

# Psychometric properties of a Turkish version of the oral health impact profile-14

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## Abstract

**Objectives:** The purpose of this study was to analyze and evaluate a Turkish translation of the oral health impact profile-14 (OHIP-14) in a Turkish population to provide an objective standard for future studies.

**Methods:** This cross-sectional research study consisted of three independent studies. Data were collected utilizing a personal interview and a review of periodontal records. This study was performed on 1205 subjects who were visiting for routine medical check-ups. The OHIP-14 was administered to measure oral health related to the quality of life, along with a questionnaire addressing demographic information, such as age, gender, and education.

**Results:** The reliability coefficient (Cronbach's alpha) of the Turkish version OHIP-14-TR (OHIP-14-TR) was reported to be nearly perfect in all 3 parts of our study (alpha 1: 0.82; alpha 2: 0.76; alpha 3: 0.91); additionally, values were greater than the recommended 0.70 threshold. Spearman's correlation coefficients showed that both OHIP scores significantly correlated with periodontal parameters, serving as proof of convergent validity ( $P < 0.01$ ,  $P < 0.001$ ). The principal component analysis with varimax rotation revealed seven factors. The OHIP-14-TR was more than 95% comprehensible.

**Conclusion:** The OHIP-14-TR is a reliable, valid, and comprehensible scale for measuring oral health-related quality of life in the Turkish population.

**Key words:** Oral health, quality of life, reliability, validity

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## Introduction

Oral health is a standard for measuring the health status of the oral tissues. It contributes to overall physical, mental, and social well-being by enabling individuals to eat, communicate, and socialize without discomfort or embarrassment and also allows them to maintain their chosen social roles. Oral health-related quality of life (OHQoL) characterizes a person's perception of how oral health influences his or her quality of life and overall well-being.<sup>[1-5]</sup> The large influence of oral health on attractiveness at first sight, breath, comfort, sleep, social life, and life quality has been previously demonstrated.

Developments in dentistry, in terms of the relationship between oral health and an individual's quality of life, have yielded improvements in the methodology for measuring OHQoL. These advances may also play an important role in clinical practice in terms of identifying needs, selecting therapies, and monitoring patient progress.<sup>[6]</sup> Among these scales, the most comprehensive, accessible, and commonly used is the oral health impact profile (OHIP)-49,<sup>[5]</sup> as well as its short version, the OHIP-14.<sup>[7]</sup>

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The OHIP has been widely used as a measurement of OHQoL; it is a disease-specific measurement of people's perceptions of the social impact of oral disorders on their well-being. The questions on the OHIP are organized into the following 7 formulated dimensions (factors): Functional limitation, pain, psychological discomfort, physical disability, psychological disability, social disability, and handicap. These factors are based on Locker's theoretical model of oral health.<sup>[8]</sup>

Each question on the OHIP-14 is phrased as follows: "Have you ... because of problems with your teeth, mouth or dentures?" The question then continues to describe the problem. Responses to the items on the OHIP-14 are recorded using the following 5-point Likert scale: 0 = never; 1 = hardly ever; 2 = occasionally; 3 = fairly often; 4 = very often.<sup>[9]</sup> A higher score indicates a greater intensity of the problem, that is, a decrease in life quality.

The OHIP-14, which is useful in terms of performance and scoring, has been adapted for use in many different languages (e.g. Chinese, Finnish, French, German, Japanese, Malaysian, Portuguese, Sinhalese, Somali, Swedish, and Tagalog); therefore, it can be used in research studies on the cultural dimensions of OHQoL and in studies that make comparisons among cultures.

Numerous studies utilizing the Turkish version of the OHIP-14 have been published.<sup>[10-12]</sup> Although these studies applied the OHIP-14 to determine the relationship between various oral or dental problems and quality of life, they did not analyze the psychometric properties of the Turkish version of the OHIP-14.

Therefore, we aimed to analyze and evaluate the reliability, validity, and comprehensibility of a Turkish translation of the OHIP-14 among a patient sample from the Turkish population to provide an objective translation and a standard for future studies.

## Methods

This cross-sectional study utilized data that were collected from randomly selected participants who were 25 years of age or older. Participants were informed about the research study, and consent was obtained.

This study involved both the questionnaire, which was conducted during a personal interview, and a periodontal examination, which was performed by a single experienced researcher using a light, mirror, and Williams periodontal probe.

### The Turkish version oral health impact profile-14

The original English language version was linguistically and culturally adapted to the Turkish language using the

back translation technique,<sup>[13]</sup> to ensure cross-cultural equivalence (adaptation). During this procedure, three bilingual dentists (an expert committee) independently translated the items into Turkish. The items that were translated differently across the three translators were discussed, and then a consensus was reached on the final Turkish version. The items were then translated back into English by a professional translator of the Turkish language who is a native English speaker. The back translation was independently reviewed by the expert committee, and necessary corrections were made to the Turkish translation after a final consensus had been reached on each item.

In addition to the OHIP-14-TR, additional questions that discussed variables to be used in further analysis were included on a questionnaire; these variables consisted of demographic information such as age, gender, and education.

### Evaluation of the Turkish version oral health impact profile-14

The OHIP-14-TR was evaluated via using a 5-point Likert scale (ranging from "4 = very often" to "0 = never"). Two different methods, simple count (SC) and additive (A) scoring were used in the analysis. For the SC method, the total score was obtained by totaling the item codes for the 14 items at the same frequency; in this method, the total score ranged from 0 to 56. In the A scoring system for the OHIP-14, the total score was calculated by totaling the number of impacts reported as occasionally or more frequently.

### Reliability

The reliability of the OHIP-14-TR was tested using the intraclass correlation coefficient (ICC) with repeated interviews conducted with a group of individuals through the test-retest method. ICCs based on one-way ANOVAs were calculated for the summary scores of the OHIP and for the seven OHIP subscales. Fifteen participants from the sample subset that received no treatment ( $n = 105$ ) were randomly chosen to have the scale re-administered with a 15 days interval between each administration.

The internal consistency of the instrument and the homogeneity of its seven dimensions were determined using Cronbach's alpha coefficient,<sup>[14]</sup> which is a measure of intercorrelation between subsets of items within the instrument.

### Construct and convergent validity

Further evidence for construct and convergent validity was collected in a subset of the sample ( $n = 600$ ) by assessing the association between the OHIP scores and the following periodontal parameters from 4 sites of each tooth present

within the patient’s mouth: Plaque index, bleeding on probing index, periodontal pocket depth, and gingival recession measurements. To analyze the relationships between the periodontal indices and OHIP-14-TR scores, Spearman’s correlation coefficients (rs) were calculated. It was hypothesized that subjects who had good oral health would have lower scores on the OHIP-14-TR than subjects who had fair or poor oral health.

### Comprehensibility

The participants (n = 1205) were asked about their understanding of the scale to test the comprehensibility of the OHIP-14-TR.

### Revision of Turkish version oral health impact profile-14

The revision of the OHIP-14-TR was validated within the last subset of sample (n = 500) in terms of reliability and construct validity with the aim of making the scale suitable for assessing OHQoL in cross-sectional and longitudinal studies conducted in the Turkish cultural environment.

When item loadings were examined, it was observed that some items were not loaded under the constructs, as in the original scale. To identify the source of this lack of fit between items and factors, the sample characteristics (e.g., possible physical discomfort or pain that the participant experienced during the administration of the questionnaire), structure, and administration procedure of the scale as well as the content of the scale were reviewed for possible translation errors. This examination revealed that the Turkish translations of 3 items on the OHIP-14-TR (items 5, 10, and 11) were problematic. The expert committee retranslated these three items from English to Turkish and agreed on the new versions of the items.

All analyses were performed using the statistical package SPSS 11.0 (SPSS Inc., 2002 Chicago, IL, USA).

## Results

### Reliability

The reliability analysis revealed that the OHIP-14 has a good mean internal consistency (Cronbach’s alpha = 0.82). When evaluated separately, three of the seven dimensions had alpha values that were <0.70 [Figure 1].

The OHIP-14-TR’s stability, as determined by the ICC, was also found to be acceptable (0.89). Items on each scale were moderately correlated with each other [Table 1].

The reliability coefficient and the test administration procedure showed that the instrument had face and content validity.

### Comprehensibility

A total of 97.7% of the sample indicated that the scale was comprehensible.

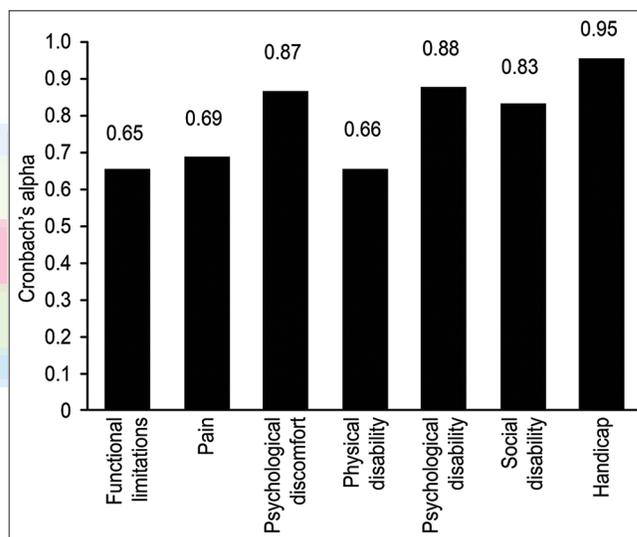


Figure 1: Internal consistency of the oral health impact profile-14 and its seven subscales measured by Cronbach’s alpha coefficient

Table 1: Internal consistency of the OHIP-14 measured by inter-item and item-scale correlation coefficients

	OHIP 2	OHIP 3	OHIP 4	OHIP 5	OHIP 6	OHIP 7	OHIP 8	OHIP 9	OHIP 10	OHIP 11	OHIP 12	OHIP 13	OHIP 14	
OHIP 1	0.454**	0.032	0.210*	0.127	0.136	0.206*	-0.022	0.164	0.326**	0.105	0.153	0.239*	0.148	
OHIP 2		0.07	0.320**	0.193*	0.132	0.399**	0.097	0.343**	0.239*	-0.017		0.061	0.047	-0.11
OHIP 3			0.397**	0.126	0.243*	0.361**	0.364**	0.386**	0.205*	0.101	0.229*	0.246*	0.104	
OHIP 4				0.174	0.352**	0.426**	0.311**	0.492**	0.205*	0.121	0.145	0.149	-0.118	
OHIP 5					0.229*	0.270**	0.093	0.153	0.172	0.149	0.174	0.136	0.153	
OHIP 6						0.452**	0.352**	0.402**	0.233*	0.347**	0.376**	0.454**	0.199*	
OHIP 7							0.497**	0.556**	0.316**	0.161	0.430**	0.369**	0.132	
OHIP 8								0.336**	0.234*	0.378**	0.336**	0.450**	0.253**	
OHIP 9									0.154	0.16	0.362**	0.305**	0.136	
OHIP 10										0.213*	0.267**	0.210*	0.179	
OHIP 11											0.360**	0.396**	0.289**	
OHIP 12												0.490**	0.601**	
OHIP 13														0.311**

\*P<0.05, \*\*P<0.01. OHIP=Oral health impact profile

### Construct and convergent validity

All of the observed associations between objective periodontal parameters and the OHIP-14-TR were in agreement with the original hypothesis. Spearman's correlation coefficients showed that OHIP scores were significantly correlated with the periodontal parameters, serving as proof of convergent validity [Table 2].

**Table 2: Construct validity: Associations between objective periodontal parameters and the OHIP-14-TR**

	PPD	BOP	GR	CAL
OHIP-14 SC	0.320**	0.253**	0.170*	0.318**
OHIP-14 A	0.297**	0.205**	0.130*	0.284**

\* $P < 0.01$ , \*\* $P < 0.001$ . PPD=Periodontal pocket depth; BOP=Bleeding on probing; GR=Gingival recession; CAL=Clinical attachment level; OHIP=Oral health impact profile; OHIP-14-TR=Turkish version oral health impact profile-14; SC=Simple count; A=Additive

When construct validity was determined by factor analysis and results were obtained without imposing dimension limits, 4 factors explained 56.68% of the variance. When the dimension number of the original scale was forced, seven factors were obtained. The principal component analysis with varimax rotation revealed seven factors that explained 74.3% of the total variance. The factor structure of the scale and the factor loading of the items are presented in Table 3.

Pearson's  $r$  coefficient analysis also proved that the OHIP-14-TR had an adequate level of test-retest reliability. The results of our analysis of the data that were collected from 61 participants who received no treatment for 15 days showed that the reliability coefficients for both types of scoring were superior (OHIP-14 SC (0.96); OHIP-14 A (0.87)).

**Table 3: Factor structure of the OHIP-14-TR**

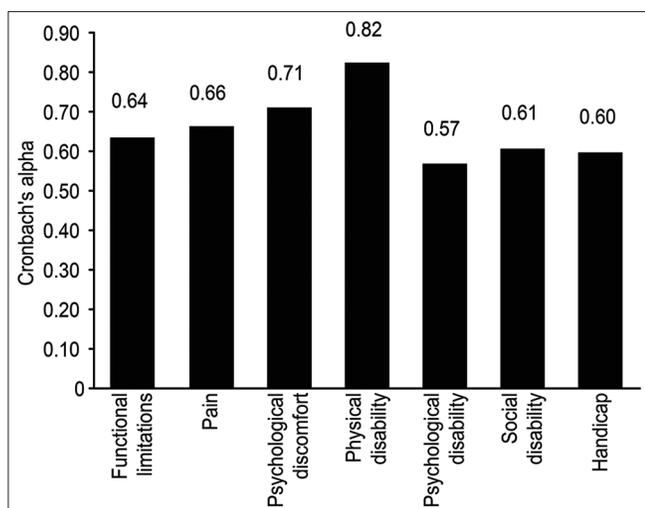
	Functional limitations	Pain	Psychological discomfort	Physical disability	Psychological disability	Social disability	Handicap
OHIP 9	0.79						
OHIP 6	0.7						
OHIP 10	0.7						
OHIP 14		0.87					
OHIP 12		0.65					
OHIP 13		0.51					
OHIP 3			0.84				
OHIP 4			0.68				
OHIP 8				0.84			
OHIP 7				0.67			
OHIP 11					0.8		
OHIP 2					0.7		
OHIP 1						0.93	
OHIP 5							0.96

OHIP=Oral health impact profile; OHIP-14-TR=Turkish version oral health impact profile-14

**Table 4: The final factor structure of the OHIP-14-TR**

	Functional limitations	Pain	Psychological discomfort	Physical disability	Psychological disability	Social disability	Handicap
OHIP 7	0.841						
OHIP 8	0.803						
OHIP 9	0.606						
OHIP 10		0.846					
OHIP 11		0.742					
OHIP 13		0.627					
OHIP 14			0.844				
OHIP 12			0.735				
OHIP 6				0.578			
OHIP 5				0.803			
OHIP 4					0.300		
OHIP 3					0.841		
OHIP 1						0.825	
OHIP 2						0.235	0.861

OHIP=Oral health impact profile, OHIP-14-TR=Turkish version oral health impact profile-14



**Figure 2:** Internal consistency of the oral health impact profile-14 and its seven subscales measured by Cronbach's alpha coefficient for the revised scale

### Revision of the Turkish version oral health impact profile-14

#### Psychometric properties of the Turkish version oral health impact profile-14

The reliability coefficient of the OHIP-14-TR was a Cronbach's alpha value of 0.91. The reliability coefficients of seven factors are shown in Figure 2. The reliability coefficients of the sub-scales varied between 0.57 and 0.82. The coefficients also showed that the Turkish version of the scale had good psychometric properties.

A principal component analysis was conducted to test the construct validity of the OHIP-14-TR. When the number of factors was set to 7, the analysis revealed that these seven factors explained 80.34% of the variance. These seven factors showed a good fit with the original structure of the OHIP-14.<sup>[6,8]</sup> As in the original instrument, these seven factors (dimensions) were as follows: Functional limitation, pain, psychological discomfort, physical disability, psychological disability, social disability, and handicap. The factor structure, the explained variance, and the distribution of items to factors revealed that the OHIP-14-TR had strong construct validity. The factor structure, item loadings, and mean values are provided in Table 4.

## Discussion

The translation of the original English OHIP was performed in our study according to the guide provided by Guillemin *et al.*<sup>[15]</sup> This process required not only a literal translation of words but also a consensus that the translation was appropriate as a whole.

The translation of the scale from the English to Turkish language was easy in our studies; however, some conceptual

differences were observed. The first translation did not differ from the original in terms of its content but because of misunderstandings with certain words, effective inaccuracies were encountered in the first study. In these cases, regenerating of the scale was straightforward due to the simple structure and universal nature of the OHIP-14.

Although the accepted lower limit of Cronbach's alpha is 0.70, it is worth noting that the reliability of the scale is related to its application. In our first and second studies, the alpha values were 0.82 and 0.76, respectively. Although these values were above the lower limit, we determined that the structure validity was insufficient; therefore, the third study was conducted to provide a standard for other studies in Turkey. As a result, the reliability of the Turkish version of the OHIP-14 was observed to be close to the gold standard (Cronbach's alpha = 0.91). It was observed that the reliability coefficient in our study was greater than the values published for the Chinese (Cronbach's alpha = 0.88) and Spanish (Cronbach's alpha = 0.89) language versions and was similar to the values published for Sri Lankan (Cronbach's alpha = 0.93) and Brazilian (Cronbach's alpha = 0.91) language versions. It is also known that reliability coefficients project the homogeneity of the studied society. When the scale is applied to a more heterogeneous group, the reliability coefficient can be much greater than the gold standard of 0.90. In our study, this value was neither low nor high; on the contrary, it was observed to be acceptable as well as ideal. Additionally, in our studies, the alpha value of some scale dimensions decreased to <0.70; however, this decrease resulted from the methodology of the short form of the OHIP [Figure 2]. These results showed that the expectations of our population regarding oral health and some oral health problems (e.g., difficulty in relaxing and embarrassment) did not match significantly. Related to the presence of questions for which the alpha value was <0.20, it has been suggested that these questions be removed or rewritten.<sup>[16]</sup>

This study was, to our knowledge, the first using psychometrically clarified OHIP-14 in focusing on OHQoL among adult population in Turkey. However, it was carried out in a specific region (Central Anatolia) of a country that presents a variety of cultural, gastronomic, and social values, so that it could not represent the wide range of Turkish population values. The specific region in this population is a limitation of this study.

John *et al.*,<sup>[17]</sup> suggested that test-retest validity shows higher internal consistency when it is performed within a short period of time. They associated this condition with patient perspectives. Because patients can forget about oral problems that they previously reported, especially after a long interval has elapsed, scale scores can eventually be affected. For this reason, the participants were called after a 15-day interval in our study; their responses indicated that

the test-retest reliability coefficient was valid (0.89–0.96). It is also a generally accepted notion that repetitions after short intervals provide better validity.

Basic component analysis (factor analysis) was applied for the purpose of testing the structure validity of the final scale; this analysis obtained seven factors. The items that were loaded under the dimensions of the OHIP-14-TR changed in an expected manner [Table 4]. The results of the factor analysis in study 2 showed, for example, that items 7, 8, and 9 were loaded under the factor of functional limitation [Table 3]. However, the results of the second factor analysis, which were conducted in study 3, showed that items 9, 6, and 10 were loaded under the same factor. Similar structural changes were observed for almost all of the factors. When examined carefully, it was observed that both the item loadings and factor structure of the later analysis produced results similar to the original OHIP-14 structure. Our results were compatible with the study results previously published by John *et al.*<sup>[17]</sup>

It was difficult to distinguish OHIP materials using factor analysis; however, it was confirmed that the OHIP was empirically divided into subsets by hierarchical aggregation.<sup>[18]</sup> The relationships between clinical and personal variables, which were collected to determine the validity of the OHIP-14-TR despite differences in the analysis methods and scores, were found to be in agreement with previous studies performed in other populations.

However, it is not surprising to see differences in the validity and reliability of the scale compared with other populations because of the critical role of cultural adaptation procedures. Both of the total OHIP scoring methods (A and SC) provide the benefit of comparison and when they are correlated with different criteria, they can be used for component analysis. For this reason, both scoring methods were used in this study and a statistically significant relationship was found between these methods.

The OHIP-14-TR is a valid, reliable, and comprehensible scale. It is correlated in different clinical situations and has perfect internal consistency (Cronbach's alpha = 0.91). The psychometric properties indicated in this measure are important for health scales, and its structural validity is supported by clinical parameters.

## Conclusion

The Turkish translation of the OHIP-14 was found to be reliable, valid, comprehensible, and repeatable. The items were internally consistent. Statistically significant relationships were observed between the survey results and clinical parameters. Hence, the Turkish translation of the OHIP-14 scale can be considered to be a scientifically

sound instrument for measuring OHQoL in the Turkish population.

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## Conflicts of interest

There are no conflicts of interest.

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