



# Turkish Validity and Reliability of Oral Health Impact on Daily Life Questionnaire in Endodontic Patients

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## Abstract

**Aim:** Oral health has an important role in the general health. It was aimed to evaluate the validity and reliability of Turkish version of Oral Health Impact on Daily Life Questionnaire (OHIDL) in adult endodontic patients.

**Material and Method:** The OHIDL was translated and adapted into Turkish. The Turkish version of OHIDL (Turkish-OHIDL) and Turkish version of the Oral Health Impact Scale (OHIP-14-TR) were applied to 222 adult endodontic patients (18 years and older) with no systemic disease. The reliability of the questionnaire was examined by test-retest reliability and internal consistency. The validity was evaluated by the correlations between domains and global questions, and between Turkish-OHIDL and OHIP-14-TR. The structure of the hypothesized domains of the OHIDL was analyzed by confirmatory factor analysis (CFA).

**Results:** The Turkish-OHIDL exhibited high internal consistency (Cronbach's alpha=0.89) and test-retest reliability (Intraclass Correlation Coefficient=0.86). There was a significant correlation between Turkish-OHIDL and OHIP-14-TR among all domains. There was a very strong correlation in terms of total score as well (rs: 0.78, p<0.001). The total OHIDL score showed the highest correlation with the global question regarding the overall impact of oral health on daily life (G3/rs:0.54), indicating a moderate correlation. Five factors containing more than one item, were statistically verified as acceptable fit using CFA.

**Conclusion:** Turkish-OHIDL has been proven as a valid and reliable tool for the measurement of oral health-related quality of life.

**Keywords:** Oral Health Impact on Daily Life Questionnaire, Oral Health Impact Scale, Oral health, Quality of life

## INTRODUCTION

Scientific research in medicine consistently shows that health begins in the mouth. Today, good oral health is not just about dental health, it is also of great importance for the overall health and well-being of our body (1). Improving oral health may have significant systemic effects on the human health, and effect the quality of life of society and individuals (2).

The Dental Patient-Reported Outcome (dPRO) is a report regarding the subjective experiences in oral health, obtained directly from the dental patients, and for which the clinician does not interpret responses (3). Oral Health-Related Quality of Life (OHRQoL) is the most essential dPRO. The concept of OHRQoL for consistent

measurement of patient-perceived impact in different oral conditions is widely acknowledged (4).

Several OHRQoL scales have been developed for pediatric, adolescent, adult, and older dental populations (5,6). The effect of many factors, such as caries, socioeconomic status, malocclusion and periodontal diseases on OHRQoL have been investigated with these scales (7-9). Adapting these existing scales that have been proven to be effective in OHRQoL assessment to other cultures is common, because it is cheaper and less time consuming than creating a new tool. Additionally, validity and reliability studies of an effective tool in other languages allow the impact of the same factors on OHRQoL to be reliably assessed in different cultures (10).

## CITATION

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The Oral Health Impact on Daily Living Questionnaire (OHIDL) was developed to measure OHRQoL with severity measures, particularly among older Chinese adults (11). The validity and reliability of OHIDL have been proven (12). In a longitudinal validation study using OHIDL for measurement of the perceived change in OHRQoL after dental treatments, it was emphasized that endodontic treatment significantly improved the OHRQoL, which supports using the scale, especially in endodontics (13).

The aim of this study was to adapt the OHIDL into Turkish and test its validity and reliability in the study group that applied to our clinic for endodontic treatment.

## MATERIAL AND METHOD

### Ethical Considerations

Permission for the Turkish validity and reliability study of the questionnaire was received from the original developers of OHIDL via e-mail. The study was approved by the Ethics Committee of Recep Tayyip Erdoğan (RTE) University (Protocol no: 2023/118). Informed consent was obtained from all the participants, and the questionnaire was completed.

### Study Population

This study was planned for the methodological design and carried out between May 2023 and June 2023 at RTE University Faculty of Dentistry, Department of Endodontics. Patients aged 18 years and older who applied to our clinic with endodontic complaints were included in the study. Patients who did not speak Turkish, had cognitive impairment, and had communication difficulties were excluded from the study. There is no widely accepted calculation formula or absolute rules for the sample size required for validity and reliability studies. However, using the participant-survey item ratio is generally recommended by the guidelines, and a ratio of 10:1 is generally accepted in the literature (14,15). The required number of participants was determined as ten times the number of items in the questionnaire. Since the questionnaire to be tested consisted of 16 items, it was aimed to include at least 160 participants. However, considering that there may be data loss, 222 patients were included in the study to apply the questionnaires.

### Translation and Cultural Adaptation

The original OHIDL questionnaire was translated from English to Turkish by three academics who are experts in their fields and fluent in English, according to the guidelines suggested by Beaton et al. (16). A team of translators and researchers evaluated the Turkish-translated versions. Conflicting terms were reviewed, the most appropriate terms were selected by consensus, and the first Turkish version of the questionnaire was obtained. Two independent translators who were unaware of the original questionnaire back-translated the first Turkish version into English. Afterward, the backtranslated version was rechecked and compared with the original questionnaire,

and after minor adjustments, the Turkish version to be used for the pilot study was created. After applying it to a pilot group of 10 patients, confusing questions and patterns were identified and re-examined. The confusing questions were edited, and the final Turkish version was created.

### The Questionnaires

Sociodemographic data of each patient who filled out the questionnaires, such as age, gender, education level, who they lived with, and the reason for going to the dentist, were recorded.

### OHIDL

In this section the Turkish version of OHIDL (Turkish-OHIDL) questionnaire was applied to participants. OHIDL consists of a total of 16 questions in 7 domains including eating, speaking, appearance, social, psychological, health, and finance (12). The questions were scored by perceived intensity. Intensity measurement was graded in the range of 0-4 as none, mild, moderate, severe, and very severe, respectively. The total score of the questions under each domain was determined as the domain score. The sum of the domain scores was recorded as the total OHIDL score.

### Global Questions

Five global questions were asked and recorded in a 5-point Likert system.

- G1) self-rating of oral health (very unhealthy- very healthy),
- G2) satisfaction with oral health (very dissatisfied-very satisfied),
- G3) perceived impact of oral health on daily living (none- very severe),
- G4) bothered by the impacts of oral health (not at all- a great deal),
- G5) overall life satisfaction (very dissatisfied- very satisfied) (12).

### Oral Health Impact Profile (OHIP-14)

Turkish version of OHIP-14 (OHIP14-TR) was also applied to participants. It includes 14 questions under 7 subgroups (functional limitation, physical pain, psychological discomfort, physical disability, psychological disability, social and handicap) (17). The answers were recorded in a 5-point Likert system, scoring 0-4 as never, rarely, sometimes, often, and always. Higher levels indicates more significant impact of dental health on quality of life.

### Statistical Analysis

The Statistical Package for the Social Sciences (SPSS), version 20 software package (IBM Corp, Armonk, NY, USA) was used for statistical analysis. A p-value of <0.05 was considered statistically significant.

## Reliability

### Internal Consistency

The internal consistency and homogeneity of the Turkish-OHIDL scale was determined by the Cronbach's alpha coefficient, with a value of 0.6-0.7 indicating acceptable internal consistency (18).

### Test-retest

For test-retest, the Turkish-OHIDL was applied to 31 patients twice at a 2-week interval. Patients who received no dental treatment during the two weeks were selected. Test-retest reliability was evaluated with the intraclass correlation coefficient (ICC). The reliability levels expressed by ICC values are as follows: <0.5 poor, 0.5-0.75 moderate, 0.75-0.9 good, and >0.9 excellent reliability (19).

### Validity

For construct validity, the correlation of the overall OHIDL score and domain scores with the global questions were evaluated using the Spearman's correlation coefficient (rs). Additionally, the relationship between Turkish-OHIDL and the OHIP-14-TR, was analyzed by the Spearman's correlation, for convergent validity. In the medical field, rs values of <0.1, 0.1-0.3, 0.3-0.5, 0.5-0.75, 0.75-0.9, and >0.9 indicate none, poor, fair, moderate, very strong, and perfect validity, respectively (20). To verify the factors, confirmatory factor analysis was performed using AMOS 24. Model fit was examined using the  $\chi^2/df$ , comparative fit index (CFI), normed fit index (NFI), root mean square error of approximation (RMSEA), the goodness of fit index (GFI), and the adjusted goodness of fit index (AGFI). RMSEA values should be  $\leq 0.08$  and CFI, NFI and GFI values should

be  $\geq 0.90$  for acceptable fit. AGFI values of  $\geq 0.85$  indicate acceptable fit (21).

## RESULTS

Of the 222 patients who participated in the study, 52.3% were female, and 47.7% were male. The mean age was 35.04 years, 0.9% of the respondents are illiterate, 17.1% are primary school graduates, 6.3% are secondary school graduates, 38.8% are high school graduates, and 38.8% are university graduates. While 12.2% of the participants live alone, 87.8% live with their families. 24.3% of the participants applied to our clinic for examination/follow-up and 75.7% for treatment.

The discriminant ability of the questions in the questionnaire was assessed using the ceiling and floor effects (22). If more than 90 percent of the respondents answered a question with the lowest or highest grade of "none" or "very severe", that question was considered low in discrimination. The distinguishing feature of all questions in the questionnaire was considered good, as more than 90% of the respondents did not answer "none" or "very severely" to any of the questions.

### Test-retest and Internal Consistency

Regarding the internal consistency of the Turkish-OHIDL, Table 1 shows satisfactory internal consistency, with the Cronbach's alpha coefficient of 0.89 for the overall OHIDL and ranging from 0.84 to 0.71 for eating, appearance, health, psychological, and social domains.

Regarding the test-retest reliability, the ICC for overall OHIDL was 0.86, showing good reliability, and ranged between 0.82 and 0.53 for individual domains, showing moderate to good reliability (Table 1).

**Table 1. Test-retest (ICC) and internal consistency (Cronbah's  $\alpha$ ) measures**

	Number of items	n=222	n=31
		Cronbach $\alpha$	ICC
OHIDL-total	16	0.89	0.86
Eating	6	0.84	0.82
Speaking	1	-	0.65
Appearance	2	0.83	0.81
Social	2	0.71	0.82
Psychological	2	0.77	0.53
Health	2	0.77	0.69
Finance	1	-	0.73

ICC: Intraclass Correlation Coefficient

### Validity

The total OHIDL score was significantly correlated with the global scores ( $p < 0.05$ ) other than the self-rating of oral health (G1/rs: -0.09,  $p = 0.17$ ). The highest correlation was with the overall impact of oral health on daily life (G3/rs: 0.54,  $p < 0.001$ ), indicating a moderate correlation.

It was fairly correlated with being bothered by oral health impacts (G4/rs: 0.50,  $p < 0.001$ ). Satisfaction with oral health status (G2/rs: -0.25,  $p < 0.001$ ) and overall life satisfaction (G5/rs: -0.18,  $p = 0.01$ ) were poorly correlated with total OHIDL score. Self-rating of oral health (G1) was poorly correlated only with the appearance domain (rs: -0.18,  $p = 0.01$ ) (Table 2).

Table 2. Spearman's rank correlation coefficient (rs) and p values among intensity measurement of domains and global questions					
	G1) Self-rating of oral health	G2) Satisfaction on oral health status	G3) Overall oral health impact	G4) Bothered by oral health impact	G5) Overall life satisfaction
Eating	-0.01	-0.11	0.44	0.35	-0.08
	0.88	0.12	0.00	0.00	0.25
Speaking	-0.06	-0.07	0.22	0.27	-0.08
	0.36	0.32	0.00	0.00	0.24
Appearance	-0.18	-0.30	0.26	0.36	-0.16
	0.01	0.00	0.00	0.00	0.02
Social	-0.12	-0.21	0.25	0.29	-0.23
	0.07	0.00	0.00	0.00	0.00
Psychological	-0.12	-0.24	0.55	0.53	-0.20
	0.08	0.00	0.00	0.00	0.00
Health	-0.02	-0.21	0.39	0.32	-0.09
	0.89	0.00	0.00	0.00	0.16
Finance	-0.13	-0.23	0.29	0.29	-0.12
	0.06	0.00	0.00	0.00	0.09
OHIDL-total score	-0.09	-0.25	0.54	0.50	-0.18
	0.17	0.00	0.00	0.00	0.01

OHIDL: Oral Health Impact on Daily Life

The correlations between OHIP-14-TR and Turkish-OHIDL total scores and domain scores are shown in Table 3. A significant correlation was found between all subgroups, and a very strong correlation (rs: 0.78,  $p < 0.001$ ) was observed between two scales in terms of total score.

Table 3. Spearman's rank correlation coefficient (rs) and p values among Turkish-OHIDL and OHIP-14-TR								
Turkish-OHIDL	OHIP 14-TR							
	Functional limitation	Physical pain	Psychological discomfort	Physical disability	Psychological disability	Social	Handicap	Total score
Eating	0.41	0.60	0.3	0.60	0.39	0.47	0.36	0.63
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speaking	0.52	0.28	0.16	0.32	0.27	0.24	0.25	0.40
	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00
Appearance	0.40	0.30	0.27	0.31	0.58	0.37	0.32	0.50
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Social	0.44	0.29	0.28	0.42	0.58	0.44	0.37	0.57
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Psychological	0.39	0.48	0.40	0.43	0.45	0.46	0.50	0.62
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Health	0.19	0.55	0.27	0.47	0.32	0.39	0.43	0.54
	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Finance	0.31	0.20	0.16	0.32	0.44	0.24	0.37	0.41
	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00
OHIDL-total score	0.52	0.63	0.38	0.64	0.60	0.57	0.53	0.78
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

OHIDL: Oral Health Impact on Daily Life, OHIP: Oral Health Impact Profile

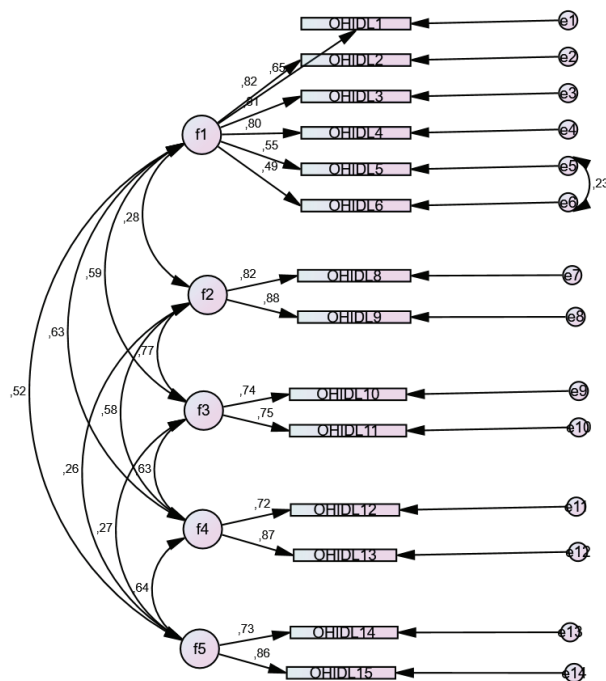
To verify the construct validity of the questionnaire, CFA was conducted for five factors containing more than one item, based on the model put forward while developing the questionnaire. Although  $\chi^2/df$ , GFI, AGFI, CFI values showed acceptable, NFI and RMSEA values did not show acceptable fit. To improve the models, it is recommended

to add the covariances between the items with the largest "modification indices" values (23). The covariance structure between item 5 and item 6, was added. The second model produced acceptable fit results except NFI value (0.894), which is very close to 0.90 (Figure 1 and Table 4).

**Table 4. Confirmatory factor analysis**

	X2/df	CFI	NFI	RMSEA	GFI	AGFI
<b>Five factors</b>	2.517	0.927	0.887	0.083	0.909	0.858
<b>Five factor with one covariance</b>	2.394	0.934	0.894	0.079	0.916	0.866

CFI: Comparative fit index, NFI: Normed fit index, RMSEA: Root mean square error of approximation, GFI: Goodness of fit index, AGFI: Adjusted goodness of fit index



**Figure 1.** Path diagram of confirmatory factor analysis

## DISCUSSION

OHIDL is a questionnaire developed on elderly patients (55 years and older) in Hong Kong, and its validity and reliability have been proven. The OHIDL scale developers recommended testing the scale's validity and reliability in other age groups and countries (12). This methodologically designed study aimed to adapt the OHIDL to Turkish and evaluate the Turkish version in terms of validity and reliability in Endodontic patients aged 18 and over.

The Turkish-OHIDL exhibited satisfactory internal consistency, with Cronbach's alpha values (0.71-0.84 for domains; 0.89 for the entire OHIDL) consistent with the original OHIDL (0.72-0.85 for domains; 0.88 for the entire OHIDL) (12).

According to test-retest results, the Turkish version of OHIDL showed good test-retest reliability with an ICC value of 0.86 for overall OHIDL. Eating (0.82), appearance (0.81), and social (0.82) domains showed good reliability,

while finance (0.73), speaking (0.65), health (0.69), and psychological (0.53) domains showed moderate reliability. In another study, the developers of the original OHIDL evaluated the validity and reliability of the OHIDL transition scale, and they assessed test-retest reliability by re-administering randomly selected five items right after the follow-up interview (13). The authors reported ICC values ranging from 0.28 (eating time prolonged) to 1.00 (headache) and stated that the scale had satisfactory reliability. Additionally, they suggested future studies, evaluating test-retest reliability of OHIDL with a longer time interval. Considering this, in the present study, for test-retest reliability, all items were re-administered with a two-week interval, and high reproducibility of the Turkish-OHIDL was proven.

A systematic review stated that OHIP-14 is the most frequently used tool to measure the quality of life in adults (24). Additionally, it has been used several times in studies evaluating OHRQoL in endodontic patients (25,26). Thus, the Turkish version of the OHIP-14 scale, whose validity and reliability were proven in 2014 by Başol et al., was used for the convergent validity in the present study (17). Spearman's correlation analysis was performed between OHIP-14 and OHIDL, and a high correlation was found between the two scales in terms of total scores ( $r_s$ : 0.78,  $p < 0.001$ ). At the same time, all of the domains were correlated with each other. As expected, the correlation between domains with similar questions was stronger, while the domains with different question contents showed a weaker correlation.

Exploratory Factor Analysis (EFA) is used to discover the factors between the items of the questionnaire, and the items determining the existing factors, and CFA can be used to investigate the existence of a previously proven structure with a new data set. Therefore, in questionnaire development studies, CFA should be used following EFA to test the validity while in adaptation studies CFA may be used solely or together with EFA (27). Since prior knowledge about the factors were reported, CFA was conducted on the factors determined in the original questionnaire and found that the model exhibited acceptable fit, supporting construct validity of Turkish-OHIDL.

The Turkish-OHIDL was correlated with all global ratings except the self-rating of oral health (G1). It was found that the overall OHIDL score exhibited a moderate correlation with item G3 (overall impact of oral health on daily life), which can be considered as indicator of OHRQoL. It was also found that the total Turkish-OHIDL score was correlated with overall life satisfaction (G5), albeit poorly. Considering these findings, it can be suggested that the Turkish-OHIDL is a powerful tool for measuring OHRQoL and can also contribute to assessing overall life satisfaction, although it has a poor correlation.

There is a direct relationship between oral-dental health and eating (28). A study conducted among patients living in a nursing home showed that chewing activity significantly affected OHRQoL (29). Speaking, as well as eating, is an essential determinant of quality of life related to oral health (30). In the Turkish version of OHIDL, eating and talking difficulties, both functional limitations, were correlated with the global questions that are indicators of OHRQoL (G3, G4).

Individuals unhappy with their appearance may exhibit behaviors such as avoiding smiling or smiling without showing their teeth, covering their mouth with their hands while speaking, or avoiding social interactions (31). Additionally, studies comparing life satisfaction before and after treatment show that aesthetics significantly affect life satisfaction (32,33). In support of these, in the Turkish-OHIDL appearance domain was correlated with all global questions and stood out as an essential determinant in assessing OHRQoL and overall life satisfaction. In addition, the patient's self-rating of oral health (G1) was not correlated with any domain other than appearance (rs: -0.18, p=0.01). This can be explained by the fact that individuals exhibit higher awareness of appearance/aesthetics rather than functional awareness, and aesthetics concerns affect people in many ways in daily life.

While all domains of the questionnaire showed a correlation with the the overall impact of oral health on daily life (G3) and being bothered by these effects (G4), only appearance, social, and psychological domains were correlated with the overall life satisfaction (G5). This can be interpreted as factors related to pain and functional limitations only affect OHRQoL, whereas appearance dissatisfaction, lack of self-confidence, and dental anxiety affect both OHRQoL and overall life satisfaction.

Dental pain is the most common acute pain in the orofacial region and is often associated with an endodontic problem (34). In endodontic patients, spontaneous widespread pain may be observed, as well as severe pain triggered by chewing, heat, or cold during eating (35). In addition, pain that disrupts sleep is expected in cases of irreversible pulpitis, especially at night (36). In a previous study, the anxiety level of patients with irreversible pulpitis was higher than that of patients undergoing other dental treatments. It is stated that the most significant cause of this anxiety is

pain during treatment (37). Anxious people exaggerate the intensity of unpleasant events, such as fear and pain (38). So, in this Turkish-OHIDL questionnaire applied to endodontic patients, it was an expected finding that the psychological, eating, and health domains showed the highest correlation with the oral health impact on daily life.

A limitation of this study is that it was designed to investigate the internal consistency, test-retest reliability, and validity of the Turkish-OHIDL, however, responsiveness was not evaluated. Further studies are required to investigate responsiveness and sensitivity to changes in the treatment process.

## CONCLUSION

Within the scope of the findings of this study, the validity and reliability of the Turkish-OHIDL have been proven and were found to be helpful as an alternative scale to OHIP-14 in the evaluation of OHRQoL. Cross-sectional and longitudinal study designs in larger sample groups may increase evidence-based results. Analyzing the OHIDL together with patients' clinical oral findings may serve to determine the impact of different oral conditions on quality of life measurement.

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**Conflict of interest:** *The authors have no conflicts of interest to declare.*

**Ethical approval:** *The study was approved by the Ethics Committee of Recep Tayyip Erdoğan (RTE) University (Protocol no: 2023/118). Informed consent was obtained from all the participants, and the questionnaire was completed.*

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