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ORIGINAL ARTICLE

The Turkish version of Caries Impacts and Experiences Questionnaire for Children: Translation, reliability, and validity

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Abstract

Background: Caries Impacts and Experiences Questionnaire for Children (CARIES-QC) has been developed to assess the oral health-related quality of life (OHRQoL) associated with caries.

Aim: This study aimed to evaluate the validity and reliability of the CARIES-QC in the Turkish-speaking population following its translation and adaptation into Turkish (CARIES-QC/T).

Design: Two hundred and fifty children between the ages of 5 and 16 years who have active dental caries were included in the study and answered the Turkish-translated and cross-culturally adapted final version of CARIES-QC/T. Test–retest reliability and internal consistency were used to examine the reliability of the CARIES-QC/T. Factor structure of CARIES-QC/T was analyzed using exploratory factor analysis (EFA), and convergent validity was determined.

Results: Cronbach's alpha and McDonald's ômega values were 0.907 and 0.908, respectively. For the CARIES-QC/T scale, the intraclass correlation coefficient (ICC) value was 0.933, and polychoric correlations ranged from 0.390 to 0.794. The convergent validity of the items revealed a statistically significant correlation with the global question ($r_s = 0.821$, $p < .001$). The EFA results of CARIES-QC/T suggested a one-factor solution and explained 59.7% of the total variance.

Conclusion: The findings provided supporting evidence that the CARIES-QC/T could be used as a tool for measuring OHRQoL in healthy Turkish-speaking children aged 5–16 years with active caries.

KEYWORDS

children, dental caries, oral health-related quality of life, reliability, validity

1 | INTRODUCTION

Dental caries remains a prevalent chronic disease in childhood and can cause tooth loss if left untreated.[1] According to the Global Burden of Disease Study, it is estimated that approximately 3.5 billion individuals worldwide suffer from oral diseases, 2 billion people have permanent tooth decay, and 520 million children

have dental caries.[2] Dental caries can cause pain, decreased eating ability, and delayed growth in children. Pain due to dental caries can cause sleep disturbance, concentration problems at school, and a decrease in quality of life in children.[3] This situation has a negative impact on the functional and psychosocial aspects of children and, consequently, the quality of life of both children and their parents.[4]

The effect of oral health on quality of life has been recognized as an important criterion in recent years, and the number of studies on oral health-related quality of life (OHRQoL) has increased significantly.[5] Studies investigating OHRQoL mention the effects of different variables, such as caries, periodontal diseases, or orthodontic problems, on individuals' quality of life.[6,7] Since measuring the quality of life in children is different, challenging, and more complex than in adults, different scales were used to examine OHRQoL in children. The Caries Impacts and Experiences Questionnaire for Children (CARIES-QC) was developed by Gilchrist et al.[8] in 2018 as a caries-specific quality-of-life measure sensitive to dental caries interventions. This scale was composed of 12 items plus one global question and was designed for children aged 5 to 16 years. It has been reported that the questionnaire's validity and reliability were high.

For various age groups, specific instruments have been designed. The most common methods among children include those developed for preschool and school children: the Early Childhood Oral Health Impact Scale,[9] the Child Perceptions Questionnaire,[10] and the Child Oral Health Impact Profile.[11] It has, however, been found that there is a limited and inconsistent correlation between dental caries parameters (such as extent) and OHRQoL in paediatric patients.[12,13] Some researchers suggest that this finding is due to the limitations of the current OHRQoL measures for children, such as analyses of paediatric populations with low rates of disease and the possible mediating effects of socioeconomic status, cultural variety, and overall well-being.[13–15]

Generally, OHRQoL scales are developed in English; therefore, the scales need to be translated into different languages since research on this subject is also conducted in countries where English is not the primary language.[16,17] Because cultural and social differences may affect the expression of an individual's OHRQoL, an adaptation process is necessary for each culture.[18] The lack of the CARIES-QC in Turkish restricts the use of this standard measure to assess OHRQoL outcomes in different cultural and ethnic groups and prevents comparison with data from other countries. In this context, the Turkish translation of CARIES-QC is crucial, especially in a country such as Turkey, with a high prevalence of dental caries.[19] The CARIES-QC has been translated into several languages, and its reliability has been evaluated but has not been adapted to Turkish.[16,20] The aim of this study was to evaluate the validity and reliability of the CARIES-QC in the Turkish child population following its translation into Turkish and language-specific cultural adaptations. The null hypothesis of the study was that no supporting evidence was provided for the validity and reliability of the CARIES-QC/T as an instrument to measure OHRQoL in healthy Turkish-speaking children aged 5–16 years with active dental caries.

Why this paper is important to paediatric dentists

- The Turkish version of the CARIES-QC questionnaire for children aged 5 to 16 years with active dental caries can be used to measure OHRQoL.
- This tool can be useful for public health professionals and epidemiologists to measure the quality of life and for paediatric dentists to evaluate the impact of different interventions in the treatment of dental caries.

2 | MATERIALS AND METHODS

2.1 | Ethics

Ethics approval for the study was obtained from the Local Ethics Committee of Alanya Alaaddin Keykubat University (approval number: 2022/04–08). After the research protocol details were explained, informed consent was obtained from the parents and children who participated in the study.

2.2 | Participants

Two hundred and fifty children who applied to the Alanya Alaaddin Keykubat University, Department of Paediatric Dentistry, between June 2022 and October 2022 participated in the study. Children between the ages of 5 and 16 years who speak natural Turkish and have active dental caries were included in the study. Children with systemic, mental, or physical disabilities or advanced oral conditions such as dental trauma and cellulitis who could not understand and answer the CARIES-QC questionnaire properly were excluded based on the information provided by their parents.

2.3 | Measures

In this study, the CARIES-QC questionnaire consisting of 12 items and a global question subscale developed by Gilchrist et al.[8] was used. The answers to all questions in the CARIES-QC questionnaire consist of a total of three responses—"Not at all," "A little," and "A lot"—corresponding to the Likert scale standards of 0, 1, and 2 points, respectively. To analyze convergent validity, the global question "How much of a problem are your teeth for you?" was included in the questionnaire.[16]

2.4 | Development of the Turkish version of the CARIES-QC

The CARIES-QC's original form and its adaptation specific to the Turkish language and culture were translated into Turkish in accordance with the recommendations in the literature.[21] At least two independent translators were recommended by Guillemin et al.[22] in the initial phase of the translation, and therefore, the original items of CARIES-QC were translated into Turkish by three translators, two of whom were paediatric dentists and one certified translator, all of whom were native Turkish speakers. This team checked the Turkish translation of the questionnaire and created the first version of the Turkish CARIES-QC by culturally adapting a few controversial terms. Two other bilingual translators, unaware of the original version, translated the first Turkish version back into English for the forward–backward translation technique suggested by Behling and Law.[23] Through discussions and comparisons, the inconsistencies between these two versions were modified with minor adjustments to create the penultimate Turkish version of the original scale. In order to examine the questions' understandability and identify comprehension issues for children of this age range, the penultimate Turkish version was evaluated on 20 eligible children who are not even a part of the study's final section. The final Turkish version of the CARIES-QC was created with minor corrections made by evaluating the data obtained from the pilot test. The flowchart of the study is presented in Figure 1.

2.5 | Data collection

Data were collected in the third quarter of 2022 after ethics approval. Parents completed a standardized questionnaire form for the first phase of data collection, which includes sociodemographic information such as age, gender, location of residence, and educational background. In accordance with the guidelines and norms set forth by the World Health Organization for the evaluation of dental caries visually, one experienced paediatric dentist examined the children's caries status at the clinic.[24] The teeth were then dried with air–water spray and examined clinically under reflector light using a mouth mirror and dental probe. The dmft/DMFT (total amount of decayed (D), missing (M), and filled (F) teeth (T) in primary/permanent dentition) index and its components were used to determine the level of carious lesions. The children were then invited to the waiting area to complete the Turkish version of CARIES-QC. Researchers were consulted if the children had any problems while filling out the questionnaires.

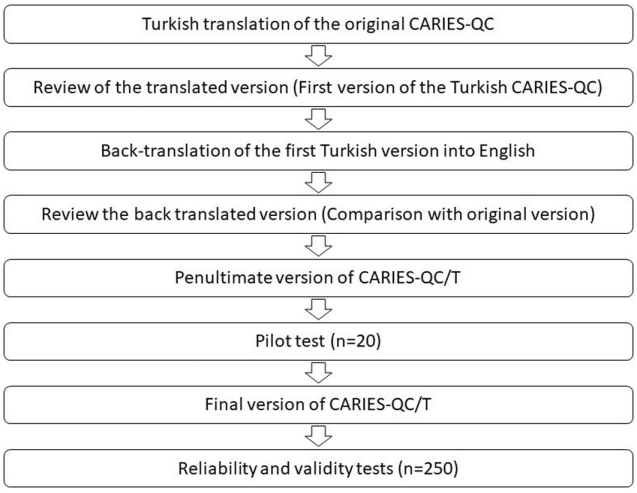

FIGURE 1 Flowchart of the study.

2.6 | Statistical analysis

Mplus version 6 software program was used for the exploratory factor analysis (EFA), and SPSS version 22.0 software program was used for the other data analyses. The statistical significance level was defined as $p \leq .05$. Since these data were not normally distributed according to the Shapiro–Wilk normality test, nonparametric tests were used to analyze the difference between the mean total CARIES-QC/T scores according to sociodemographic data and clinical variables. Specifically, the Mann–Whitney U test was used to compare means between two groups, whereas the Kruskal–Wallis test was used for comparisons between multiple groups. For the reliability analysis of the Turkish version of the original scale, test–retest reliability and internal consistency were assessed.

Internal consistency was examined using Cronbach's alpha (α), McDonald's ômega (ω), and polychoric correlation. Cronbach's alpha values between 0.70 and 0.80 were recommended as appropriate for a valid comparison across groups.[25] The values of Cronbach's alpha, however, should not be higher than 0.95 to prevent redundancy.[26]

Using the intraclass correlation coefficient (ICC), test–retest reliability was calculated. An ICC value of 0.70 is regarded as a minimum requirement for acceptable reproducibility, and higher ICC values indicate better reliability.[27] The information gathered from retesting a randomly chosen sample was used to determine the ICC. The Turkish version of the CARIES-QC was administered to 60 randomly selected children who completed the questionnaire and agreed to be interviewed a second time within 3 weeks to measure the test–retest reliability. These children were not given any dental treatment throughout the three-week period.

Convergent validity and cross-cultural validity were assessed for the CARIES-QC Turkish version's validity analysis. EFA method was used to determine the construct validity of the scale. Polychoric correlation matrix-based EFA was performed with Varimax rotation using the adjusted mean and weighted least squares with variance (WLSMV) as the estimation method due to the ordinal nature of the item responses. Bartlett's test of sphericity and the Kaiser–Mayer–Olkin (KMO) test were used to determine the adequacy of the scale content and sample size. The KMO value >0.5 and significant Bartlett's test p value <.05 were considered sufficient.[28] Eigenvalues ≥1 were used to interpret the number of factors in the dataset. Scree plot method was also employed to provide additional evidence regarding the number of extracted factors. The following criteria were used to assess model fit: root mean square error of approximation (RMSEA) close to or below 0.08 and standardized root mean square residual (SRMR) close to or below 0.08, comparative fit index (CFI), and the Tacker–Lewis index (TLI) greater than 0.9.[29,30]

The convergent validity was determined by examining the correlation between the total CARIES-QC scores and the scores from the global question. The correlation between these two values ranged from 0 to 1, with a higher value indicating a stronger correlation.[31] According to the previous study, these convergent validity values should range from a moderate correlation (0.41–0.60) to a good correlation (0.61–0.80).[8]

3 | RESULTS

3.1 | Demographic information

A total of 250 children, 111 boys (44.4%) and 139 girls (55.6%), completely answered the CARIES-QC/T questionnaire. Table 1 shows sociodemographic information and the mean CARIES-QC/T scores according to sociodemographic information and clinical variables. The majority of children (74.4%) resided in urban areas, and the majority (76.6%) had a family income of less than 8500 Turkish Liras (approx. 500 USD). The education levels of mothers (51.6%) and fathers (44.2%) were mostly at the primary school level. The mean age of the children was 9.6 ± 2.1 years. The mean values of the dmft and DMFT indices of children were 4.09 ± 3.32 and 1.68 ± 1.89, respectively. There were no statistically significant differences in the mean CARIES-QC/T total score where these data were partitioned according to age group and gender ($p > .05$). A statistical difference was found between the mean CARIES-QC/T total score of children with different

TABLE 1 CARIES-QC/T scores by sociodemographic information and clinical variables ($n = 250$).

Parameter	*N* (%)	Total CARIES-QC/T mean (standard deviation) values
Age		
<9 years	112 (44.8%)	11.26 (5.55)
≥9 years	138 (55.2%)	10.54 (5.94)
p value[a]		.271
Gender		
Male	111 (44.4%)	10.41 (6.17)
Female	139 (55.6%)	11.22 (5.43)
p value[a]		.231
Place of residence		
Rural	64 (25.6%)	10.33 (5.83)
Urban	186 (74.4%)	12.41 (5.34)
p value[a]		.015
Mother's education level		
Primary school or below	138 (55.2%)	12.04 (5.91)
High school	72 (28.8%)	9.78 (5.21)
University	40 (16%)	8.75 (5.37)
p value[b]		.006
Father's education level		
Primary school or below	115 (46.0%)	12.30 (6.21)
High school	74 (29.6%)	9.81 (4.69)
University	61 (24.4%)	9.43 (5.55)
p value[b]		.006
Household income		
<8500 TL/m	190 (76%)	11.52 (5.81)
>8500 TL/m	60 (24%)	8.80 (5.16)
p value[a]		.002
Caries status (total dmft and DMFT)		
<6	120 (48%)	9.86 (5.92)
≥6	130 (52%)	11.79 (5.49)
p value[a]		.003

[a]The Mann–Whitney U test.

[b]The Kruskal–Wallis test.

mothers' and fathers' education levels, caries levels, and household income ($p < .05$).

3.2 | Reliability

The mean scores and reliability values for the CARIES--QC/T items are shown in Table 2. Upon analyzing the mean scores of each item for CARIES-QC/T, it was observed that Item 4 "Food stuck" had the highest mean value (1.09 ± 0.63), whereas Item 7 "Hurt when brushing teeth" had the lowest mean value (0.66 ± 0.66). Cronbach's alpha and McDonald's ômega values for the whole scale of the CARIES-QC/T were 0.907 and 0.908, respectively, indicating excellent internal consistency. The corrected item–total correlation coefficients of CARIES--QC/T, which is a part of the internal consistency reliability measure, ranged from 0.560 to 0.711. The lowest value was related to "hurt when brushing teeth," and the highest coefficient was related to "annoyed." When the items were deleted one by one, Cronbach's alpha value ranged between 0.896 and 0.903 and did not increase when any item was deleted. The test–retest reliability was assessed using the ICC, which were ranged from 0.809 to 0.869 for CARIES-QC/T items (Table 3). The CARIES-QC/T's overall ICC value was 0.933. Table 4 presents the polychoric correlation matrix for the 12 items of CARIES-QC/T. Polychoric correlations of CARIES-QC/T items ranged from 0.390 to 0.794. The strongest relationship was between "hurts" and "annoyed." Contrarily, the weakest correlation was found between "hurt when brushing teeth" and "eating slowly" items.

3.3 | Validity

Table 5 shows the Spearman rank correlations between the CARIES-QC/T scores and the global question score. The convergent validity of the items revealed a statistically significant correlation with the global question ($r_s = 0.821$, $p < .001$). The suitability of CARIES-QC/T for factor analysis was determined using the KMO test and Bartlett's test of sphericity. The KMO value of 0.926 showed that the sample size was sufficient for factor analysis, and Bartlett's test of sphericity was significant ($p < .001$, $\chi^2 = 2049.416$). There was only one factor with an eigenvalue ≥1, and the scree plot showed that the curve stabilized after the first component. These findings suggested a one-factor solution for the scale (Figure 2). The eigenvalue of this factor was 7.165, explaining 59.7% of the variance. All items were loaded on a single factor, and the lowest factor load was 0.669. Therefore, no item was required to be deleted, and a 12-item scale was used, similar to the original scale. Factor loading values of all items were between 0.669 and 0.846, whereas residual variance values ranged between 0.284 and 0.552 (Table 6). The fit indices for the one-factor exploratory model were calculated as CFI = 0.977, TLI = 0.971, RMSEA = 0.077, and SRMR = 0.053, indicating an acceptable model fit.

TABLE 2 Mean, standard deviation (SD), corrected item-total correlations, and Cronbach's alpha values for CARIES-QC/T.

Item	Mean	SD	Corrected item-total correlation	Cronbach's alpha if item deleted
1. Hurts	1.00	0.631	0.627	0.900
2. Hard to eat some foods	0.85	0.683	0.667	0.898
3. Eating on one side	1.08	0.727	0.591	0.902
4. Food stuck	1.09	0.630	0.586	0.902
5. Kept awake	0.80	0.694	0.662	0.898
6. Annoyed	1.01	0.659	0.711	0.896
7. Hurt when brushing teeth	0.66	0.660	0.560	0.903
8. Eating carefully	1.02	0.682	0.667	0.898
9. Eating slowly	0.92	0.681	0.582	0.902
10. Feeling cross	0.86	0.730	0.704	0.896
11. Cried	0.90	0.727	0.646	0.899
12. Hard to do schoolwork	0.67	0.686	0.631	0.900

TABLE 3 Test–retest reliability of CARIES-QC/T: intraclass correlation coefficients ($n = 60$).

Item	Test–retest (intraclass correlation coefficient)	95% confidence interval
Item 1	0.809	0.683–0.888
Item 2	0.846	0.741–0.911
Item 3	0.832	0.719–0.902
Item 4	0.819	0.698–0.894
Item 5	0.842	0.734–0.908
Item 6	0.843	0.737–0.909
Item 7	0.820	0.700–0.895
Item 8	0.819	0.698–0.894
Item 9	0.823	0.704–0.897
Item 10	0.834	0.722–0.903
Item 11	0.869	0.778–0.924
Item 12	0.843	0.736–0.909
Total	0.933	0.883–0.962

TABLE 4 Polychoric correlation matrix of CARIES-QC/T items.

Item	1	2	3	4	5	6	7	8	9	10	11	12
1	1.000											
2	0.590	1.000										
3	0.481	0.514	1.000									
4	0.495	0.611	0.515	1.000								
5	0.596	0.556	0.576	0.506	1.000							
6	0.794	0.727	0.517	0.631	0.643	1.000						
7	0.459	0.512	0.431	0.491	0.470	0.606	1.000					
8	0.487	0.603	0.618	0.529	0.618	0.548	0.567	1.000				
9	0.413	0.512	0.581	0.497	0.596	0.490	0.390	0.671	1.000			
10	0.639	0.604	0.535	0.539	0.668	0.665	0.526	0.601	0.530	1.000		
11	0.533	0.631	0.529	0.440	0.529	0.569	0.601	0.589	0.443	0.668	1.000	
12	0.633	0.548	0.444	0.502	0.580	0.634	0.490	0.535	0.497	0.686	0.620	1.000

TABLE 5 Convergent validity of the CARIES-QC/T: Spearman's rank-order correlation coefficients (r_s).

Item	r_s	95% confidence interval	*p*
Item 1	0.597	0.485–0.690	<.001
Item 2	0.666	0.576–0.744	<.001
Item 3	0.478	0.367–0.579	<.001
Item 4	0.637	0.541–0.729	<.001
Item 5	0.600	0.481–0.699	<.001
Item 6	0.667	0.574–0.743	<.001
Item 7	0.527	0.425–0.621	<.001
Item 8	0.624	0.517–0.714	<.001
Item 9	0.503	0.375–0.616	<.001
Item 10	0.673	0.581–0.753	<.001
Item 11	0.643	0.547–0.726	<.001
Item 12	0.589	0.487–0.680	<.001
Total score	0.821	0.759–0.865	<.001

4 | DISCUSSION

Oral health-related quality-of-life questionnaires, which are very useful for improving general well-being, have very limited use among children in Turkey. This study translated the original English version of CARIES-QC into Turkish, adapted it to the cultural context of Turkey, and investigated the measurement properties in a population of 5- to 16-year-old Turkish children with dental caries.[8] CARIES-QC was previously translated into Arabic and Chinese by researchers.[16,20] Nevertheless, to our knowledge, CARIES-QC/T had never been tested on a group of Turkish children before this study.

In recent years, the number of studies evaluating the OHRQoL in various populations and patient groups has increased. Translation and cultural adaptation of questionnaires should be carried out in accordance with standard procedures recommended by international guidelines. Turkey, with a population of 84 million, is among the 20 countries with the largest population in the world. For use in clinical trials, it is crucial to create and validate the Turkish version of the original scale.

Translation and cross-cultural adaptations were carried out step-by-step, carefully following the previously recommended standards.[22] This process yielded a reversed version (CARIES-QC/T) that is nearly identical to the original. The processes of translation and cross-cultural adaptation were successful, and the CARIES-QC/T pilot test showed that it was a simple tool that needed little assistance for children to use. There was supporting evidence for the validity and reliability of the CARIES-QC/T as a tool to measure OHRQoL in healthy Turkish-speaking children aged 5–16 years with active dental caries, rejecting the null hypothesis of this study.

In this study, the relationship between gender, age, and CARIES-QC/T scores was examined, and neither age nor gender was found to be significantly associated with CARIES-QC/T scores in the statistical analysis, consistent with previous studies.[32,33] Oral and dental health status is an effective factor in OHRQoL. Many studies focusing on children have confirmed that oral diseases such as carious lesions can affect quality of life. In the present study, a difference was found between the CARIES-QC/T scores of children with different caries levels, consistent with the literature.[34,35] In addition to oral and dental health conditions, variable factors such as parents' education level and household income have been reported to affect OHRQoL in children.[36] Parental education has a significant effect on children's OHRQoL, and higher income families provide their children with better oral hygiene practices, access to health care, and

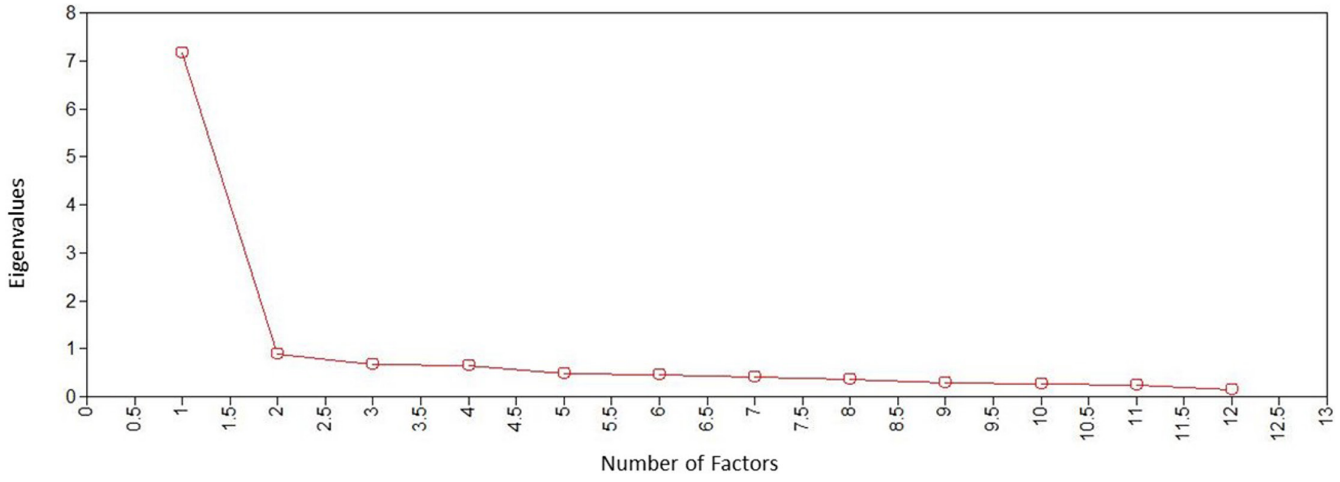

FIGURE 2 Scree plot of the CARIES-QC/T in exploratory factor analysis.

TABLE 6 Factor loadings and residual variances of CARIES-QC/T items.

Item	Factor loadings	Residual variances
Item 1	0.769	0.408
Item 2	0.780	0.391
Item 3	0.700	0.510
Item 4	0.695	0.517
Item 5	0.775	0.400
Item 6	0.846	0.284
Item 7	0.669	0.552
Item 8	0.775	0.400
Item 9	0.703	0.506
Item 10	0.817	0.333
Item 11	0.753	0.434
Item 12	0.758	0.426

preventive interventions, thereby improving their quality of life.[32]

Cronbach's alpha, which analyzes the degree of correlation between questionnaire items, is used to determine the reliability of internal consistency. Typically, Cronbach's alpha values vary from 0 to 1, with 0 indicating no internal consistency and no correlation between items. Contrarily, a value of 1 for alpha denotes perfect internal consistency and correlation between all variables. In this study, Cronbach's alpha for the total CARIES-QC/T scale was 0.907; an alpha greater than 0.90 indicated excellent internal consistency.[37] This value was similar to the values of CARIES-QC/C (0.942), CARIES-QC/A (0.905), and the original CARIES-QC (0.900).

A polychoric correlation was used to examine the correlation between the items since a Likert-type questionnaire was applied, and the questionnaire responses were ordinal data. The polychoric correlation coefficient approaching 1 indicates a perfect relationship. In this study, the polychoric correlations of the CARIES-QC/T items ranged from 0.390 to 0.794. Since the Arabic and Chinese versions of the CARIES-QC did not use a polychoric correlation, the results could not be directly compared.[16,20]

In this study, a test–retest was also used to evaluate the reliability of the CARIES-QC/T. Retest reliability is determined by applying the scale twice within a predetermined time interval.[38] Longer retest intervals may result in lower reliability values, as health is variable, and patients' perspectives on health may change over time. Short retesting intervals are also undesirable, as patients may recall their previous responses, and some may perceive the retesting method as a memory test.[39] Therefore, retests were scheduled 3 weeks after the initial test. The ICC for the total CARIES-QC/T scale was 0.933, indicating excellent repeatability. The ICC was slightly higher in a study of the Arabic version, whereas it was lower in studies of the Chinese and original versions. These differences may be due to the test–retest interval as well as cultural, linguistic, and social factors.

In this study, EFA was used to evaluate the construct validity of the scale. EFA of the CARIES-QC scale has not been previously reported; however, in studies evaluating the validity of the Chinese and Arabic versions of the CARIES-QC scale, CFA was performed by assuming that the scale was single factor. There was only one factor with eigenvalue greater than 1 and according to the scree plot method, the curve was found to stabilize after the first component. According to both methods, only one factor was found, and the one-factor model explained 59.7% of the total variance. Factor loading values of all items were between 0.669 and 0.846. These

results indicated that the items on the CARIES-QC/T scale had adequate validity and that each item was adequately related to the scale.

RMSEA, SRMR, CFI, and TLI indices in the EFA were used to evaluate the model's goodness of fit. The results of the fit indices of the one-factor model were RMSEA—0.077, SRMR—0.053, CFI—0.977, and TLI—0.971. Consistent with the results reported for the Chinese and Arabic versions with CFA, all indices showed the goodness of fit to the model.[16,20]

The CARIES-QC/T item scores were compared with global question scores for convergent validity analysis. Convergent validity results assessing the correlation between each question and the global question ranged from 0.478 to 0.673, indicating a moderate correlation, and these results are consistent with the original, Chinese, and Arabic versions.[8,16,20] In this study, a strong correlation was found between the global question and the total CARIES-QC/T score ($r_s = 0.821$, $p < .001$). Studies have been conducted on measuring with single-item scales as opposed to multi-item scales.[40,41] Single-item measurements, such as the global question, provide the researcher with advantages such as fast and easy application.[42] Multi-item scales, however, are generally preferred over single-item scales, especially since they have psychometric advantages in terms of greater reliability and validity. Additionally, having more multi-item scales may allow for detecting differences even with smaller sample sizes.[41]

The study had some limitations. The study's cross-sectional design prevented the questionnaire's responsiveness from being investigated and is one of the study's limitations. Therefore, longitudinal study designs should be considered to explore different evidence-based results in future research. Although it is stated that the questionnaire was primarily designed to assess OHRQoL in children with dental caries, questionnaire findings in children with low caries levels who do not complain of pain might be different.[8] In addition, a community-based study would be useful for evaluating the scale among the larger population. The reduction in response categories in Likert-type scales leads to a decrease in the scale's reliability.[43] It was, however, also stated that although there was a difference between the reliability of scales with two or three response categories and the reliability of scales with seven or more response categories, the difference was not significant.[44] The three-response Likert scale used in this study may be among the limitations. The majority of the children participating in the study had no problems understanding the questions and answered them without assistance. In addition, the researchers helped a small number of children in the 5-year age group to understand the questions by reading the items to them. Although the children were allowed to complete the questionnaire without any intervention while answering the questions, this could be among the limitations of the study.

In conclusion, the CARIES-QC/T was first translated from English to Turkish, then culturally adjusted and tested for validity and reliability. The findings of this study provided supporting evidence for the validity and reliability of the CARIES-QC/T as a tool for measuring OHRQoL in healthy Turkish-speaking children aged 5–16 years with active dental caries. In upcoming clinical studies, it may be a useful scale to assess the Turkish child population's perceptions of OHRQoL regarding dental caries, being a clear and brief form suitable for children of various ages.

AUTHOR CONTRIBUTIONS

Hayri Akman conceived the idea; Koray Surme and Hayri Akman collected the data; Koray Surme analyzed the data; and Koray Surme and Hayri Akman wrote and reviewed the manuscript.

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CONFLICT OF INTEREST STATEMENT

The authors declare that they have no conflict of interest.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

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