detected for the samples of prosthesis users in both versions of the instrument, allowing for a better assessment of the oral health-related quality of life in patients who experienced more impact of oral health problems. This aspect comes from the suggestion that users of dental prostheses have been through bad experiences related to oral health conditions, which may have had physical, social, and psychological impacts, making these individuals more sensitive to the perception of the oral health impacts on their quality of life (Özhayat and Gotfredsen, 2013).

It is important to highlight that the OHIP is a psychometric scale developed to estimate the impacts caused by oral problems

in the individuals' lives, which may have consequences on their quality of life. It is important to note, however, that regardless of the application context, some authors present the results in an inadequate manner; that is, they consider the construct measured by OHIP as oral health-related quality of life, when in fact this is only one reflection of the actual construct measured, which is the "individual profile of the impacts generated by oral problems in the individuals' lives" (Inukai *et al.*, 2010; de Souza *et al.*, 2012; Komagamine *et al.*, 2012).

The specificity of the sample may represent a limitation to the generalization of this study, since, as stated earlier, the validation studies suffer direct influence from sample characteristics. However, we believe that given the large sample size used and the accuracy of the analysis conducted, the modeling of the versions of the OHIP presented could serve as a basis for further studies that seek to investigate the construct in different populations. One difficulty observed is a direct comparison of the results of this study with the literature, since this is a new methodological approach with use of analysis techniques that are not widely used in the dentistry field.

Thus, it is expected that this study will be useful, given that it presents a new proposal for measuring the impact of oral health on quality of life based on a global score, which considers the impact of the items and the different factors on the construct. We further expected to alert professionals to the need to confirm the validity and reliability of psychometric scales prior to their application in each study sample.

CONCLUSION

The OHIP-14 was reliable and valid in assessing the construct “Oral Health Impact Profile,” which was more pronounced in prosthesis users.

ACKNOWLEDGMENTS

We would like to thank FAPESP for financing this study (Process: 2012/01590-3, 2012/01856-3). The authors declare no potential conflicts of interest with respect to the authorship and/or publication of this article.

REFERENCES

- Adulyanon S, Sheiham A (1977). Oral impacts on daily performances. In: *Measuring oral health and quality of life*. Slade GD, editor. Chapel Hill, NC: University of North Carolina.
- Anastasi A (1988). *Psychological testing*, 6th ed. New York City, NY: Macmillan.
- Associação Brasileira de Empresas de Pesquisa (2008). Critério de Classificação Econômica Brasil, 2008. URL accessed on 4/9/2014 at: <http://www.abep.org/new/Servicos/Download.aspx?id=07>.
- Atchison KA, Dolan TA (1990). Development of the Geriatric Oral Health Assessment Index. *J Dent Educ* 54:680-687.
- Baker SR (2007). Testing a conceptual model of oral-health: a structural equation modeling approach. *J Dent Res* 86:708-712.
- Baker SR, Gibson B, Locker D (2008). Is the oral health impact profile measuring up? Investigating the scale's construct validity using structural equation modelling. *Community Dent Oral Epidemiol* 36:532-541.
- Bianco VC, Lopes ES, Borgato MH, Moura E, Silva P, Marta SN (2010). O impacto das condições bucais na qualidade de vida de pessoas com cinquenta ou mais anos de vida. *Cien Saude Colet* 15:2165-2172.
- de Souza RF, Terada AS, Vecchia MP, Regis RR, Zanini AP, Compagnoni MA (2012). Validation of the Brazilian versions of two inventories for measuring oral health-related quality of life edentulous subjects. *Gerodontology* 29:e88-e95.
- Fornell C, Larcker DF (1981). Evaluating structural equation models with unobservable variables and measurement error. *J Marketing Res* 18:39-50.
- Franchignoni M, Giordano A, Brigatti E, Migliario M, Levrini L, Ferriero G (2010). Psychometric properties of the Italian version of the reduced form of the Oral Health Impact Profile. *G Ital Med Lav Ergon* 32(3):B71-B78.
- Hair JF, Black WC, Babin B, Anderson RE, Tatham RL (2005). *Multivariate data analysis*, 6th ed. New York City, NY: Prentice Hall.
- Inukai M, John MT, Igarashi Y, Baba K (2010). Association between perceived chewing ability and oral health-related quality of life in partially dentate patients. *Health Qual Life Outcomes* 8:118.
- Kline RB (1998). *Principles and practice of structural equation modeling*. New York City, NY: Guilford Press.
- Komagamine Y, Kanazawa M, Kaiba Y, Sato Y, Minakuchi S, Sasaki Y (2012). Association between self-assessment of complete dentures and oral health-related quality of life. *J Oral Rehabil* 39:847-857.
- Lawshe C (1975). A quantitative approach to content validity. *Personnel Psychology* 28:563-575.
- Liu JY (2012). The mandarin Chinese shortened version of Oral Health Impact Profile for partially edentate patients with implant-supported prostheses. *J Oral Rehabil* 39:591-599.
- Locker D (1988). Measuring oral health: a conceptual framework. *Community Dent Health* 5:3-18.
- Maroco J (2010). *Análise de Equações Estruturais: Fundamentos teóricos, software & Aplicações*. Pêro Pinheiro: Edição em Português Publicado em 10-2010.
- Oliveira B, Nadanovsky P (2005). Psychometric properties of the Brazilian version of the Oral Health Impact Profile—short form. *Community Dent Oral Epidemiol* 33:307-314.
- Özhayat EB, Gotfredsen K (2013). Oral health-related quality of life in patients to be treated with fixed or removable partial dental prostheses. *Acta Odontol Scand* 71:113-119.
- Pires CP (2003). Impacto da Saúde Bucal na Qualidade de Vida: tradução para a língua portuguesa, adaptação cultural e validação do questionário Oral Health Impact Profile (OHIP-49). São Paulo, Brazil: Universidade Federal de São Paulo.
- Pires CP, Ferraz MB, de Abreu MH (2006). Translation into Brazilian portuguese, cultural adaptation and validation of the Oral Health Impact Profile (OHIP-49). *Braz Oral Res* 20:263-268.
- Sierwald I, John MT, Durham J, Mirzakhania C, Reissmann DR (2011). Validation of the response format of the Oral Health Impact Profile. *Eur J Oral Sci* 119:489-496.
- Slade GD (1997). Derivation and validation of a short-form Oral Health Impact Profile. *Community Dent Oral Epidemiol* 25:284-290.
- Slade GD, Spencer AJ (1994). Development and evaluation of oral health impact profile. *Community Dent Health* 11:3-11.
- Van der Meulen MJ, John MT, Naeije M, Lobbezoo F (2012). Developing abbreviated OHIP versions for the use with TMD patients. *J Oral Rehabil* 39:18-27.
- World Health Organization Quality of Life assessment (WHOQOL): position paper from the World Health Organization. (1995). *Soc Sci Med* 41:1403-1409.
- Wilson FR, Pan W, Schumsky DA (2012). Recalculation of the critical values for Lawshe's content validity ratio. *Meas Eval Couns Dev* 45:197-210.