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Cross-cultural adaptation of the Turkish version of the dentin hypersensitivity experience questionnaire short form (DHEQ-15)

Gizem Ayan^{1*} , Tugba Misilli¹ and Mehmet Buldur¹

Abstract

Background The short form of the Dentin Hypersensitivity Experience Questionnaire (DHEQ-15) is a valid and reliable tool for Oral Health-Related Quality of Life (OHRQoL) studies. The aim of this study was cross-culturally adapt and validate the English version of DHEQ-15 for the Turkish language.

Methods The Turkish version of the DHEQ-15 was developed using the forward-backward translation method. Two independent translators translated it from English to Turkish, followed by back-translation into English. A pilot study was conducted with 30 patients with dentin hypersensitivity (DH). The sample consisted of 150 individuals with DH and 150 without. DH was assessed using the Schiff Sensitivity Scale by applying air to the cervical area of the tooth for 1 s from a distance of 1 cm. A total of 300 individuals completed the Turkish DHEQ-15 in the waiting room. Subsequently, 30 randomly selected individuals with DH completed the questionnaire again after 7–10 days to assess test-retest reliability. Participants provided an overall oral health rating assessment on a 6-point scale. The reliability of the DHEQ-15 was assessed using internal consistency and test-retest methods. Exploratory Factor Analysis (EFA) identified its domains, while construct validity was evaluated through cross-cultural (Confirmatory Factor Analysis-CFA), discriminative (Mann-Whitney test) and convergent (Spearman correlation) validity.

Results The demographic characteristics of the sample included 137 men and 163 women, with an average age of 36. The Turkish DHEQ-15 demonstrated excellent internal consistency ($\alpha = 0.970$) and outstanding test-retest reliability ($r = 0.920, p < 0.001$), indicating an excellent correlation. Confirmatory factor analysis confirmed the unidimensional scale structure of the Turkish DHEQ-15 ($p = 0.000$). A statistically significant negative correlation was found between the DHEQ-15 score and the overall oral health rating assessment ($p < 0.05$). Participants with DH had a significantly higher DHEQ-15 score compared to those without DH ($p < 0.001$).

Conclusions This study provides evidence supporting the cross-cultural validity and reliability of the Turkish DHEQ-15.

Keywords Dentine hypersensitivity, Reliability, Quality of life, Questionnaire, Validation

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Introduction

Dentin hypersensitivity (DH) is defined as a short-term, localized, and sharp pain that occurs in response to thermal, tactile, osmotic, or chemical stimuli, and disappears once the stimulus is removed [1]. The etiology of DH includes various factors such as improper brushing, bad habits, incorrect diet, parafunctional habits, gum recession, and periodontal diseases [2]. Prevalence studies reported in the literature regarding DH have shown a wide range of data, varying from 2.8% to 74% [3, 4]. This heterogeneity has been attributed to the population screened, recruitment process, study setting, and the different diagnostic criteria used to collect data [5]. This rate is higher in individuals with periodontal disease, reported to be approximately 72–98% [6]. DH is commonly observed between the ages of 20 and 50, but it can also affect individuals up to their 70s [7].

The Oral Health-Related Quality of Life (OHRQoL) reflects the patient's perception of how their oral health status affects their quality of life [8]. Bekes et al. [9] reported in their study that specific effects of DH could not be identified through the general OHRQoL measure, such as the Oral Health Impact Profile (OHIP), which is one of several generic instruments available for assessing OHRQoL. This highlights the importance of developing culturally relevant and validated assessment tools to accurately reflect the experiences of individuals with DH across different populations. Therefore, Boiko et al. [10] developed the Dentine Hypersensitivity Experience Questionnaire (DHEQ), consisting of 48 items, which is capable of capturing the daily experiences of individuals with DH. The DHEQ has been found to have excellent reliability, validity, and sensitivity to change [11, 12]. Basaran and Çelik developed the Turkish version of the DHEQ in 2018 with 251 DH patients [13]. They stated that the developed Turkish version of the DHEQ is valid and reliable. However, the DHEQ, with its 48 items, presents various challenges. While measures with more items tend to be more precise and reliable, their administration and completion can be time-consuming. This is particularly critical in clinical settings where time constraints are prevalent. This can make the process more cumbersome for clinicians, researchers, and participants. Short forms can increase response rates, reduce missing data, lower data collection costs, and facilitate use among older adults or broader population groups [14].

For these reasons, Machuca et al. [15] developed the DHEQ-15 short form, consisting of 15 items. The DHEQ-15, like the DHEQ-48, consists of five subscales: 'restrictions', 'adaptation', 'social impact', 'emotional impact', and 'identity' [15]. The DHEQ-15 uses a 7-point Likert scale, with response options as follows: 1 = 'strongly disagree', 2 = 'disagree', 3 = 'agree a little', 4 = 'neither agree nor disagree', 5 = 'agree a little', 6 = 'agree' and, 7 = 'strongly

agree'. The total score of the DHEQ-15 ranges from 15 to 105 [15]. Higher scores on the DHEQ-15 denote poorer OHRQoL [16].

Since its development, versions of the DHEQ-15 have been available in Brazilian Portuguese [17], Chinese [18], Arabic [19], and Romanian [20]. However, the rich Turkish culture, with its thousands of years of history, and the linguistic characteristics of Turkish, including its agglutinative structure, necessitate the adaptation of the DHEQ-15 for the Turkish population. Moreover, understanding how Turkish individuals perceive and experience DH can only be accurately captured through culturally relevant tools. The DHEQ-15 needs to be adapted for the Turkish population and validated among Turkish patients for use in a new country, culture, and language. The aim of this study is to evaluate the cultural adaptation of the DHEQ-15 and test its reliability and validity among Turkish patients.

Materials and methods

This study was conducted between August and December 2023 at the Department of Restorative Dentistry, Faculty of Dentistry, Çanakkale Onsekiz Mart University. This research was approved by the Clinical Research Ethics Committee of Çanakkale Onsekiz Mart University on July 26, 2023, under decision number 2023/10–03. The present study was also conducted in accordance with the Helsinki Declaration of 1975, as revised in 2013.

Study population

Besides the sample size calculated using G*Power, it has been recommended by Norusis that a minimum sample size of 300 should be used in scale development and adaptation studies [21]. The study included a total of 300 participants, comprising 163 women and 137 men, aged between 19 and 70 years. Participants included in the study were over 18 years old, fluent in Turkish, and able to read and write in Turkish, with 150 patients having DH and 150 patients without DH. Participants with orthodontic appliances, communication and cooperation difficulties, significant oral pathologies, advanced periodontal diseases, extensive or faulty restorations, pulpitis, caries, cracked enamel, or removable partial denture supports were excluded from the study. Patients were informed about the purpose of the study, and written consent was obtained from all participants.

Assessment of dentin hypersensitivity

To determine DH, air was applied to the cervical area of the tooth for 1 s from a distance of 1 cm by the same surgeon (Sur.). DH was evaluated only once at the initial assessment on two non-adjacent teeth, while the neighboring teeth were protected using cotton rolls to ensure

that the stimulus did not affect them. The Schiff Sensitivity Scale (SSS) was used [22]:

0- No response to the air stimulus;

1- Response to the air stimulus present, no need to discontinue the stimulus;

2- Response to the air stimulus present, cessation of the stimulus is requested;

3- Response to the air stimulus, considers the stimulus to be painful.

The SSS was =0 for individuals without DH. For individuals with DH in two or more non-adjacent teeth, the SSS was ≥ 1 . In individuals with DH, two non-adjacent test teeth were identified. The SSS values of the two test teeth were summed and then divided by two to calculate the average SSS [22].

Development of the Turkish version of the DHEQ-15

The DHEQ-15 was cross-culturally adapted and validated into Turkish using the forward-backward translation process proposed by Guillemín et al. [23]. This process includes the following five stages:

1. The DHEQ-15 was translated from English to Turkish by two independent translators whose native language is Turkish.
2. The Turkish version was then back-translated into English by two independent translators whose native language is English.
3. The versions translated from English to Turkish and then from Turkish back to English were evaluated by an expert panel consisting of three specialist dentists who are also the researchers of the study, two general dentists, a biostatistician, and a linguist in both English and Turkish, resulting in the creation of the preliminary Turkish version of the DHEQ-15.
4. The Turkish version of the DHEQ-15 was evaluated through a pilot study conducted on a group of 30 patients with DH. These 30 individuals from the pilot study were not included in the main psychometric validation group ($n = 300$).
5. The pilot study revealed that some patients encountered difficulties in understanding certain items, prompting revisions for clarity in the wording. Based on the results of the pilot study, the final version of the DHEQ-15 Turkish version was created by the expert team.

A total of 300 individuals participated in the study, completing the 15-item Turkish version of the DHEQ-15. The DHEQ-15 was completed by patients in the waiting room. Responses to all questions on the form were scored from 1 to 7, with the total DHEQ-15 score calculated to range between 15 and 105. 20% of the 150 individuals with DH, equating to 30 patients, were randomly

selected. These 30 patients completed the Turkish version of the DHEQ-15 again after 7–10 days to assess the test-retest reliability of the questionnaire [18]. This interval should be neither too long to allow for accurate recall of responses nor too short to ensure that the patients' conditions remain unchanged, as suggested by the literature, which indicates that a retest interval of 7 to 10 days is generally considered optimal for minimizing recall bias while maintaining stability in the participants' conditions [24]. No treatment related to dentin hypersensitivity was administered to the patients during this period.

Additionally, all participants were asked to self-report their overall oral health rating on a 6-point scale ranging from 1 (very poor) to 6 (excellent) [10]. The correlation between the DHEQ-15 scale scores and oral health rating was assessed to evaluate the construct validity of the Turkish DHEQ-15.

Statistical methods

The data were statistically analysed using SPSS 25.0 and AMOS 23.0 software (IBM Corp., Armonk, NY, USA). Descriptive statistics provided count, percentage, mean, standard deviation, median, minimum, and maximum. The relationship between demographic characteristics and the presence of dentin sensitivity was analyzed using the Pearson Chi-Square test ($p < 0.05$).

Reliability analysis

When evaluating the reliability of the scale, two aspects should be considered: internal consistency and test-retest reliability. Internal consistency was assessed using Cronbach's Alpha, measuring the degree to which all items in the scale evaluated the same concept [25]. For the Corrected Item-Total Correlation Coefficients, values greater than 0.20 were considered acceptable [18]. Also, the split-half reliability results indicated a close variance between the two halves, with the first half consisting of eight items and the second half comprising seven items [26]. This analysis illustrated strong internal consistency between the two halves of the scale. Test-retest reliability was used to assess the consistency of responses over time, requiring Spearman Correlation coefficient between the first and second measurements to exceed 0.70 [17]. Test-retest reliability was evaluated over a 1–2 week period, which was considered long enough to prevent recall bias but short enough to avoid clinical changes [27].

Validity analysis

To evaluate the validity of the DHEQ, an Exploratory Factor Analysis (EFA) was conducted to determine its factor structure. Firstly, the Kaiser-Meyer-Olkin (KMO) test assessed sample adequacy for factor analysis, while Bartlett's Test of Sphericity evaluated the suitability of the data matrix and variable correlations [18]. EFA

was utilized to uncover the underlying structure of the data and to explore the common variances of the items included in the scale [28]. To further refine this analysis, the Principal Component Analysis (PCA) approach was employed within the EFA framework to identify the common variances among the items in the scale [29]. A scatter plot was used to identify the number of factors for the developed DHEQ, with the cutoff value for factor loadings established at 0.300 [30]. Additionally, the communal variance explanation values for each item were required to exceed this threshold, which ensured that all items contributed meaningfully to the overall construct being measured. Confirmatory Factor Analysis (CFA) was employed later to validate the factor structure identified in EFA, reinforcing the findings through hypothesis testing. Additionally, CFA is recommended for evaluating cultural validity according to the guidelines proposed by COSMIN (Consensus-based Standards for the Selection of Health Status Measurement Instruments) [31]. In CFA, the model's fit to the dataset was assessed using Structural Equation Modeling (SEM), and fit indices were evaluated [32].

Discriminative validity was evaluated using the Mann-Whitney U test by comparing the total scores between DH absent and present groups. Convergent validity was assessed by examining the correlation (Spearman's rank correlation) between DHEQ-15 total score and a global

rating of oral health. Additionally the correlation between the Schiff scale and DHEQ was also analyzed to assess conceptual validity. The correlation values are interpreted as follows: <0.20 (poor), 0.21–0.40 (fair), 0.41–0.60 (good), 0.61–0.80 (very good), and >0.81 (excellent) [15].

Results

The expert panel assessed the translations and found that the items conveyed the same meaning, maintained idiomatic expressions, and did not present any translation difficulties. The panel testing recommended two modifications. The original term “sensations in my teeth” was replaced with “sensitivity in my teeth” in the Turkish DHEQ-15. In item 5, the original term “cold day” was modified to “cold air” in the Turkish DHEQ-15. Furthermore, the panel understood the scales and reported no consistent problems in the use of DHEQ-15.

Patients’ characteristics

The distribution of patients’ demographic and clinical characteristics is shown in Table 1. The mean age of the patients was 38.4±13.81 (range 19–70) years, and the 54.3% were female. Moreover, Pearson Chi-square test revealed statistically significant relationships between study groups (DH present/absent) and gender ($p=0.015$), education level ($p=0.012$), and oral health rating ($p=0.001$). It was observed that women predominantly experienced sensitivity at a rate of 61.3%. Additionally, participants with primary education were found to be more prone to sensitivity, with a prevalence of 81%. Those exhibiting poor oral health status (scores of 1–3) also demonstrated a higher likelihood of experiencing sensitivity (50%, 81.3%, 66.7%, respectively).

Reliability

All DHEQ-15 questionnaires were fully completed. Table 2 presents the Cronbach's Alpha Reliability Coefficients obtained through item deletion for the DHEQ-15, with the alpha if item deleted ranging from 0.967 to 0.972. The DHEQ yielded results ranging from a minimum of 15 to a maximum of 105 points. The average score for this questionnaire was determined to be 55.47±27.32. The DHEQ total score was found to be highly reliable, with a Cronbach's alpha reliability coefficient of 0.970.

The split-half reliability analysis as presented in Table 3. As a result of the analysis, the alpha value for the first section consisting of 8 items is 0.953, and for the second section consisting of 7 items, the alpha value is 0.940. The reliability coefficients were found to be quite high, and it was determined that the questions were prepared in a manner that supports each other. The internal consistency coefficient between the two sections was found to be 0.898, indicating a high level of similarity. The Spearman-Brown coefficient was found to be 0.947, and the

Table 1 Distribution of participants’ demographic and clinical characteristics

		n	%
Group	DH absent	150	50.0
	DH present	150	50.0
Gender	Female	163	54.3
	Male	137	45.7
Educational background	Primary education	21	7.0
	High school	61	20.3
	University	135	45.0
	Master's degree	77	25.7
	Doctorate	6	2.0
Oral health rating	Very poor	2	0.7
	2	16	5.3
	3	72	24.0
	4	107	35.7
	5	84	28.0
	Excellent	19	6.3
Schiff	No sensitivity	150	50.0
	1	4	1.3
	1.5	20	6.7
	2	50	16.7
	2.5	30	10.0
	Most severe sensitivity	46	15.3
Min.-Max.		Mean ± SD (Median)	
Age	19–70	38.4 ± 13.81(36)	
Schiff	0–3	1.16 ± 1.23(0.5)	

Table 2 Corrected item-total correlations results for the DHEQ-15

	Scale mean if item deleted	Corrected item-total correlation	Cronbach's alpha if item deleted
DHEQ-1	51.3067	0.843	0.968
DHEQ-2	51.4967	0.858	0.968
DHEQ-3	51.0600	0.815	0.968
DHEQ-4	51.4867	0.832	0.968
DHEQ-5	51.8433	0.802	0.969
DHEQ-6	51.3433	0.785	0.969
DHEQ-7	52.1533	0.849	0.968
DHEQ-8	52.4533	0.815	0.968
DHEQ-9	52.8567	0.575	0.972
DHEQ-10	51.5200	0.856	0.968
DHEQ-11	51.2567	0.903	0.967
DHEQ-12	51.4867	0.885	0.967
DHEQ-13	52.4067	0.756	0.969
DHEQ-14	52.1633	0.805	0.969
DHEQ-15	51.7933	0.844	0.968

Table 3 Split-half reliability analysis of the developed DHEQ

	Cronbach alpha and internal consistency coefficients
First half (items 1–8)	0.953
Second half (items 9–15)	0.940
Correlation coefficient between the two halves	0.898
Spearman-Brown coefficient	0.947
Guttman split-half coefficient	0.942

Table 4 The communal variance values of the items in the developed DHEQ

The items	The communal variance values	The items	The communal variance values
S1	0.752	S9	0.375
S2	0.775	S10	0.772
S3	0.708	S11	0.845
S4	0.735	S12	0.817
S5	0.689	S13	0.617
S6	0.664	S14	0.688
S7	0.760	S15	0.750
S8	0.705		

Guttman Split-Half coefficient was 0.942. These internal consistency coefficients, being higher than the minimum of 0.600, indicate that the scale is at an excellent level of reliability and has a high level of internal consistency. Test-retest reliability was found to be $r=0.920$ ($p<0.001$) using data from the 30 patients who re-completed the DHEQ-15 after a 2-week interval, indicating an excellent correlation and demonstrating that the measurements were stable and consistent.

Validity

The communal variance values of the items in the DHEQ are presented in Table 4. For this scale, the smallest communal variance explanation ratio is 37.5% for item 9. The communal variance explanation ratios of the items used in the analysis are at adequate level, being greater than 0.300 [0.375–0.845].

The scatter plot shown in Fig. 1 reveals significant breakpoints at the 2nd and 4th factors. According to this graph, examining structures with 2 and 4 factors is appropriate. Additionally, it has been observed that the only case where the eigenvalue is greater than 1 corresponds to a unidimensional scale structure. In all subsequent dimensions, including two, three, and four, the eigenvalue falls below 1 for the multidimensional scale. These findings support the suitability of the unidimensional structure.

Table 5 presents the results of the Factor Analysis for the Dimensions of the DHEQ. The KMO value was determined to be 0.963. It was concluded that the sample adequacy was very high for conducting factor analysis. The dataset is suitable for factor analysis ($X^2=4924.555$; $p<0.001$).

In the analysis conducted for a single factor, no items were found where the difference in factor loadings between factors was greater than 0.100 units for items with explained communal variance values below 30% and present across multiple factors. The scale does not contain any reverse items. The factor loadings were found to be at a sufficiently high level, ranging from 0.612 to 0.919. The scale explains 71.001% of the total variance.

According to the CFA, the structural equation modeling results indicate that the scale is statistically significant at the $p=0.000$ level and is related to the structure of the 15-item scale, as shown in Table 6. In order to improve model fit, corrections were made between covariances when the modification index parameter was above 10. In this study, five covariances have been added (e5-e6; e7-e8; e11-e12; e13-e14; e14-e15). Due to the similarities of these items, a higher covariance between the residuals has been observed. Improvements are being made to the model, as presented in Fig. 2. While making improvements, variables that reduced fit were identified, and new covariances were created for those with high covariance among residuals (e5-e6; e7-e8; e11-e12; e13-e14 ve e14-e15). The table shows the values for fit indices accepted for the initial fit indices and the recalculated fit indices after improvements were made. According to the results of the single-factor model confirmatory factor analysis, the goodness-of-fit indices for the developed scale are as follows: RMSEA=0.080; GFI=0.900; AGFI=0.850; CFI=0.965; and $\chi^2 = 256.792$ ($p=0.000$), indicating that the indices are at an acceptable level.

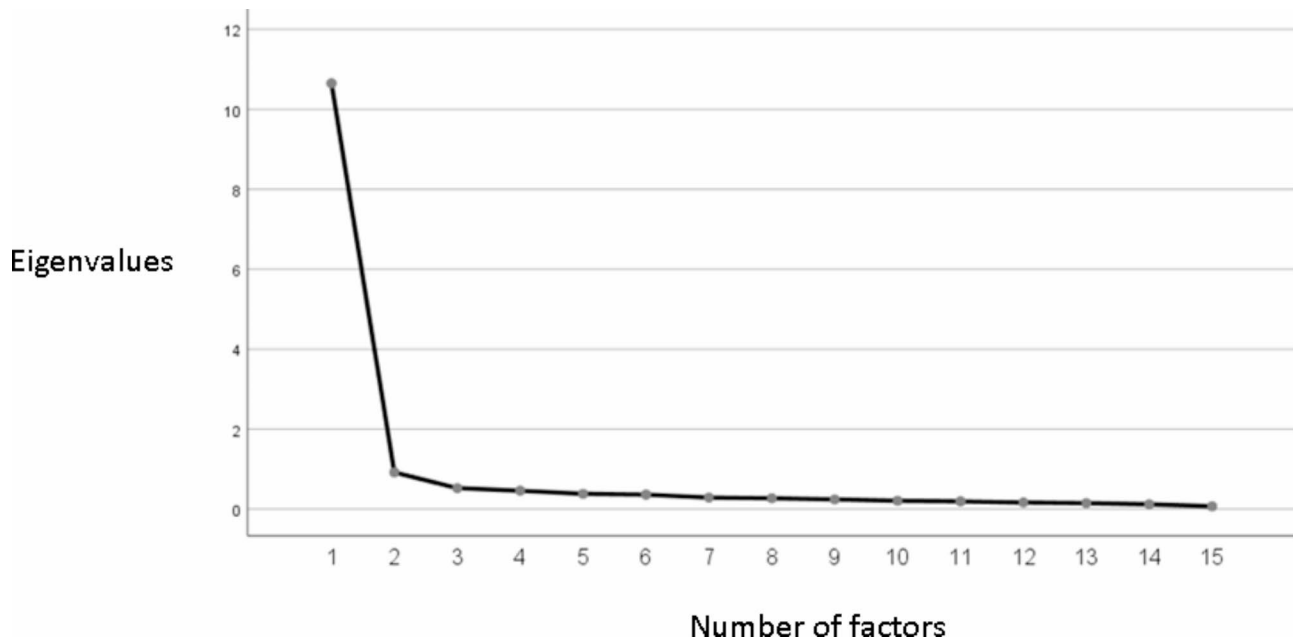


Fig. 1 The scatter plot for the number of factors in the developed scale

Table 5 Results of the factor analysis for the dimensions of the developed DHEQ

Scale items	Rotated factor loadings
DHEQ 1	0.867
DHEQ 2	0.880
DHEQ 3	0.842
DHEQ 4	0.857
DHEQ 5	0.830
DHEQ 6	0.815
DHEQ 7	0.872
DHEQ 8	0.840
DHEQ 9	0.612
DHEQ 10	0.878
DHEQ 11	0.919
DHEQ 12	0.904
DHEQ 13	0.785
DHEQ 14	0.829
DHEQ 15	0.866
Kaiser-Meyer-Olkin: 0.963	Total Explained Variance: 71.001
Bartlett's Test of Sphericity:	
$X^2 = 4924.555; p < 0.001$	

The Mann-Whitney U test revealed statistically significant differences among study groups (DH absent/present) in terms of total DHEQ scores ($p < 0.001$). Participants in the DH present group had higher scale scores, with a mean value of 77.1 ± 16.92 (median 77.5),

compared to the DH absent group, which had a mean score of 33.85 ± 16.43 (median 30.5). The DHEQ-15 total score showed a significant negative correlation with global oral health status ($r = -0.307$, $p < 0.001$), indicating fair convergent validity. Additionally, a positive, fair correlation ($r = 0.257$, $p < 0.001$) was found between the DHEQ and Schiff Scale scores.

Discussion

The process of adapting a measurement tool for different cultural contexts is critical to ensuring its effectiveness and relevance. After the back-translation process, the synthesized version was evaluated by the expert panel who conducted the cross-cultural adaptation. This evaluation may have enhanced the equivalence between the original and translated versions. The expert panel concluded that both the translation/back-translation pairs provided sufficient semantic equivalence with the original tool. A pilot test of the translated tool among participants was conducted to assess the clarity of items and response forms, which improved the quality of the final version of the translation [33]. The recommendations of the expert panel were accepted, and changes were made to align with the current vocabulary and culture of Turks.

The Turkish DHEQ-15 demonstrated a high level of reliability, with an internal consistency coefficient of

Table 6 Fit indices of the single-factor model of the developed scale's confirmatory factor analysis

RMSEA	NFI	CFI	IFI	GFI	TLI	AGFI	CMIN	CMIN/df
0.136	0.883	0.899	0.882	0.767	0.882	0.689	588.466	6.539
RMSEA	NFI	CFI	IFI	GFI	TLI	AGFI	CMIN	CMIN/df
0.080	0.949	0.965	0.965	0.900	0.957	0.850	256.792	3.000

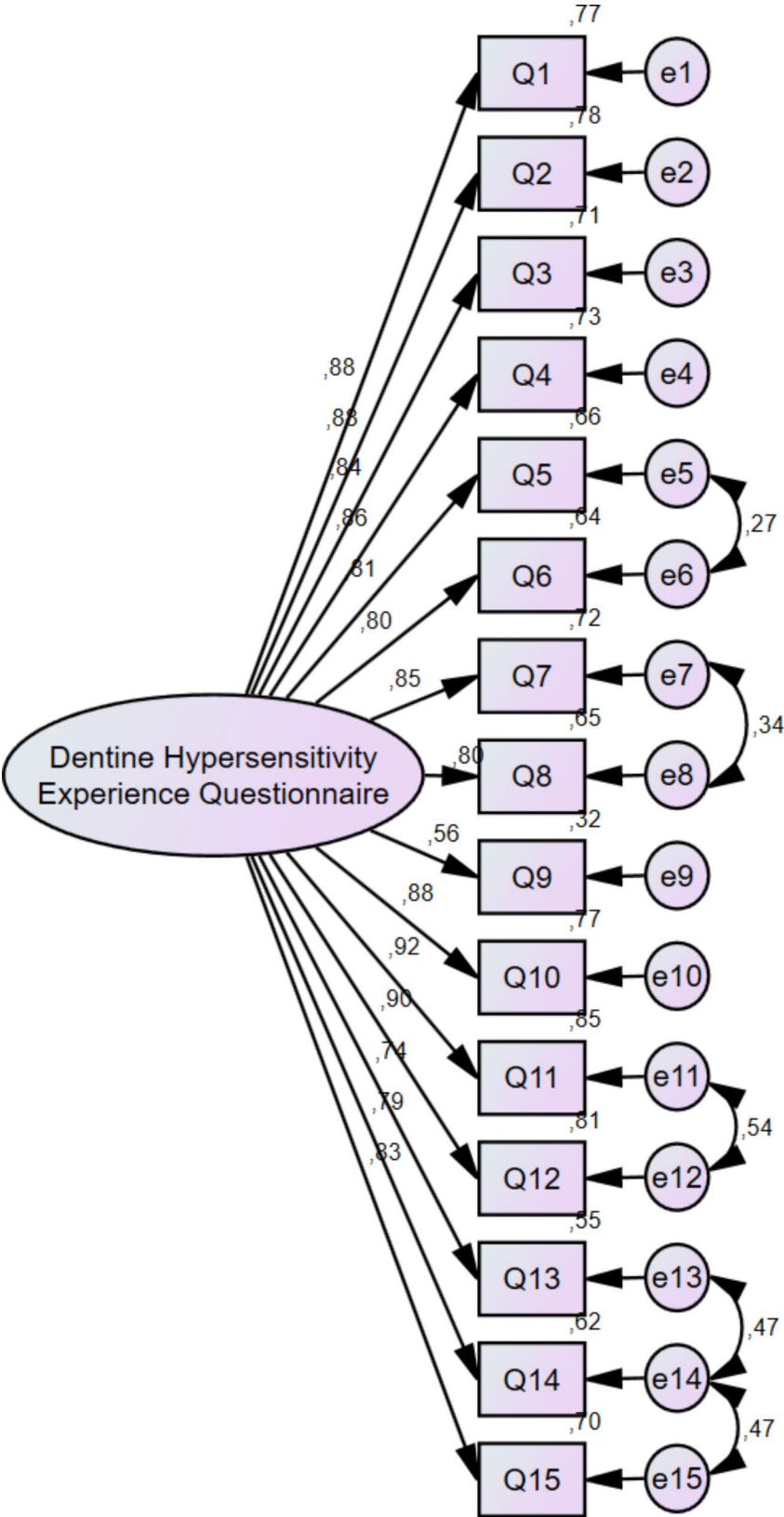


Fig. 2 Model for the single-factor confirmatory factor analysis of the developed scale

0.970. This value is higher than the Arabic DHEQ-15 (0.912) [19], English DHEQ-15 (0.906) [15], Chinese DHEQ-15 (0.934) [18], and Brazilian DHEQ-15 (0.945) [17] scales. However, the internal consistency coefficients in other scales are also above the minimum value of 0.9 recommended by Bland and Altman, similar to this study [34]. Given the very high internal consistency of the Turkish DHEQ-15, it is considered that some items, particularly those showing high similarity, may be redundant. In light of this, future revisions of the tool may consider modifying or omitting potentially redundant items, such as items 7, 12, and 14, to optimize internal consistency and overall reliability.

The test-retest reliability value for the Turkish DHEQ-15 was found to be 0.920, indicating an excellent correlation, consistent with the values reported for the Chinese DHEQ-15 [18] and Brazilian DHEQ-15 scales [17]. These results indicate that the Turkish DHEQ-15 can be considered a reliable and stable tool.

In terms of convergent validity, it was observed that those with higher overall oral health scores and lower DH scores on the Schiff scale had lower Turkish DHEQ-15 scores. These findings are consistent with the versions of the DHEQ-15 in various languages [17, 19]. Regarding discriminative validity, as in the Brazilian version [17], the DHEQ-15 scores of participants with DH are significantly higher than those without. This difference can be seen as evidence of discriminative validity and may indicate that the groups with and without DH are distinct from each other.

Cultural validity was demonstrated in this study, with the Turkish DHEQ-15 showing a single-factor structure that differs from the five-factor structure of the Brazilian [17] and original DHEQ-15 [15] and the three-factor structures of the Chinese [18] and Arabic DHEQ-15 [19] are three-factor scales. The five-factor scales of the Brazilian DHEQ-15 encompass aspects such as restrictions, adaptation, social impact, emotional impact, and identity. The single-factor structure of the Turkish DHEQ-15 may be related to the way Turkish culture and language express individual health experiences. Societal norms related to health and nutrition in Turkey may influence individuals to perceive their experiences within a more holistic framework. Additionally, the use of language and expressions may also affect the differences in the factor structures of the scale; because language shapes the way individuals express their experiences. Therefore, the single-factor structure of this scale may be related to the rich linguistic possibilities offered by the Turkish language and how this language shapes individuals understanding of their health experiences.

Previous research indicates that women often experience higher sensitivity and may report greater discomfort associated with DH [35, 36]. Basaran et al. [13] also

stated that women have higher DHEQ scores and that this is related to higher sensitivity problems. The reasons for higher sensitivity in women compared to men are not yet clear. Que et al. [37] suggested that women's greater sensitivity to pain might be one of the reasons for the occurrence of DH. However, further research is needed to understand how gender influences patients' experiences of DH. It has been found that individuals with lower education levels, like women, are also more predisposed to DH. It is thought that low education levels may potentially contribute to DH, as they may be associated with an increased risk of periodontal diseases [38]. Consistent with these findings, this study observed that women and individuals with lower education levels are more predisposed to DH. These demographic findings could guide clinical practice by encouraging healthcare providers to consider gender-related perceptions when developing management strategies for DH. Tailored interventions that address the specific needs of these groups may enhance patient outcomes.

One of the limitations of this study is that it was conducted in only a single clinic, which may limit the generalizability of the findings to the broader population [39]. The study was conducted in the western region of Turkey, where socioeconomic and educational levels are relatively higher. Conducting the study in lower socioeconomic regions, such as eastern Turkey, could have highlighted different cultural nuances and experiences related to DH. Future research could benefit from multicenter studies that include diverse populations across various geographic locations and clinical settings, thereby enhancing the external validity of the results.

Evaluating the responsiveness of the DHEQ-15 to dental treatment interventions is essential. This aspect has not been addressed in the current study. In the future, it is anticipated that longitudinal studies aiming to investigate how the DHEQ-15 responds to various dental treatments over time will be conducted. These studies are expected to provide valuable insights into the effectiveness of this tool in assessing changes in patients' OHRQoL following treatment. Another limitation of the study is the potential redundancy of some items in the Turkish DHEQ-15, particularly those with high internal consistency, which may be redundant. Future revisions and cross-cultural studies should focus on optimizing the scale by addressing these items.

The study is one of the few that investigates the cultural validity of the DHEQ-15 in countries where languages other than English are spoken [17–19] and is the first study conducted on a Turkish-speaking population. This tool will help dentists in the Turkish-speaking world provide appropriate dental care for patients suffering from DH. The DHEQ-15 is capable of capturing the daily experiences of individuals with DH, facilitating

the understanding of DH in Turkey and assisting in better diagnosis and treatment with a patient-centered approach. The Turkish DHEQ-15 has shown excellent equivalence with the original questionnaire.

Conclusion

The Turkish DHEQ-15 is a reliable and valid tool for assessing the OHRQoL of patients with DH complaints and provides initial evidence for its use in this field. Some items need to be modified and others need to be omitted. Further research is recommended to assess the cross-cultural validity and reliability of the Turkish DHEQ-15, including a revision of the identified items to ensure the tool's optimal performance.

Abbreviations

CFA	Confirmatory Factor Analysis
DH	Dentine hypersensitivity
DHEQ	Dentin Hypersensitivity Experience Questionnaire
DHEQ-15	Dentin Hypersensitivity Experience Questionnaire Short Form
EFA	Exploratory Factor Analysis
OHIP	Oral Health Impact Profile
OHRQoL	Oral Health-Related Quality of Life
PCA	Principal Component Analysis
SEM	Structural Equation Modeling
SSS	Schiff Sensitivity Scale

Supplementary Information

The online version contains supplementary material available at <https://doi.org/10.1186/s12903-024-05235-0>.

Supplementary Material 1

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Author contributions

All authors were involved in study interpretation and writing and reviewing the manuscript, including final approval. Additionally, GA was involved in study data collection; TM contributed to statistical analyses; and MB contributed to revising the manuscript critically.

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Data availability

Data is provided within the manuscript. If deemed necessary, the SPSS data of the study may be shared with BMC Oral Health.

Declarations

Ethics approval and consent to participate

This research was approved by the Clinical Research Ethics Committee of Canakkale Onsekiz Mart University on July 26, 2023, under decision number 2023/10–03. Written informed consent was obtained from all participants to participate in the study.

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

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