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Investigation of the psychometric properties of the Turkish child-friendly Oral Health Questionnaire

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Abstract

Background Oral problems are a common occurrence among school-age children. In order to develop effective oral health interventions and services, it is essential to determine children's oral health behaviours using an internationally accepted standardised instrument that is child-friendly. However, no instrument currently exists to measure oral health according to the Theory of Planned Behaviour (TPB) in Turkish school-aged children. The aim of this study was to investigate the psychometric properties of the Oral Health Questionnaire, which includes the components of the theory of planned behavior such as attitude toward children's oral health, subjective norm, perceived behavioral control, and self-efficacy, for the Turkish population.

Methods This was a methodological–descriptive–correlational study conducted on 298 school children aged 9–10 years. Data were collected using The Oral Health Questionnaire. The data were evaluated using explanatory and confirmatory factor analysis, Cronbach's alpha, item-total score correlation, and Pearson product-moment correlation analysis.

Results Factor analysis confirmed the five-dimensional structure. The factor loads were greater than 0.30, and all fit indices were greater than 0.90. The model consistency indexes were found to be $\chi^2 = 146.95$, RMSEA = 0.053, GFI = 0.94, CFI = 0.98, IFI = 0.97, and NNFI = 0.97. The Cronbach's alpha values of its sub-dimensions were 0.71 and 0.80.

Conclusions The Turkish version of Oral Health Questionnaire is considered a reliable and valid instrument that can be used by professionals to determine children's attitudes, subjective norms, perceived behavioral control, and oral and dental health intentions toward tooth brushing.

Keywords Planned behavior theory, Oral hygiene, School health, Dental health

Background

Epidemiological studies support that dental caries and oral health problems are common in school-age children [1]. Studies show that children who have acquired positive oral health behaviors have a reduced risk of developing caries in permanent and deciduous teeth compared with those with irregular oral hygiene habits [2–4]. When health-promoting behaviors are adopted early in life, they are more likely to continue into adulthood, and health behaviors developed in childhood are of great importance for public health [5]. In order for children to acquire healthy living habits, their knowledge, attitude,

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intention, and behavior development skills should be considered. However, promoting behaviour change in child populations requires an understanding of how personal and environmental determinants influence behaviour, so that effective health-related behaviour change interventions can be designed and implemented [6].

The theory of planned behaviour (TPB) has become a widely used conceptual framework for studying human behaviour and developing effective behaviour change interventions. According to the model, individuals' intention to perform the behavior is influenced by three factors [7]. These are attitudes toward one's behavior, subjective norm, and perceived behavioral control. Attitude is the evaluation that the person who will show the behavior develops positively or negatively against the realization of that behavior. The subjective norm is the individual's perception of the opinions of people who are important to the individual (reference persons; spouse, mother, friend...) about whether to practice the behavior or not. Perceived Behavioral Control is the perception of the person who will perform the behavior about how easy or how difficult it will be to perform the behavior in question [7]. According to the Theory of Planned Behavior, the individual who has the belief that the behavior will produce the desired result (attitude), who receives approval from his/her social environment to implement the behavior (subjective norm), and who thinks that he/she will easily implement the behavior (perceived behavioral control) is prone to implement the behavior [7, 8].

In our country, studies have been conducted using scales to determine the quality of life related to oral health in children [9]. Although the literature reports a high prevalence of dental caries and oral problems in school-age children [10], no study has yet been conducted using a child-friendly oral health scale based on the theory of planned behaviour. The scale, which was developed based on the theory of planned behavior, aims to determine whether children's attitudes towards tooth brushing, their subjective norms and perceived behavioral controls have an impact on their oral and dental health intentions and behaviors, and to evaluate the relationship between the two [3, 5]. Davison et al. developed "child-friendly TPB-based questionnaire", which has been shown to be valid, reliable. This study has demonstrated the utility of the theory as a framework for evaluating self-reported tooth brushing. Furthermore, it provides additional evidence supporting the applicability of the TPB with a child sample [6]. In another study, Davison et al. provided empirical support for the theoretical model of TPB and emphasised the importance of basic theoretical constructs in predicting school children's toothbrushing intentions. It was also found to elucidate the relative importance

of factors that are influential in determining children's toothbrushing motivations and decisions [3]. A theory-based assessment of oral health in school-age children is a prerequisite for a validated and standardised translation version for the development of effective oral health interventions and services. It allows the needs of the population to be identified, care to be prioritised and treatment strategies to be evaluated. Also a validated and standardised translation version will allow meaningful comparisons to be made between the results of different studies. Due to the use of child-friendly TPB-based questionnaire, translation and validation in the local language are required, especially as the questionnaire is self-administered in nature. Currently, there has been no validated translation of child-friendly TPB-based questionnaire into Turkey. Considering the importance of having a Turkish version of child-friendly TPB-based questionnaires in Turkey, the aim of this study was to investigate the psychometric properties of the Oral Health Questionnaire, which includes the components of the theory of planned behavior such as attitude toward children's oral and dental health, subjective norm, perceived behavioral control, and self-efficacy, for the Turkish population.

Methods

Sample and study design

The study was conducted in 12 central primary schools affiliated with the Directorate of National Education in Fethiye between May and October 2021. The population of the study consisted of 5077 primary school students studying in 12 primary schools in the center of Fethiye in the 2020–2021 academic year. The study population comprised students in the third class of all primary schools in the centre of Fethiye. It is well-established that the sample size in validity and reliability studies should be at least 3–10 times the number of items [11]. Since the number of items on the scale was 57, it was aimed to reach a sample size of 298 people, which is five times the number of items. Since the original scale was designed for students aged 9–10, since the literacy skills of first and second-class students were just developed and their cognitive competencies were limited in terms of understanding the questions, third-class students were included in the study. To ensure the homogeneous distribution of students, the stratified random sampling method was used. In the sample determined by the stratified random sampling method, the number of students per school was determined and the students in the schools were stratified according to their classes, and data were collected from a total of 298 students.

Inclusion criteria

The following students were included in the study:

- ✓ Third-class students of central primary schools affiliated with the Directorate of National Education in Fethiye,
- ✓ Those without any communication barrier
- ✓ Those with reading and writing skills who can answer questionnaires
- ✓ Families who agreed to participate in the study and students who volunteered

Exclusion criteria

- ✓ Students and the parents who did not agree to participate in the study or who wanted to leave the study after it started were excluded from the study.

Measures

The Oral Health Questionnaire was used as the data collection tool in the study. It was developed by Davison et al. (2017) as a child-friendly scale consisting of 57 questions in a 5-point Likert type based on the TPB [6]. The scale consists of three parts. The first part consists of questions to obtain sociodemographic information (items 1–9), and the second part consists of questions to determine the behavioral characteristics of the individual toward tooth brushing. Tooth brushing behaviors are evaluated based on the individual’s statements. The last

part of the scale consists of questions to determine direct and indirect measures of beliefs based on the theory of planned behavior. We used the Pictorial rating Likert scales as original.

Direct measurements

In line with the recommendations of Francis et al. (2004), a generalized model of intention, attitude, subjective norm, perceived control, and self-efficacy was adopted in this study [12]. Cronbach alpha values of attitude (item 41- consists of three sub-questions), subjective norm (items 12, 40, and 51), perceived control (items 11, 39, and 50), self-efficacy (items 10, 38, 49), and behavioral intention (items 9, 37, and 48) are presented in Table 1.

In the scales prepared based on the Theory of Planned Behavior, for each dimension, first, the perception of existing expectations and then the importance of these expectations for the individual are questioned. In the data analysis section, the value obtained by multiplying the responses given to these items is considered as a single item. The attitude sub-dimension consists of items indicating positive and negative thoughts of children toward brushing their teeth. Considering this situation, before conducting the analysis, the actual values to be used in the research are obtained by multiplying the numbers corresponding to the items in the beliefs section of the model for the attitude sub-dimensions and the individual’s responses to the items in the consequences of behavior section. In the scoring of this sub-dimension, the actual values to be used in the research

Table 1 Direct Measures of TBP, Cronbach’s Alpha, item-total score, and item-subscale score correlations when an item is deleted

ITEMS	Cronbach’s Alpha If Item Deleted	Corrected Item-Total Correlation (r)*	Component of TPB	Number of Items	Original Cronbach alpha	Turkish Scale Cronbach alpha
Item 1	.805	.534	Self efficacy	3	.84	.80
Item 2	.667	.699				
Item 3	.653	.712				
Item 4	.701	.511	Perceived Behavior Control (PBC)	3	.76	.73
Item 5	.601	.594				
Item 6	.636	.567				
Item 7	.663	.496	Subjective norm	3	.75	.71
Item 8	.616	.538				
Item 19	.581	.565				
Item 10	.732	.650	Attitude	3	.85	.80
Item 11	.764	.615				
Item 12	.690	.686				
Item 13	.773	.557	Intention	3	.79	.78
Item 14	.623	.694				
Item 15	.711	.617				

* Significant at $p < .001$. I = Item

are obtained by multiplying the numbers corresponding to the items in the beliefs section and the responses given by the individual to the items related to evaluating the consequences of his/her behavior. For example, if the individual gave 3 points to the question 'toothache is bad, and 4 points to the question 'If I brush my teeth, my teeth won't hurt', then the individual's attitude sub-dimension score is calculated as 12. The total attitude score was obtained by summing the scores of all items. Items 25–36 are items measuring behavioral beliefs. Items 13–24 are items aimed at evaluating the consequences of the behavior. The attitude subscale score is obtained by multiplying 13 by 25, 14 by 26, 15 by 27, 16 by 28, 17 by 29, 18 by 30, 19 by 31, 20 by 32, 21 by 33, 22 by 34, 23 by 35 and 24 by 36 and summing them all. A high score indicates a positive attitude. The subjective norm is derived from the expectations of six people: mother, father, other family members, dentist, friend, and teacher. Respondents are asked to indicate the extent to which these individuals, whom they attach importance to, would approve of each of the respondents' intentions to brush their teeth. In scoring this sub-dimension, the actual values to be used in the study were obtained by multiplying the numbers corresponding to the responses given to the items in the normative beliefs section of the model and the items in the motivators section. Items 42, 43, 44, 45, 46, and 47 are items measuring normative beliefs. Items 52, 53, 54, 55, 56, and 57 are items that indicate the motivations that lead the individual to behavior. The subjective norm subscale score is obtained by multiplying 42 by 52, 43 by 53, 44 by 54, 45 by 55, 46 by 56, and 47 by 57 and summing them all together. A high score indicates a high level of support for tooth brushing. The perceived control subscale consists of items between 58–65 related to the individual's sense of control over tooth brushing. A high score indicates a high sense of control over tooth brushing.

Translation of the scale

The language validity study was conducted in line with the International Society for Pharmacoeconomics and Outcomes Research (ISPOR) language validity guidelines [13]. The translation is the first step in the adaptation process. It is recommended that translators take into account the cultural, psychological, and grammatical differences in both languages, and be knowledgeable about the culture of the original scale, but that the native language of the translators is the language of the target culture (Turkish) [14]. Translators should make translations by taking into account the language-specific nuances and idioms in their native language, and in cases where there are multiple word choices, they should include alternative words for future decision-making [15]. For this

purpose, the scale was translated into Turkish by three English language experts. After the scale was translated into Turkish, a common Turkish version was developed by the researchers through group work. The Turkish version of the scale was translated into English by a different linguist who is an expert in both Turkish and English.

Expert opinion

Content appropriateness was established by determining whether the content of each item of the instrument is relevant to the target culture. To determine the content validity of the scale whose language validity was completed, it was submitted to the opinions of 10 faculty members, including pediatric nursing, public health nursing, and pedodontics experts. Scale items were rated on a four-point scale for each item: "not appropriate" (1), "needs to be modified" (2), "appropriate, but needs minor changes" (3), and "very appropriate" (4). These changes have been made to ensure that children understand more easily based on the recommendations of the experts: In Sect. 2, Item 12, the sentence 'Whether I brush my teeth every morning and every evening for the next week is largely up to me- (Dişlerimi gelecek hafta her sabah ve her akşam fırçalayıp fırçalamayacağım çoğunlukla bana bağlıdır in Turkish) ' has been changed to 'Whether I brush my teeth every morning and every evening for the next week is usually up to me (Dişlerimi önümüzdeki hafta her sabah ve her akşam fırçalayıp fırçalamayacağım genellikle benim kararımdır. In Turkish)'. In Sect. 3, Item 14, the word 'bad (kötü in Turkish) ' has been changed to 'unhealthy (sağlıksız in Turkish)'.

Pilot study

After receiving expert opinions, it is recommended to administer the scale to a group of approximately 20–30 individuals who have similar characteristics with the study subjects but will not be included in the sampling of the study [16]. The data collection tool was administered to 30 students aged 9–10 years with similar characteristics to the sample in order to determine the meaning and structure problems that may occur in the items of the scale. No adjustments were made to the measurement tool after the administration, and the data obtained in the pre-administration were not included in the study.

Procedure

The implementation of the research was started after getting approval from Muğla Sıtkı Koçman University Health Sciences Ethics Committee and TR Ministry of National Education Research, Competition and Social Activity. The purpose of the study was explained by the researchers to the administrators of the schools where the study was conducted and planning was made with

the school administration. The data were collected in 15–20 min from the students who agreed to participate in the study during the course hours deemed appropriate by the administration. The purpose of the study and how to fill in the measurement tools was explained to the students, and it was stated that the research data would be kept confidential and used only by the researcher. The self-administered questionnaires were filled out on the paper. Verbal consent was obtained from the students participating in the study and written informed consent was obtained from their parents. Registration of the clinical trial was made on clinical trials.gov ID NCT06525090 on 07.24.2024.

Statistical analyses

Two different computer programs were used within the scope of the research. The first one is IBM SPSS 22.0 (IBM Corp., Armonk, NY, USA), with which the reliability analysis was conducted. The second one is LISREL 8.71 (Mooresville, Ind.: Scientific Software), where confirmatory factor analysis was performed. Percentage and frequency statistics were used to analyze descriptive data. For the language validity of the scale, the translation-back translation technique was used, and for content validity, I-CVI and S-CVI were used Davis technique. According to Davis technique, each item of the scale was evaluated by ten faculty members who are experts in the field by choosing one of the four rating options from 1 (not relevant) to 4 (highly relevant). Item Content Validity Index (I-CVI) for each item was obtained by dividing the number of experts who chose option (3) or (4) when evaluating each item and dividing by the total number of experts [17]. The intraclass correlation coefficient was used to evaluate the expert opinions for the content validity of the scale. Regarding reliability, the Cronbach alpha reliability coefficient was used to evaluate the internal consistency of the scale and its sub-dimensions, and Pearson product-moment correlation was used to compare item-total score correlations. Correlation and regression analysis were conducted for predictive validity. While the sample size was analyzed with Kaiser–Meyer–Olkin, its suitability for factor analysis was tested with Bartlett's Test of Sphericity, factor analysis, and principal component analysis. CFA was used to determine whether the items and subscales explained the original scale structure. CFA were performed on the same sample, the general sample was randomly split. The model verification of the comparative fit index (CFI) was conducted based on the chi-square test, degree of freedom, root mean square error of approximation (RMSEA), goodness of fit index (GFI), and normal fit index (NFI) [16].

Ethical consideration

After contacting Dr. Jenny Davison, one of the researchers who developed the OHQ, via e-mail, ethical approval was obtained from the Health Sciences Ethics Committee of Muğla Sıtkı Koçman University (Decision No: 58) and necessary permissions were obtained from the National Education Directorate, Competition, and Social Activity for the adaptation study of the scale. Consent was obtained from the adolescents and informed consent was obtained from their parents before the study. To protect the rights of the students within the scope of the research, consent was obtained from the parents before starting to collect the research data and the ethical principles including the principle of "Confidentiality and Protection of Confidentiality" and the principle of "Respect for Autonomy" were obtained by taking those who want to participate voluntarily in the research. Throughout the study, the Declaration of Helsinki on Human Rights was adhered to.

Results

Of the students, 50.3% were girls and 49.7% were boys. 11.1% of the students were nine years old, 69.1% were ten years old, and 19.8% were eleven years old. 97% of the students stated that they brushed their teeth regularly, 47.3% of them brushed twice a day, 76.8% of them liked to brush their teeth, and 50.3% of them went to regular dental check-ups.

Reliability analysis of the scale

Internal consistency analysis of the scale and its sub-dimension

The reliability of the translated OHQ was evaluated by considering the following: (a) Cronbach's alpha coefficient, (b) a corrected item-total correlation coefficient, and (c) the alpha estimate when an item was deleted.

Subscale reliabilities ranged from 0.71 to 0.80, with the intention subscale having an alpha of 0.78, the self-efficacy subscale having an alpha of 0.80, the perceived behavioral control subscale having an alpha of 0.73, the subjective norm subscale having an alpha of 0.71, the attitude subscale having an alpha of 0.80.

All corrected item-total correlations were positive. Intention subscale item-total correlation ranged from 0.63 to 0.77, the self-efficacy subscale item-total correlation ranged from 0.53 to 0.71, the perceived control subscale item-total correlation ranged from 0.51 to 0.59, the subjective norm subscale item-total correlation ranged from 0.49 to 0.56 and the attitude subscale item-total correlation ranged from 0.61 to 0.68 (Table 2).

Table 2 Explanatory Factor Analysis of Direct Measures of TBP

Items	Subscales				
	Self efficacy	PBC	Subjective norm	Attitude	Intention
Item 1	.850				
Item 2	.654				
Item 3	.557				
Item 4		.734			
Item 5		.712			
Item 6		.618			
Item 7			.735		
Item 8			.677		
Item 9			.604		
Item 10				-0.871	
Item 11				-0.738	
Item 12				-0.629	
Item 13					.756
Item 14					.470
Item 15					.440
Total Variance (%)	32.47	9.92	6.73	4.81	1.97
Eigenvalues	5.25	1.96	1.53	1.13	0.68

Validity analysis of the scale

In this study content, validity construct, and predictive validity were used to ensure the validity of the Turkish version of the scale.

Content validity

The content validity index for content validity was determined by Davis technique [17]. According to the evaluations of 10 faculty members for content validity, the I-CVI of the items ranged between 0.81–1.00, and the S-CVI for all scale items was 0.95.

The interclass coefficient correlation was conducted to assess for agreement among the ten experts. No significant differences between the experts were found (ICC 0.71).

Construct validity

Explanatory and confirmatory factor analysis

In the factor analysis, the KMO coefficient was 0.850 and Bartlett’s test X^2 value was 1799.260 ($p < 0.001$). These findings suggest that the level of correlation between scale items is sufficient to conduct a factor analysis on the sample. The scale has a total of five sub-dimensions: the first

sub-dimension (self-efficacy) accounts for 32.47% of the total variance, the second sub-dimension (perceived control) for 9.92%, the third sub-dimension (subjective norm) for 6.73%, the fourth sub-dimension (attitude) for 4.81% and the fifth sub-dimension (intention) for 1.97%. The total variance of the scale is 55.90%. In the Explanatory Factor analysis, factor loadings were found to be 0.85–0.57 for the first sub-dimension, 0.73–0.61 for the second sub-dimension, 0.73–0.60 for the third sub-dimension, -0.87- -0.62 for the fourth sub-dimension, and 0.75–0.44 for the fifth sub-dimension (Table 3).

To verify the factors of the original scale form, Confirmatory Factor Analysis (CFA) was performed, in the context of structural validity. With help of the CFA, the hypothesis, if the items were being represented by 5 factors as it was projected in the original scale, was tested. The model consistency indexes were found to be $X^2=146.95$, $RMSEA=0.053$, $GFI=0.94$, $CFI=0.98$, $IFI=0.97$, and $NNFI=0.97$. A graphic of the instrument in a CFA model is given below in Fig. 1.

Prediction of intention

Correlation analyzes were conducted to explore the relationship between intention and each of the measured variables. The most significant correlation with tooth brushing intention was self-efficacy ($r=0.761$), followed by attitude ($r=0.545$). PBC, however, failed to correlate significantly with tooth brushing intention. These relationships were further confirmed in a subsequent regression analysis, where 60% of the variance in tooth brushing intention was explained by the TPB [$F(62.971)$, $P < 0.01$; $\beta=0.343$ (self-efficacy) and $\beta=0.133$ (attitude) (Table 4).

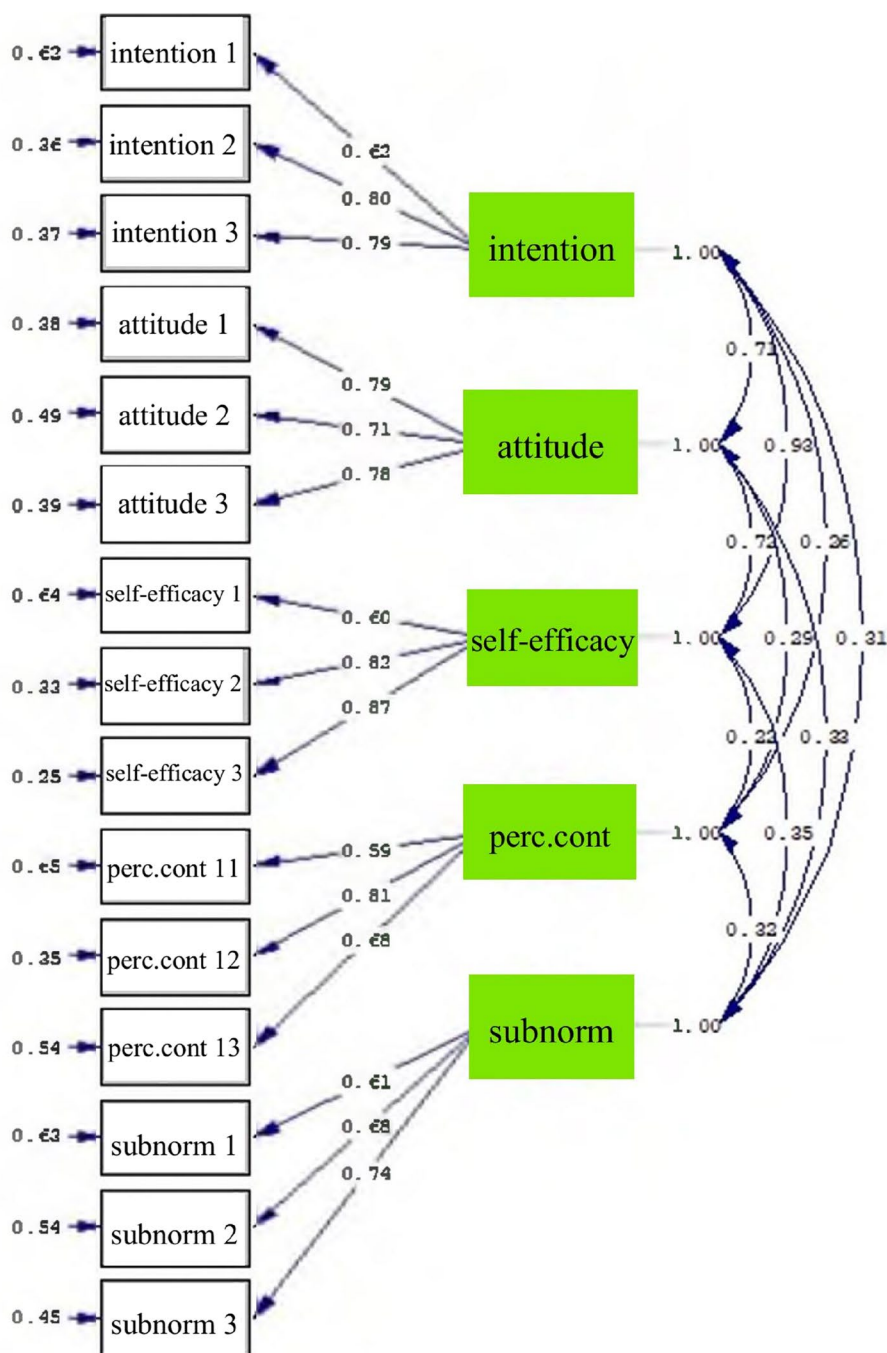
Discussion

In this study, the "Oral Health Questionnaire" developed by Davison et al. (2017) based on the components of the theory of planned behavior such as attitude toward children’s oral and dental health, subjective norm, perceived behavioral control, and self-efficacy was adapted into Turkish [6]. In this study, both I-CVI and S-CVI values were higher than 0.78. It has been underscored that the agreement between the experts is high, the scale items are compatible with Turkish culture and represent the desired field, and content validity is ensured [18].

Whether the data were sufficient and suitable for factor analysis was analyzed with the Kaiser–Meyer–Olkin

Table 3 Confirmatory Factor Analysis Model Fit Indices

Models	X^2	p	X^2/SD	NNFI	NFI	CFI	RFI	IFI	GFI	RMSEA
Factor	146.95	0.000	1.836	0.97	0.96	0.98	0.94	0.98	0.94	0.053



Chi-Square=141.95, df=80, P-value=0.00001, RMSEA=0.052

Fig. 1 Confirmatory factor analysis

coefficient (KMO) and Bartlett's test. In our study, the fact that the KMO value was greater than 0.60 and the Bartlett's Test of Sphericity result was significant indicates that the data are suitable for factor analysis and

the sample size is sufficient. As a result of the EFA, the five-factor scale explained 55.9% of the total variance, suggesting a relatively high total variance on the scale. As a result of the explanatory factor analysis conducted

Table 4 Predicting behavioural intention: multiple regression analysis of the direct and indirect measures

Model		Unstandardized Coefficients		Standardized Coefficients	t	p	95.0% Confidence Interval for B
		B	SE	Beta			
1	Constant	3.495	.680		5.141	.000*	2.157 to 4.832
	IPC	.003	.012	.010	.269	.788	-.021 to .027
	IA	.003	.002	.067	1.518	.130	-.001 to 0.006
	ISN	.002	.003	.037	.806	.421	-.003 to 0.008
	A	.130	.046	.133	2.820	.005*	.039 to .220
	SE	.567	.043	.643	13.240	.000*	.483 to .651
	PC	.021	.027	.032	.790	.430	-.032 to .074
	SN	-.018	.035	-.023	-.513	.608	-.087 to 0.051

Dependent variable: behavioural intention

Durbin-Watson = 1.979 F = 62.971. $p < .001$ R = 0.777. $R^2 = 0.603$

Abbreviations: CI Confidence interval, SE Standard error, β Standardized regression coefficient, IPC Indirect Perceived Control, IA Indirect Attitude, ISN Indirect Subjective Norm, A Attitude, SE Self-efficacy, PC Perceived Control, SN Subjective Norm

Adjusted $R^2 = 0.594$ * $p < 0.05$

in this study, it was found that the factor loadings of all items were above 0.30. In the literature, it is stated that it is sufficient for the total variance explained in multidimensional scales to be greater than 40% and factor loadings greater than 0.30. The fact that the total variance explained in this study was above 50% and all factor loadings were greater than 0.30 showed that the scale had strong construct validity [16, 18, 19]. According to the confirmatory factor analysis conducted with the second part of the data, the factor loadings of all subscales were lower than 0.30, the fit indices were lower than 0.90 and RMSEA was lower than 0.080. There was a strong and significant correlation between the subscales (Fig. 1). According to the literature, Model Fit indicators are required to be $N \geq 0.90$ and RMSEA 0.08 [20, 21]. In our study, the CFA results show that the data are compatible with the model, confirm the items of each subscale, and that the subscales have. In this study, CFA results were not compared with the original scale because CFA values were not calculated in the original study, but CFA was conducted in the adaptation study. The X^2 / df ratio from the CFA model consistency index must be 2:1 or 5:1; the root mean squared error of approximation (RMSEA) must be lower than < 0.08 ; and the goodness of fit index (GFI), comparative fit index (CFI), and non-normed fit index (NNFI) values must be over > 0.90 [16, 22, 23]. The CFA results show the RMSEA to be below 0.08, the X^2 / df ratio to be 183, the CFI to be above 0.90, and all values to be proportionate, apart from the CFI being over 0.90 and NFI being over 0.90. This proves the model to be in accordance with and also a verification of the 5-structure model. The results of the exploratory and confirmatory factor analysis in the study support the construct validity of the scale and reveal that the scale is a valid instrument.

Cronbach's alpha coefficient indicates whether the items are related to the subject to be measured and whether they measure the same subject. The alpha coefficient ranges between 0 and 1. In scales, this value of 0.70 is acceptable, 0.80 is good, and 0.90 indicates that the scale is highly reliable [24–26]. In this study, it was found that the overall alpha value of the scale ranged between 0.70 and 0.80 and was close to the original scale [6]. In original scale Cronbach's alpha coefficients ranged from $\alpha = 0.75$ to 0.85 and so demonstrated high levels of internal consistency for the questionnaire items [6]. In the study, the scale was found to be highly reliable. The results of the study showed that the items measured the desired subject sufficiently, that the items were sufficiently related to the sub-dimensions, and that the scale and sub-dimensions had a very good level of reliability.

It is recommended to use item-scale total score and item-subscale total score correlations to determine the relationship of the items with the scale and sub-dimensions, and to what extent the items measure the structure that the scale intends to measure [19, 27–29]. According to the literature, inter-item correlation values between 0.30–0.90 and item-total score correlation values above 0.50 indicate that the item adequately measures the construct [29]. In this study, the correlations of the items with both the total score and the subscale total score were found to be compatible with the literature. These results show that all items of the scale had a high level of correlation between the total score of the scale and the total score of its sub-scales. All in all, it was shown that the items adequately measured the desired quality and the scale had a high level of reliability.

Similarly, in the original study of the scale, the relationship between intention and each measured variable

was examined, and it was found that the most significant correlation with the intention to brush teeth was between self-efficacy, attitude, and subjective norm sub-dimension. It was determined that 66% of the variance in tooth brushing intention was explained by TPB [6].

In conclusion, the study found that the Turkish version of Oral Health Questionnaire has been successfully translated and adapted to Turkish culture, and its psychometric properties have been validated among school children aged 9–10 years. In addition, factor analyses showed that the Turkish version of Oral Health Questionnaire was dimensionally consistent with the original scale and was reliable and valid. There is a need to understand the impact of personal and environmental factors on children's behaviors and habits to create behavior changes in children. This tool can be used by school nurses, pedodontists, public health specialists, pediatricians to determine children's attitudes, subjective norms, and perceived behavioral control, and oral and dental health intentions toward tooth brushing. The questionnaire can effectively assess oral health among 9–10 years old children, create educational initiatives and research interventions, and improve the quality of care services.

Abbreviations

TPB	The theory of planned behavior
I-CVI	Item content validity index
CFA	Confirmatory Factor Analysis
CFI	Comparative fit index
RMSEA	Root mean square error of approximation
GFI	Goodness of fit index
NFI	Normal fit index
OHQ	The oral health questionnaire
KMO	Kaiser-Meyer-Olkin coefficient

Supplementary Information

The online version contains supplementary material available at <https://doi.org/10.1186/s12903-024-04764-y>.

Supplementary Material 1.

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Authors' contributions

G.K., G.M., Ö. C. D. and R.K. conceived the ideas, R.K. collected the data, G.K. analyzed the data, All authors led the writing and reviewed the manuscript.

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Availability of data and materials

The datasets used and/or analyzed during the current study available from the corresponding author on reasonable request.

Declarations

Ethics approval and consent to participate

Ethical approval was obtained from the Health Sciences Ethics Committee of Muğla Sıtkı Koçman University (Decision No: 58) and necessary permissions were obtained from the National Education Directorate for the adaptation study of the scale. Informed consent was obtained from the adolescents and their parents before the study. Throughout the study, the Declaration of Helsinki on Human Rights was adhered to approval and consent to participate.

Consent for publication

No individual participant has been identified in the details within this manuscript. Each author has approved the final version of this paper.

Competing interests

The authors declare no competing interests.

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