

ORIGINAL ARTICLE

Turkish Translation and Cultural Adaptation of the Scale of Parental Perception of Children's Exposure to Tobacco Smoke: A Validity and Reliability Study

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Main Points

- The Turkish adaptation of the scale measuring parental perception of children's exposure to tobacco smoke, comprising 19 questions and 4 subscales, is the first and only scale of its kind in Türkiye, demonstrating robust reliability and validity.
- Turkish version of the Parental Perception of Children's Exposure to Tobacco Smoke Scale has four factors with high internal consistency; second-hand smoke exposure ($\alpha = 0.89$), third-hand smoke exposure ($\alpha = 0.82$), outdoor exposure to tobacco smoke ($\alpha = 0.88$), and perception of time-related exposure ($\alpha = 0.80$).
- The total scores of women ($p < .001$), those with university and higher education levels ($p = .013$), health workers ($p = .003$), and those who have never smoked ($p < .001$) were statistically significantly higher.

Abstract

Smoking not only poses a significant health risk to smokers but also endangers non-smokers, particularly children, through passive smoke exposure. We aimed to develop a Turkish version of the "Parental Perception of Children's Exposure to Tobacco Smoke Scale" and evaluate its psychometric properties. The research involved 500 parents with children under 18 years of age who presented to family health centers between November 2022 and April 2023. The scale's reliability was assessed through item – total score correlations, test – retest analysis, and Cronbach's alpha coefficient, which yielded a high value of 0.937. Exploratory and confirmatory factor analyses, following Kaiser – Meyer – Olkin and Bartlett tests, revealed a four-factor structure. Scale scores were higher among women, healthcare professionals, individuals with higher education levels, and non-smokers. This newly validated and reliable scale serves as a valuable tool for evaluating parents' perceptions of smoke exposure in children, aiding in the identification of effective interventions and the assessment of their impact.

Keywords: Children, parental perception, prevention, second-hand smoke, tobacco

Introduction

Smoking and exposure to tobacco smoke is a global phenomenon that negatively affects the quality of life (Milic et al., 2020). Although the prioritization of public health issues in societies may change over time, smoking, considered the leading cause of non-communicable diseases and preventable deaths, continues to maintain its prominent position (WHO, 2021). Tobacco smoke, which has been definitively

identified as a carcinogen by the International Agency for Research on Cancer, contains more than 8000 chemicals that react with substances in the air or the environment over time (Lim et al., 2022; Schaller et al., 2016).

The smoke emitted into the air with the breath of a smoker is called mainstream tobacco smoke, and the smoke that directly enters the air from the burning cigarette is called sidestream smoke (Ni et al.,

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2022; Zhang et al., 2022). The combination of these two forms reactive second-hand smoke (Chen et al., 2023). The residual products of tobacco smoke in the environment are referred to as third-hand smoke (Vanzi et al., 2023). The term “environmental tobacco smoke” that causes passive exposure is used to refer to everything left behind after the cigarette has burned, including both second and third-hand smoke (Laura et al., 2016). It has been shown that the health risks associated with passive exposure are similar to smoking itself, there is no reliable threshold for exposure to tobacco smoke, and it is a risk factor or facilitator for many diseases throughout all stages of life, starting from the womb (Benowitz et al., 2018). In 2019, passive exposure to tobacco smoke was responsible for 1.3 million deaths worldwide, contributing to 37 million disability-adjusted life years, including 11.2% in children under five (Collaborators, 2020).

Parents play an important role in exposure both as a source and in protecting their children by taking preventive measures. Having at least one smoking parent significantly increases children's exposure to tobacco smoke, even if smoking is not allowed in the home (Gunay et al., 2020). Despite all the awareness and prevention efforts related to the harms of passive smoking, the rate of children exposed to tobacco smoke at home has been reported to be approximately 40% (Maedel et al., 2018; Zheng et al., 2017). The World Health Organization has reported that 700 million children are exposed to tobacco smoke yearly (Zhuge et al., 2020). Passive smoke exposure varies between regions and countries due to the level of development, cultural characteristics, and tobacco control programs. In a study conducted in the European region, indoor smoke exposure was reported as 53.7%, while outdoor exposure was 73.7%. In Türkiye, home smoke exposure for children under 15 was 46.1%, and for adults, it was 26.7% (TURKSTAT, 2023; WHO, 2023).

There are various indicators to measure exposure to tobacco smoke (Chao et al., 2018; Parks et al., 2022; Quintana et al., 2021). However, the use of indicators is not considered suitable for routine use due to their chemical characteristics, the incompatibility of all laboratories for these tests, and the time and cost factors when evaluated together (Gunay et al., 2020; Prochaska et al., 2015). Therefore, while data on exposure to tobacco smoke are often obtained through surveys, information about children's exposure status is based on parental statements. Studies have shown that the information provided by parents about exposure to tobacco smoke is often not consistent with laboratory measurements (Gunay et al., 2020; Leventer-Roberts et al., 2021; Maedel et al., 2018). Reasons such as lack of knowledge, unawareness of risks, or inability to accurately describe the exposure situation can result in the underreporting of a child's exposure to tobacco smoke. Additionally, personal life experiences, smoking status, and the child's age can also influence the perception level (Leventer-Roberts et al., 2021; Myers et al., 2020; Myers et al., 2018; Parks et al., 2022).

In the literature, no scale has been developed in Turkish or adapted from a foreign language to Turkish that would predict the reliability of the information provided by parents about their perceptions regarding children's exposure to tobacco smoke by determining the sensitivity levels of parents' opinions. Therefore, we aimed to linguistically and culturally adapt the Parental

Perception of Children's Exposure to Tobacco Smoke Scale developed by Myers et al. (Myers et al., 2018), which assesses parental perception regarding children's exposure to tobacco smoke, and to evaluate the psychometric properties of the Turkish version.

Material and Methods

The data for this methodological study, which includes the linguistic and cultural adaptation of the Parental Perception of Children's Exposure to Tobacco Smoke Questionnaire into Turkish, were collected between November 2022 and April 2023 in Samsun province. The research was conducted with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards. Participants were informed about the study, and informed consent was obtained. The Clinical Research Ethics Committee of Ondokuz Mayıs University (KAEK: 2022/329) approved the study. The institutional permission required to carry out the study in Family Health Centers (FHCs) was obtained from the Samsun Provincial Directorate of Health “Scientific Research Evaluation Commission”.

Translation of the Scale into Turkish

We obtained permission from Professor Shiloh to translate and test the parental perception of children's exposure to tobacco smoke in the Turkish parent sample. Two researchers, both native Turkish speakers specialized in medical English, independently translated the scale from English to Turkish. The two versions were compared, and discussions were held until the final version was obtained. The obtained scale was presented to an expert panel consisting of one pediatrician, one forensic medicine specialist, one pulmonologist, and three public health specialists. The panel rated each item of the Turkish scale according to Davis's technique as (a) “item appropriate,” (b) “item needs slight revision,” (c) “item needs serious revision,” or (d) “item not appropriate.” Subsequently, the “Content Validity Index (CVI)” was calculated by dividing the number of experts marking (a) and (b) options by the total number of experts, and the CVI values of all items in the scale were compared with the literature's specified threshold value of 0.80 (Alpar, 2022; Davis, 1992). At this stage, the scale was back-translated into English by two separate individuals who were not knowledgeable about the original questionnaire. A common back-translation obtained from these two translators was found to be similar to the original scale, and the Turkish questionnaire proceeded to a pilot study.

Pilot Study

We conducted the pilot study face-to-face with 20 individuals (10 males and 10 females) who met the inclusion criteria at a FHC that was part of the sample set but not selected for the sample. Feedback was obtained from all participating parents, indicating that the questions were understandable and did not require further clarification.

Questionnaire

Parental Perception of Children's Exposure to Tobacco Smoke Scale, developed by Myers et al. (Myers et al., 2018), consists of 23 questions divided into six subscales. Eight of the questions are answered through eight different photographs, specifically taken to represent the situation described in the scale. Each photograph features a child in indoor or outdoor settings where smoking is taking place, such as a car. Nine questions

describe different hypothetical situations in which children are present, and smoking is occurring. For the first 17 questions related to children's exposure, respondents are asked to rate their perception on a seven-point Likert scale ranging from 1 (Not exposed at all) to 7 (Exposed very much). The 18th question inquires about the percentage of invisible tobacco smoke and offers three response options. The lowest option, 20%, corresponds to one point, 50% to four points, and 80% to seven points. The 19th and 20th questions are open-ended questions asking how long it takes for the environment to become smoke-free after indoor smoking. Zero to 1 hour corresponds to one point, 2 to 3 hours corresponds to two points, 4 to 14 hours corresponds to three points, 15 to 24 hours corresponds to four points, several days to several weeks corresponds to five points, 1 to 12 months corresponds to six points, and 1 year or more corresponds to seven points. The last three questions assess the respondents' perceived knowledge levels and confidence in their answers. There are seven options, ranging from "Not at all" to "Very much." The average scale score is obtained by dividing the total scale score obtained by summing the scores from all questions by the number of questions. The total score that can be obtained from the scale ranges from 23 to 161. There is no cutoff value for comparing total scores; higher scores indicate a higher level of sensitivity and awareness of exposure to tobacco smoke. The Cronbach's alpha values of the subscales range from 0.69 to 0.93. The test – retest reliability coefficient is 0.856 ($p < .001$).

Sampling and Participants

While there is no general rule for the sample size for Exploratory Factor Analysis (EFA), a sample size between 200 and 300 is considered appropriate, and for Confirmatory Factor Analysis (CFA), the sample size should not be less than 200 individuals according to the literature (Ho, 2023). Considering studies recommending 500 participants as the ideal sample size for reliable results of psychometric analyses, we conducted the study with 500 individuals (Bartram et al., 2018). We used the FHC as the sampling unit. Five different levels of development of districts in Samsun were determined based on socioeconomic development ranking data, and one district was randomly selected from each cluster, and one FHC was selected from that district (Acar et al., 2022). The number of individuals to be included in the study was determined by weighing the cluster population based on the city's population. An equal number of male and female parents were surveyed from each FHC. The inclusion criteria for participation in the study were being over 18 years old, having a child in the 0 – 18 age group, being literate, not having a visual impairment, not having a communication barrier, and being willing to participate in the study. Informed consent was obtained, and questionnaire forms were administered through face-to-face interviews. A total of 17 parents refused to participate in the study. All of those who refused stated that they could not participate because they did not have time. For the test – retest analysis, contact information was obtained from 50 individuals who volunteered from the sample group, and the questionnaire was administered again 3 weeks later.

Statistical Analysis

The data obtained from the study were analyzed using the IBM SPSS 22.0 and LISREL 8.80 package programs. We conducted

validity and reliability analyses of the scale and examined the floor and ceiling effects of the obtained structure.

Validity analysis: We tested the content validity of the Turkish adaptation of the Parental Perception of Children's Exposure to Tobacco Smoke Scale using the Davis' technique and tested construct validity with EFA and CFA. After confirming the adequacy of the sample with the Kaiser – Meyer – Olkin (KMO) coefficient and Bartlett's test, we determined the number of factors in the EFA analysis, considering eigenvalues, scree plots, and the explained total variance (Kartal & Bardakçı, 2018). We applied Promax rotation to clarify the distribution of item loads on factors in the EFA analysis. After determining the factor structure with EFA, CFA was applied to the scale. We compared the goodness of fit indices of the structure created in CFA with acceptable threshold values.

Reliability analysis: We used Cronbach's alpha coefficient and item-total score correlations to evaluate internal consistency, and we used the test – retest method to evaluate the temporal stability of the scale. We accepted $p < .05$ as the limit for statistical significance in all statistical analyses.

Results

The mean age of the 250 female and 250 male parents who participated in the study was 38.1 ± 7.4 years. Among the parents, 35.8% reported currently smoking, 51.6% reported never smoking, and 12.6% reported quitting smoking. Furthermore, 38.4% stated that smoking was never allowed in their homes, while 58.2% reported not allowing smoking in their cars.

The average total score of the scale of the participants was 93.8 ± 22.5 . In the study, it was found that the total scale scores of women ($p < .001$), those with university and higher education levels ($p = .013$), health workers ($p = .003$), and those who have never smoked ($p < .001$) were statistically significantly higher.

There was no statistically significant difference between the mean scores of the 50 individuals who participated in the test – retest application, with an average score of 116.9 ± 19.8 for the initial test and 115.8 ± 19.9 for the retest conducted 3 weeks later ($p = .572$). Correlation analysis revealed a high and significant relationship between the two test scores ($r = 0.78$; $p < .001$). When the test – retest reliability was assessed using the intraclass correlation coefficient (ICC), it was found to be 0.92, indicating excellent reliability. The confidence interval ranged between 86% and 95%, indicating a reliability level between good and excellent. The Cronbach's alpha value for the 23-item form of the scale was calculated as 0.918. To evaluate internal consistency, it was observed that the correlation of the 18th, 22nd, and 23rd questions with the total score was below the acceptable threshold value of 0.20 (0.166, 0.150, and -0.155 , respectively), and these questions were considered suitable for removal. The coefficient for the 21st question was 0.277, and due to this, it was identified as a suspicious question that could disrupt factor analysis, but it was not removed at this stage. After the removal of questions, the Cronbach's alpha value for the 20-item scale increased to 0.934, with the lowest coefficient in the item-total score correlations remaining at 0.283, associated with the 21st question.

Table 1.*Results of the Exploratory Factor Analysis of the Parental Perception of Children's Exposure to Tobacco Smoke*

Factor	Item Number	Factor Loadings	Eigenvalue	Variance %	Cumulative % Variance
Second-hand smoke exposure	6	0.930	9.30	48.96	48.96
	8	0.848			
	5	0.835			
	3	0.811			
	7	0.745			
Third-hand smoke exposure	11	0.917	1.86	9.80	58.76
	14	0.816			
	12	0.786			
	10	0.772			
	13	0.701			
	17	0.625			
	16	0.588			
Outdoor exposure to tobacco smoke	4	0.934	1.63	8.60	67.36
	2	0.804			
	1	0.712			
	15	0.675			
	9	0.402			
Perception of time-related to exposure	19	0.935	1.32	6.95	74.31
	20	0.926			

For content validity, evaluations by six different experts following Davis's technique showed that all items of the scale had a CVI greater than 0.80, indicating sufficient content validity. The adequacy of the sample size and suitability for factor analysis was demonstrated through the KMO test (KMO = 0.90) and Bartlett's sphericity test ($\chi^2 = 8170.3$; $p < .001$) results, supporting the transition to EFA. When examining the homogeneity values of the items for EFA, it was found that the homogeneity value for item 21 was 0.124, which did not meet the required threshold value (>0.20), and it was decided to remove this questionable item, starting from the reliability analysis. In repeated validity analyses for the 19 items, the KMO coefficient was again calculated as 0.90, indicating excellent sample size adequacy. The Bartlett test was also statistically significant ($\chi^2 = 8111.7$; $p < .001$). When examining the homogeneity values of the 19-item form for factor analysis, it was observed that all items had homogeneity values greater than 0.66, indicating that all items were appropriate at this stage. In the factor analysis, it was found that the 19 items were distributed across four factors, explaining a total variance of 74.3% (Table 1).

During the analysis, as a result of the removal of some items, the factor structure that differed from the original article was respectively referred to as second-hand smoke exposure, third-hand smoke exposure, outdoor exposure to tobacco smoke, and perception of time related to exposure.

The resulting four-factor structure was tested with CFA and was found to meet acceptable threshold values (Table 2).

Table 2.*Critical Values and Results of the Fit Indices Used in the Model Evaluation of Confirmatory Factor Analysis*

Fit Index	Excellent Fit	Acceptable Fit	CFA Results for the Scale
p of χ^2	$.05 < p \leq 1.00$	$.01 \leq p \leq .05$	<0.001
χ^2/SD	$0 \leq \chi^2/SD \leq 2$	$2 < \chi^2/SD \leq 5$	4.09
RMSEA	$0.00 \leq RMSEA \leq 0.05$	$0.05 < RMSEA \leq 0.08$	0.08
GFI	$0.90 \leq GFI \leq 1.00$	$0.85 \leq GFI < 0.90$	0.91
NFI	$0.95 \leq NFI \leq 1.00$	$0.90 \leq NFI < 0.95$	0.97
NNFI	$0.95 \leq NNFI \leq 1.00$	$0.90 \leq NNFI < 0.95$	0.97
CFI	$0.97 \leq CFI \leq 1.00$	$0.95 \leq CFI < 0.97$	0.98
IFI	$0.95 \leq IFI \leq 1.00$	$0.90 \leq IFI < 0.95$	0.98
RFI	$0.95 \leq RFI \leq 1.00$	$0.90 \leq RFI < 0.95$	0.96
AGFI	$0.90 \leq AGFI \leq 1.00$	$0.85 \leq AGFI < 0.90$	0.85
SRMR	$0.00 \leq SRMR \leq 0.05$	$0.05 < SRMR \leq 0.08$	0.06

Note: χ^2 = Chi-square; AGFI = Adjusted Goodness-of-Fit Index; CFI = Comparative Fit Index; IFI = Incremental Fit Index; GFI = Goodness-of-Fit Index; NFI = Normed Fit Index; NNFI = Non-Normed Fit Index; RFI = Relative Fit Index; RMSEA = Root mean square error of approximation; SRMR = Standardized root mean square residual.

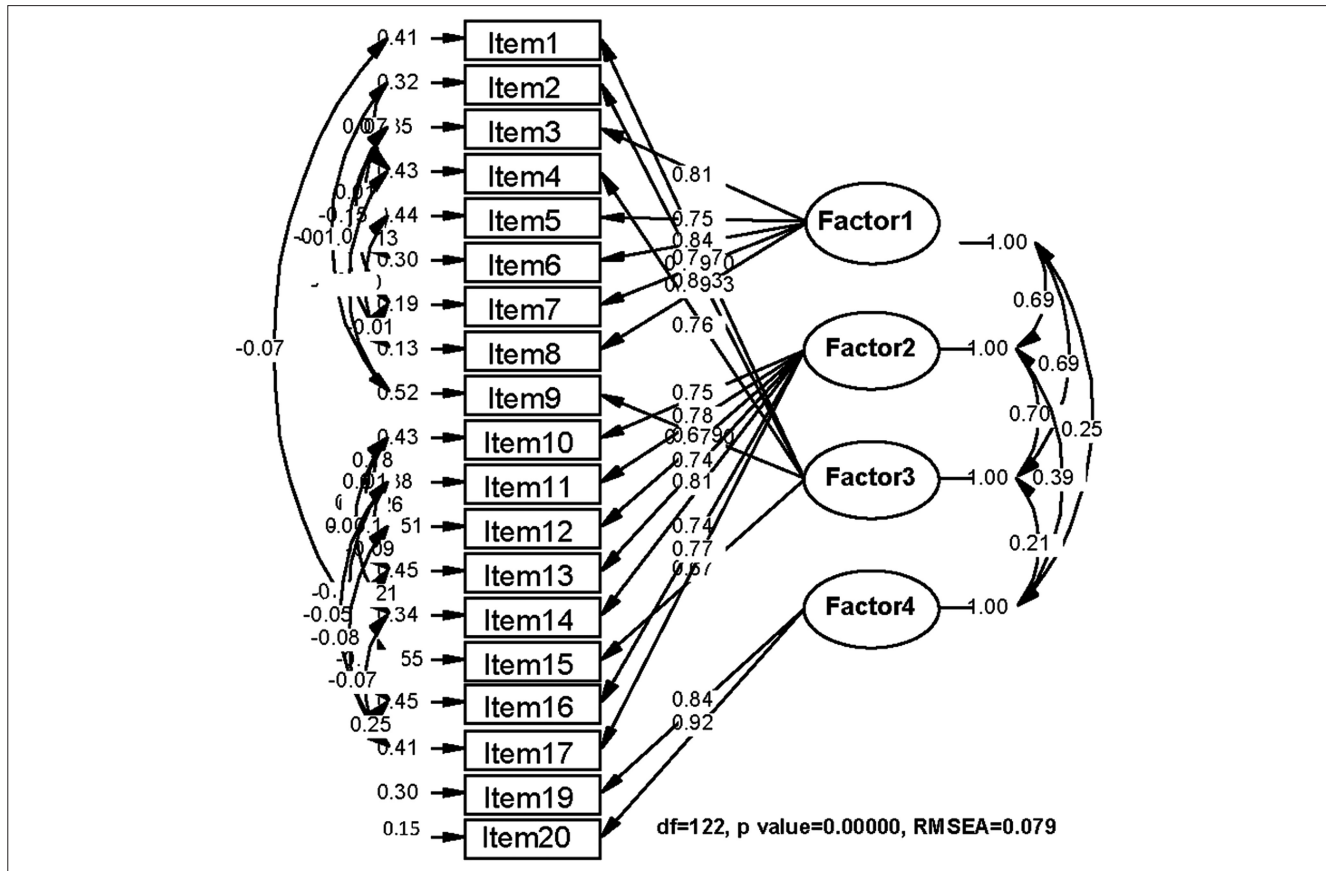


Figure 1. Path diagram of confirmatory factor analysis for the Parental Perception of Children's Exposure to Tobacco Smoke Scale.

The path diagram for the factor confirmatory analysis is presented in Figure 1.

The total score average of the 19 reliable and valid questions of the Parental Perception of Children's Exposure to Tobacco Smoke Scale was calculated as 93.8 ± 22.5 , the floor effect was 0.2%, and the ceiling effect was 0.4%. Finally, reliability analyses were repeated for the 19-item scale, and Cronbach's α value for the entire scale was found to be 0.937. Cronbach's α values for the factors were 0.934 for the first factor, 0.916 for the second factor, 0.852 for the third factor, and 0.859 for the fourth factor. The item-total score correlations for all

items were above 0.30. The test – retest analysis results are presented in Table 3.

Discussion

In our validity and reliability study of the scale of parental perception of children's exposure to tobacco smoke, developed by Myers et al., we obtained sufficient validity and reliability findings. Myers et al. (Myers et al., 2018) included 220 parents, 86% of whom were women, in the original scale and reported that the KMO value was 0.83. In our study, working with 500 parents increased the KMO value to 0.90, which elevated the sample

Table 3.

Test – Retest Analysis Results of the Parental Perception of Children's Exposure to Tobacco Smoke

Factor	First Test Score (Mean $\pm$ SD)	Retest Score (Mean $\pm$ SD)	p	Correlation Analysis		
				r	p	ICC (%95 CI)
1	30.0 $\pm$ 5.9	29.5 $\pm$ 5.2	.296	.682	<.001	0.89 (0.81-0.94)
2	39.4 $\pm$ 7.4	38.7 $\pm$ 7.6	.409	.561	<.001	0.82 (0.68-0.90)
3*	22.4 $\pm$ 6.0	22.8 $\pm$ 5.8	.427	.785	<.001	0.88 (0.79-0.93)
4	7.3 $\pm$ 2.7	6.9 $\pm$ 2.9	.190	.691	<.001	0.80 (0.64-0.89)
Total	99.1 $\pm$ 18.3	97.9 $\pm$ 17.8	.556	.720	<.001	0.91 (0.84-0.95)

Note: Factor 1: second-hand smoke exposure; factor 2: third-hand smoke exposure; factor 3: outdoor exposure to tobacco smoke; factor 4: perception of time-related to exposure.

ICC = Intraclass correlation.

*Comparisons for factor 3 were conducted using paired-sample t-test and Pearson correlation analysis. Wilcoxon test and Spearman correlation analysis were used for other comparisons.

suitability from “good” to “excellent.” Furthermore, unlike the original study, which suggested that the high participation rate of women was a limitation, both genders were included in our study. This allowed for a more realistic assessment of parental representation.

The Cronbach's α coefficient, which was used to assess reliability, was 0.94 for the entire scale in our study, and since it was deemed appropriate to remove four items, it changed the structure but ranged from 0.85 to 0.93 for the subscales. In the original scale, consisting of 23 questions and six subscales, values ranging from 0.69 to 0.93 were calculated. The higher reliability coefficient of the scale in our study can be interpreted as a correct decision to remove the questions.

Test – retest analyses were conducted with 50 individuals (10%) in our study, and a statistically significant and very good correlation was found ($r = .72$). In the original scale, it was conducted with 13 individuals (6%), and a statistically significant ($p < .001$) and excellent-level correlation was found between the results ($r = 0.86$) (Myers et al., 2018). The reason for finding a higher correlation coefficient in the original scale may be that those who completed the second test in the online survey were individuals with genuinely high sensitivity to the subject, and due to their low numbers, this sensitivity was reflected as a general situation. Since more people participated in the retest in our study, the score distribution may have been different. Nevertheless, all test – retest analysis results in our study showed correlations between moderate and excellent levels. Since the ICC was not calculated in the original scale, a comparison could not be made; however, when compared with the literature, both the total scale score and all subscales have coefficients at a good to excellent level (Koo & Li, 2016). Thus, it has been demonstrated that the Turkish version of the scale has high reliability.

In the EFA, the structure of the scale, consisting of four factors, explained 74.3% of the total variance. Although this value is lower than the 76.3% explained variance in the original scale, it is in line with the information in the literature that scales with multiple factors should explain at least 66% of the total variance and is considered at the desired level (Aksu G, 2017).

Although there were no results of the CFA of the original scale, when the goodness of fit indices of the Turkish version of the scale were compared with acceptable threshold values, it was shown that the four-factor structure was confirmed. Thus, the validity of the scale has been demonstrated.

Removing the questions from the scale will not cause difficulties in terms of comparing the Turkish scale with other studies. Since no changes were made in the scale scoring and Likert-type scale during the adaptation stages into Turkish, the value obtained by dividing the total score, defined as the “average scale score” in the original scale, can be compared and used in comparisons with the results of any scale in different languages. Like the original scale, there is no cutoff point in the Turkish version.

In terms of the new feature, which is desired to be evaluated in reliability and validity studies, namely the floor and ceiling effect, the values obtained in our study are within the desired limits. Therefore, the scale's sensitivity to changes in different

factors such as age, gender, and educational status was considered appropriate.

The strengths of our study include reaching a relatively large sample through a multistage sampling method that could represent the city of Samsun in the sample selection, conducting face-to-face interviews by the same researcher to prevent data loss, and contributing to the literature by providing a Turkish tool to measure parents' perception of children's exposure to tobacco smoke. The study has some limitations. First, there is a possibility of respondents providing different answers than their actual attitudes due to concerns about not creating a negative bias since a physician administered the questionnaire. Second, there may be selection bias because only parents who volunteered participated in the study. Finally, since the type of study is cross-sectional, causal associations cannot be established.

As a result of this study, it was concluded that the Turkish version of the Parental Perception of Children's Exposure to Tobacco Smoke scale, consisting of 19 questions and 4 subscales, is highly reliable and valid. The scale provides a reliable tool that will contribute to making environmental, societal, and clinical decisions regarding children's exposure and conducting awareness studies in the community.

Ethics Committee Approval: This study was approved by the Clinical Research Ethics Committee of Ondokuz Mayıs University (approval number: 329; date: June 22, 2022).

Informed Consent: Informed consent was obtained from the patients who agreed to take part in the study.

Peer-review: Externally peer reviewed.

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