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Original Research

Development and psychometric evaluation of the smoking attitude scale in adolescents

Cahide Çevik [a,*], Yasemen Yalçınkaya [b,c], Safiye Karavar [b,c]

[a] Afyonkarahisar Health Sciences University, Faculty of Health Sciences, Department of Public Health Nursing, 03200, Afyonkarahisar, Turkiye
[b] Afyonkarahisar Health Sciences University, Turkiye

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ABSTRACT

Objectives: Smoking addiction poses a major public health risk, with its onset frequently occurring during adolescence. Attitudes toward smoking significantly influence the development of smoking addiction, making the assessment of these attitudes essential for effective prevention and intervention strategies. This study aimed to develop a scale for assessing adolescents' attitudes toward smoking and to evaluate its psychometric properties.

Study design: This study employs a methodological framework for developing and validating a measurement scale.

Methods: The study was conducted among 10th and 11th-grade students at high schools. Data were collected from 602 high school students between February 19 and February 29, 2024. The students' mean age was 15.83 ± 0.74 years, with 58.8 % (n = 354) being female and 41.2 % (n = 248) male. The proportion of students who smoked was 11 % (n = 66). Among non-smokers, 36.4 % (n = 195) had attempted smoking. The mean age at which smokers began smoking was 14 ± 1.50 years. The selection of candidate items was based on a comprehensive literature review and focus group discussions with adolescents. The factor structure of the scale was analyzed using exploratory and confirmatory factor analyses across different sample groups. Convergent and discriminant validity were examined, and reliability was assessed through Cronbach's α coefficients, corrected item-total correlations, and test-retest analysis.

Results: Exploratory factor analysis revealed that the Smoking Attitude Scale consists of three factors comprising 15 items, which focus on health risks, social influences, and peer pressure, accounting for 62.50 % of the total variance. Confirmatory factor analysis supported this structure. Both convergent and discriminant validity were established. The scale demonstrated high reliability, with an overall Cronbach's α value of 0.90, and factor values of 0.88, 0.78, and 0.84. Composite reliability scores for the factors were 0.88, 0.81, and 0.83, respectively.

Conclusions: The Smoking Attitude Scale is a valid and reliable instrument for evaluating adolescents' attitudes toward smoking.

1. Introduction

Smoking addiction poses a critical public health threat. The World Health Organization has reported that smoking is responsible for over 8 million deaths annually. Of these, more than 7 million result from direct smoking, while approximately 1.2 million are caused by second-hand smoke exposure among non-smokers.[1] The extensive negative health impacts underscore the importance of addressing smoking addiction as a public health priority. Notably, most adult smokers begin smoking during adolescence.[2]

Attitudes toward smoking are pivotal in the onset and progression of smoking addiction. Attitudes, which encompass beliefs, thoughts, and emotions regarding a specific object or person, shape individuals' choices and preferences.[3] Numerous theories have been developed to explain how attitudes are formed, how they change, and how they influence individual behavior. Attitude theories describe attitudes through different components. The ABC Model—also known as the Tripartite Model of Attitudes—explains the multidimensional nature of attitudes. This model of attitudes outlines three key components: cognitive, affective, and behavioral. The cognitive component refers to an

* Corresponding author.
E-mail addresses: cahide.cevik@afsu.edu.tr (C. Çevik), yasemenyalcinkaya.yyk@gmail.com (Y. Yalçınkaya), karavarsafiye@gmail.com (S. Karavar).
[c] Yasemen Yalçınkaya and Safiye Karavar are nursing undergraduate students.

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individual's knowledge and beliefs about an object, person, or situation, and plays a key role in determining whether something is perceived as good or bad, thereby influencing approach or avoidance behaviors.[4] The affective component involves emotional responses to an attitude object, reflecting feelings toward it. A person's attitude toward an object is shaped not only by cognitive beliefs but also by emotions, which function in tandem with cognitive processes.[4] The behavioral component encompasses verbal or non-verbal actions or reactions stemming from an attitude object, reflecting the individual's inclination to engage with or avoid the object.[5]

Other models focus on predicting behavior, explaining the process of attitude change, determining the influence of social context on attitudes, and examining the functional aspects of attitudes.[6–10] In contrast, the ABC model analyzes the nature of attitudes by focusing on the individual's intrinsic attitude components. To conduct such analyses regarding smoking behavior, valid and reliable measurement tools are required. The literature includes several scales designed to measure attitudes toward smoking. The Smoking Attitudes Scale developed by Etter et al. (2000) for smokers and former smokers comprises three factors: the adverse effects of smoking, its psychoactive benefits, and the pleasure of smoking.[11] Similarly, the Smoking Attitudes Scale developed by Shore et al. includes topics such as smoking in restaurants, cigarette sales, legal restrictions, smokers' rights, and non-smokers' rights.[12] Additionally, the survey developed by Campo et al. (2021) assesses smoking habits, attitudes, knowledge, and needs.[13] Another scale developed to measure attitudes and beliefs about the consequences of smoking includes factors such as emotional benefits, health hazards, self-confidence, and body image.[14] Although these scales assess attitudes toward smoking from a multidimensional perspective, they appear to place limited emphasis on intrinsic components. Attitudes toward smoking are inherently multidimensional. For instance, knowing the harms of smoking (cognitive) does not always lead to quitting smoking (behavioral) or disliking smoking (affective). Therefore, evaluating attitudes through these three factors can provide a more comprehensive framework. Furthermore, measuring attitudes with multidimensional intrinsic components can help reveal the nature of attitudes. In this study, a scale was developed with a focus on these intrinsic components in the formulation of scale items. Accordingly, this study aimed to develop a scale that evaluates adolescents' attitudes toward smoking in terms of cognitive, affective, and behavioral components and to examine its psychometric properties. Understanding attitudes through these three factors may contribute to the design of effective prevention and intervention programs.

2. Methods

2.1. Setting and sample

The study was conducted among 10th and 11th-grade students at three high schools in Afyonkarahisar, Turkiye, selected for their similar sociodemographic characteristics. The 12th-grade students were excluded to avoid disrupting their academic preparations for university entrance exams. The total number of students enrolled in the 10th and 11th grades across these three schools was 761. According to the literature, an ideal sample size for methodological studies should exceed 500 participants.[15] Thus, 639 students who met the inclusion criteria—voluntary participation, parental consent, and proficiency in Turkish—were included in the study. Of these, 30 students formed the pilot group, while the remaining 609 students comprised the main study group. Data collection took place from February 19 to February 29, 2024, during class periods approved by the school administration. The scale was distributed to the students, who completed it in approximately 15–20 min. After excluding incomplete or erroneous responses, data from 602 students were analyzed. These students were 58.8 % female and 41.2 % male, with an average age of 15.83 ± 0.74 (min:14, max:18) years. A total of 46.3 % (n = 279) were 10th-grade students, while 53.7 % (n = 323) were in the 11th grade.

2.2. Design

This study employed a methodological design, carried out in several stages: item pool generation, content validity assessment, pilot testing, main study implementation, exploratory factor analysis, confirmatory factor analysis, and reliability testing.

The item pool was developed through a comprehensive literature review and focus group discussions with eight adolescents. Two semi-structured interviews were conducted with the adolescents, each lasting approximately 30 min. During the interview, the items were formulated based on the three-component attitude model. In some scale development studies on various domains, it has been observed that scale items are structured in accordance with the components of this model.[16–18] The research team then reviewed and refined the items, resulting in a finalized draft scale consisting of 41 items.

2.3. Content validity assessment

To assess the content validity of the measurement tool, feedback was obtained from ten experts, selected based on their qualifications, which included holding a doctoral degree, prior experience in scale development, and/or research expertise in addiction. Four experts specialized in public health, while one expert had a background in child health. Three experts were selected due to their extensive experience in scale development studies, and two experts were chosen based on their research on addictions. The Content Validity Index (CVI) method proposed by Polit and Beck was used for this assessment. In line with this method, the Item Content Validity Index (I-CVI) for each item and the Scale Content Validity Index (S-CVI) were calculated. The I-CVI was determined by dividing the number of experts who rated the item as either 3 or 4 by the total number of experts. The S-CVI was calculated by dividing the number of items rated as 3 or 4 by all experts by the total number of items.[19] A cut-off value of 0.80 was established for the I-CVI and 0.90 for the S-CVI.[20] Since no items had an I-CVI below 0.80, no items were removed at this stage. Based on expert feedback, revisions were made to items 7, 8, 15, 23, 27, 34, 38, and 39.

2.4. Pilot study

A pilot study was conducted with 30 students who were not included in the main study sample to evaluate the clarity of the scale items. The class for the pilot study was randomly selected. Students were asked to assess the comprehensibility of each item and suggest alternative phrasing for any items they found unclear. Based on the feedback, the final version of the scale was refined. In response to one student's suggestion, the phrase "people's" was added to items 10, 11, 13, and 14, "to a person" to item 12, and "to people" to item 16.

2.5. Data collection instruments

2.5.1. Personal information form

This form, developed by the researchers, includes questions designed

to determine the individual characteristics such as age, gender, smoking status, and the age of smoking initiation.

2.5.2. Smoking attitude scale

The scale was designed to assess adolescents' attitudes toward smoking. The scale items were structured according to the ABC model, which represents the affective (A), behavioral (B), and cognitive (C) components of attitude. Initially composed of 41 items, no items were removed during the content validity analysis and pilot study. However, following the validity analyses conducted after the main study, 16 items were excluded. The final version of the scale comprises 15 items, organized into three factors: cognitive, affective, and behavioral. It utilizes a five-point Likert scale with response options ranging from "strongly agree" (1) to "strongly disagree" (5). Items 1, 2, 3, 4, 5, 13, 14, and 15 are reverse scored. The total possible score ranges from 15 to 75, with lower scores indicating a more negative attitude toward smoking.

2.6. Construct validity

Construct validity was evaluated through both Exploratory Factor Analysis (EFA) and Confirmatory Factor Analysis (CFA). The dataset, consisting of 602 students, was randomly divided into two groups.

2.7. Exploratory factor analysis

EFA was conducted on data from 301 participants, using the principal component extraction method with varimax rotation in SPSS 25.0 (SPSS Inc., Chicago, IL, USA). The following criteria were applied to determine factor retention: (a) eigenvalues greater than 1; (b) total variance explained >50 %,[21] and (c) a factor loading threshold of 0.40.[22] In this context, the factor loadings of the items were examined, and the theoretical framework established prior to the research was taken into account. Additionally, items with factor loadings lower than 0.40 or with factor loadings exceeding 0.40 in multiple factors were excluded from the factor. When a factor's eigenvalue is greater than 1, it means that the factor is strong enough to explain the variance of at least one variable. Factors with eigenvalues below 1 are generally considered negligible due to low explanatory power.[23] For the results of the factor analysis to be reliable, they are expected to explain a certain percentage of the total variance. In social sciences, it has been established that when the total variance explained is 50 % or more, the model has adequate explanatory power.[24]

2.8. Confirmatory factor analysis

CFA was performed on the remaining 301 participants to assess the fit of the factor model identified through EFA. AMOS 24.0 (IBM Corp., Armonk, NY, USA) was used to determine model fit. The following fit indices were employed: Chi-Squared Test, Relative Chi-Square (CMIN/DF), Root Mean Square Error of Approximation (RMSEA), Comparative Fit Index (CFI), Normed Fit Index (NFI), Non-Normed Fit Index (TLI) and İncremental Fit Index (IFI), Goodness of Fit Index (GFI).

2.9. Convergent and discriminant validity

Convergent and discriminant validity were evaluated using Average Variance Extracted (AVE), Composite Reliability (CR), Maximum Shared Variance (MSV), Average Shared Variance (ASV), and inter-factor Pearson correlation coefficients. AVE is the average of the squared loadings of all indicators related to a specific construct. The general rule for an acceptable AVE is that it should be 0.50 or higher.[24] CR value above 0.70 is recommended, and CR > AVE should be met.[21] For discriminant validity, it has been stated that AVE > MSV, AVE > ASV, and the square root of AVE>the correlation between factors.[25]

2.10. Reliability

To assess reliability, Cronbach's alpha coefficient, corrected item total correlation, and test-retest analyses were employed. The scale was re-administered to 32 students three weeks after the initial application to evaluate test-retest reliability. A correlation coefficient greater than 0.70 was deemed acceptable. Intraclass correlation (ICC) and Pearson correlation coefficients were calculated, and a paired *t*-test was performed for dependent groups to determine any differences between the two administrations.

2.11. Ethical approval

Ethical approval for the study was obtained from Afyonkarahisar Health Sciences University Clinical Research Ethics Committee (Date: June 2, 2023, Issue: 2023/270). Informed consent was obtained from both the participants and their parents.

2.12. Data analysis

Data analysis was performed using IBM SPSS 25.0 (SPSS Inc., Chicago, IL, USA) and AMOS 24.0 (IBM Corp., Armonk, NY, USA). Descriptive statistics, including frequency, percentage, and mean, were used to analyze the demographic and descriptive data. For reliability assessment, Cronbach's alpha, item-total score analysis, and test-retest analysis were utilized, with the test-retest conducted at a three-week interval. Validity was evaluated through item and scale-based content validity indices, exploratory factor analysis, confirmatory factor analysis, and both discriminant and convergent validity analyses. A significance level of 0.05 was applied for all statistical tests.

3. Results

3.1. Characteristics of the study participants

Among the students, 58.8 % were female and 41.2 % were male, with an average age of 15.83 ± 0.74 (min:14, max:18) years. Of the students, 18.6 % had mothers who smoked, while 55.4 % had fathers who smoked. The prevalence of smoking among students was 11 %, and among the students outside this group who do not smoke, 36.4 % had tried smoking. The average number of cigarettes smoked per day was 10 ± 6.80, and the average age of smoking initiation was 14 ± 1.50. Similarly, the average age at which non-smoking students first tried smoking was also 14.

3.2. Content validity

To assess content validity, the scale was reviewed by 10 experts. I-CVI were calculated individually for each item. The I-CVI values ranged from 0.80 to 1.00. The S-CVI value was 0.95.

3.3. Construct validity

3.3.1. Exploratory Factor Analysis

The ABC model was used as a basis to reveal attitudes toward smoking in accordance with internal components. EFA was conducted to test the structure created based on the cognitive, affective, and behavioral components. Bartlett's test of sphericity was significant ($\chi 2 = 2304.501$, df = 105, $p < 0.001$), indicating the appropriateness of factor analysis. The Kaiser–Meyer–Olkin (KMO) measure of sampling adequacy was 0.899. The principal component extraction method with Varimax rotation validated a three-factor structure, accounting for 62.5 % of the total variance. The scale comprised 15 items, with the three factors labeled as "cognitive" (5 items), "affective" (5 items), and "behavioral" (5 items). Factor loadings for the first factor ranged from 0.66 to 0.88, for the second factor from 0.58 to 0.76, and for the third factor from 0.61 to 0.86 (Table 1).

3.4. Confirmatory Factor Analysis

Following the identification of a three-factor structure through EFA, CFA was performed to validate the structure of the Smoking Attitude Scale (SAS). Model correction was made to account for correlations between the error terms of items 27 and 29 (affective factor), items 32 and 38 (behavioral factor), and items 39 and 41 (behavioral factor). After these adjustments, goodness-of-fit indices were evaluated. The CFA results were as follows: $\chi^2 = 183.754$, df = 84, $p < 0.001$; CMIN/DF = 2.188; RMSEA = 0.063; CFI = 0.95; NFI = 0.92; TLI = 0.94; IFI = 0.95; and GFI = 0.93. Since all the goodness-of-fit indices fell within acceptable ranges, no items were removed from the scale (Fig. 1).

3.5. Convergent and discriminant validity

According to the findings, the AVE values for the three factors ranged from 0.46 to 0.60, while the CR values ranged from 0.81 to 0.88. The MSV values were between 0.32 and 0.38, and the ASV values ranged from 0.39 to 0.46. The CR values were greater than the AVE values, and the AVE values were greater than both the MSV and ASV values. Furthermore, the square root of the AVE for each factor was greater than the inter-factor correlation values (Table 2).

3.6. Reliability

3.6.1. Internal consistency

For the overall scale, the Cronbach's α coefficient was 0.90 (15 items), with the cognitive factor at 0.88 (5 items), the affective factor at 0.78 (5 items), and the behavioral factor at 0.84 (5 items). The corrected item-total correlations ranged from 0.41 to 0.70 (Table 3).

3.7. Time invariance

The test-retest analysis, conducted to evaluate the temporal stability of the scale, revealed no statistically significant differences between the first and second administrations in terms of total scale scores and factor scores ($p > 0.05$). The correlation values demonstrating the significant relationship between the mean scores obtained three weeks apart for each factor were as follows: cognitive factor, r = 0.88, $p < 0.001$; affective factor, r = 0.72, $p < 0.001$; behavioral factor, r = 0.91, $p < 0.001$; and total scale score, r = 0.94, $p < 0.001$ (Table 4). Additionally, the ICC values for both the total score and the factor scores ranged from 0.84 to 0.97 (Table 4).

4. Discussion

Many individuals begin smoking during adolescence, and attitudes toward smoking addiction play a critical role in smoking initiation. Adolescents with a positive attitude toward smoking are more likely to engage in smoking behavior. Understanding these attitudes provides an opportunity for early intervention, helping to prevent them from manifesting as smoking behavior. However, reliable tools are required to accurately assess attitudes toward smoking. In this study, a Smoking Attitude Scale was developed, and its validity and reliability were thoroughly examined. The findings indicate that the scale, comprising 15 items across three factors, is both valid and reliable.

4.1. Content validity

Content validity refers to the extent to which a measurement tool accurately represents the characteristic and conceptual framework it is designed to measure.[26] While various methods exist for assessing content validity, the Polit and Beck approach recommends that both the I-CVI and the S-CVI should exceed 0.80 to demonstrate agreement among expert opinions.[27] The I-CVI and S-CVI values of the scale indicated that the measurement tool adequately measures the intended construct and ensures content validity.

4.2. Construct validity

Construct validity assesses the extent to which a measurement tool

Table 1
Factor loading of the SAS after varimax rotation with three factors.

Item	Description	Factor loading		
		F1 (Cognition)	F2 (Affect)	F3 (Behavior)
1	I believe smoking helps people solve their problems	**0.77**	0.15	0.18
2	I believe smoking calms people down	**0.88**	0.18	0.20
3	I believe smoking reduces stress	**0.85**	0.13	0.22
4	I believe smoking has certain benefits	**0.66**	0.24	0.28
5	I believe smoking provides people with pleasure	**0.68**	0.14	0.33
6	I strongly dislike the smell of cigarettes	0.29	**0.66**	0.25
7	I am afraid of becoming addicted to smoking	0.27	**0.65**	0.15
8	I fear getting cancer if I smoke	0.30	**0.58**	0.23
9	I get mad at my friend who has started smoking	0.04	**0.76**	0.10
10	I feel upset when a friend I care about begins smoking	0.02	**0.72**	0.19
11	I can decline when a friend offers me a cigarette	0.16	0.38	**0.71**
12	I can avoid smoking even if smoking is common in a new environment I'm entering	0.26	0.34	**0.61**
13	I might accept a cigarette offer if my friends are very insistent	0.20	0.15	**0.86**
14	Despite knowing the health risks of smoking, I might continue smoking.	0.33	0.30	**0.68**
15	I might try smoking, believing that smoking once won't lead to addiction	0.31	0.05	**0.66**
Eigenvalues		6.570	1.652	1.154
Total percentage and cumulative addition (%)		43.80	11.01	7.70
Total percentage of the factor model (%)				62.50

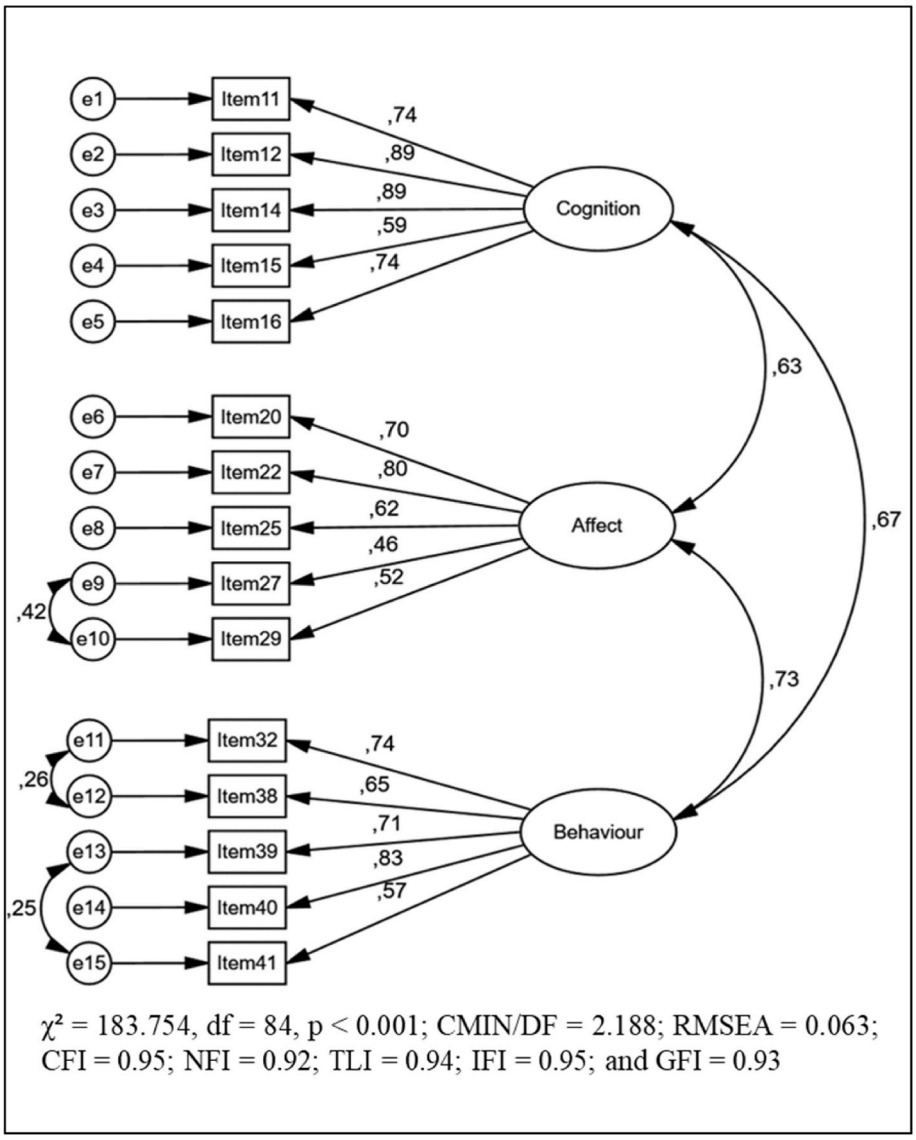

Fig. 1. Confirmatory Factor Analysis model of SAS.

Tablo 2
Convergent validity and discriminant validity indices of SAS.

	CR	AVE	MSV	ASV	Cognition	Affect	Behavior
Cognition	0.88	0.60	0.37	0.42	0.78[b]		
Affect	0.81	0.46	0.33	0.39	0.51[a]	0.68[b]	
Behavior	0.83	0.50	0.37	0.46	0.61[a]	0.57[a]	0.71[b]

[a] inter-factor correlation values and P < 0.001.
[b] Square root of the AVE.

accurately measures the characteristic it is intended to measure and how effectively it achieves this aim. Factor analysis is the most widely used method to test construct validity. It categorizes observed variables with strong correlations into groups based on specific rules, with each group sharing a common factor that represents the underlying structure of the scale. EFA is used to determine the number of structures, latent variables, or factors underlying a set of items.[24] Factor analysis can be conducted using two approaches: EFA and CFA.

In this study, the suitability of the data for factor analysis was assessed using Bartlett's Test of Sphericity and the KMO measure of sampling adequacy. According to the literature, Bartlett's Test of Sphericity should be statistically significant, and the KMO value should

Tablo 3
Smoking Attitude Scale item mean scores, item-total correlations, and Cronbach's α coefficient if item deleted.

Item	Factor	Mean ± SD	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted	Cronbach's Alpha
1	**Cognition**	1.79 ± 1.29	0.62	0.90	**0.88**
2		2.29 ± 1.53	0.70	0.89	
3		2.25 ± 1.50	0.68	0.89	
4		1.63 ± 1.17	0.57	0.90	
5		2.40 ± 1.50	0.63	0.90	
6	**Affect**	2.04 ± 1.42	0.60	0.90	**0.78**
7		2.12 ± 1.54	0.58	0.90	
8		1.69 ± 1.28	0.55	0.90	
9		2.20 ± 1.46	0.41	0.91	
10		1.88 ± 1.33	0.45	0.90	
11	**Behavior**	1.62 ± 1.28	0.63	0.90	**0.84**
12		1.53 ± 1.15	0.60	0.90	
13		1.92 ± 1.44	0.60	0.90	
14		1.78 ± 1.35	0.70	0.89	
15		2.31 ± 1.59	0.55	0.90	

Tablo 4
Test-retest analysis results (n = 32).

	Initial application Mean ± SD	Second application Mean ± SD	t	p	r	p	ICC
Total score	24.72 ± 11.67	24.94 ± 11.74	−0.294	0.77	0.94	0.000	0.97
Cognition	8.00 ± 4.58	8.13 ± 4.51	−0.322	0.75	0.88	0.000	0.94
Affect	7.81 ± 4.17	8.41 ± 4.35	−1.049	0.30	0.72	0.000	0.84
Behavior	7.03 ± 3.75	7.19 ± 3.81	−0.549	0.59	0.91	0.000	0.95

t: a paired *t*-test, r: correlation coefficient, ICC: Intraclass correlation.

be at least 0.60 for factor analysis to be considered appropriate.[28] In this study, Bartlett's Test of Sphericity was significant, and the KMO value was greater than 0.60. These findings indicate that the sample size was both sufficient and appropriate for conducting factor analysis.

In the EFA, three factors with eigenvalues greater than 1 were identified, explaining 62.5 % of the total variance. This suggests that the scale has good construct validity. The literature recommends that newly developed multidimensional scales should explain more than 50 % of the variance.[15] It is emphasized that items with a factor loading above 0.50 should be included in the scale.[29] The factor structure was determined based on the theoretical framework established prior to the research, eigenvalue coefficients, factor loadings, and explained variance. It was found that the scale consists of three factors: cognitive attitude (5 items), affective attitude (5 items), and behavioral attitude (5 items). The factors also align with the ABC attitude model. Additionally, factor analysis results indicate that the scale has good construct validity.

To validate the three-factor structure identified in the EFA, CFA was conducted. The CFA confirmed that the scale comprises three main components. The fit indices were found to be within the acceptable limits as specified in the literature.[24] The CFA results from this study were consistent with these benchmarks. The CFA results indicated that the data were consistent with the model, confirming the structure identified by the exploratory factor analysis, and showing that the factors were compatible with the scale.

4.3. Convergent and discriminant validity

Convergent validity refers to the high correlation between items within a factor and the factor itself. Discriminant validity, on the other hand, suggests that items should exhibit lower correlations with other factors to which they do not belong. To confirm convergent validity, all conditions were met except for Factor 2, whose AVE value was below 0.50.[30] The literature suggests that when AVE<0.50 but CR > 0.60, convergent validity is still considered acceptable.[25,31] Based on these findings, it can be concluded that the scale satisfies both convergent and discriminant validity requirements.

4.4. Reliability

Reliability refers to the consistency of a measurement tool's results when administered at different times. The internal consistency of the SAS was assessed using Cronbach's alpha coefficient and item-total score correlations, while temporal stability was evaluated through test-retest analysis. Cronbach's alpha measures whether the items assess a similar characteristic and serves as an indicator of homogeneity within a scale. A Cronbach's α value above 0.70 is generally considered to demonstrate good internal consistency.[15] In this study, the Cronbach's α values for both the total scale and all factors exceeded 0.70. The scale was also assessed for CR, with all factors showing CR values greater than 0.70.[15,21]

Item-total score analysis indicates whether the items in a scale effectively measure the intended concept. A recommended threshold for item-total score correlation is at least 0.30.[32] In this study, the item-total score correlations provided evidence that the items measured the intended construct.

A test-retest analysis was performed to evaluate the temporal stability of the scale. A statistically significant, positive, and strong correlation was observed between the test-retest scores for both the total scale and its factors. Furthermore, the ICC values indicated strong consistency between the two sets of measurements taken at different times. Paired *t*-test results for dependent groups revealed no significant differences between the two measurements. These findings confirm that the scale consistently measures the intended concept over time. Overall, the reliability analyses in this study demonstrate that the scale exhibits high reliability. Thus, it can be concluded that the scale is sufficiently reliable.

4.5. Limitations

This study has several limitations. One limitation is the lack of a comparable measurement tool that assesses similar characteristics, preventing the evaluation of external convergent validity. Another limitation is that the AVE value for the second factor (Affect) was below 0.50, which limited the assessment of convergent validity. The absence of parallel analysis in factor determination represents another limitation of this study. Despite these issues, the remaining validity analyses exhibited strong statistical properties.

4.6. Conclusion

This scale, developed to evaluate adolescents' attitudes towards smoking, consists of 15 items and is structured around three factors. This study demonstrates strong reliability and validity. The scale offers a tool for health professionals, educators, and researchers to assess adolescents' attitudes towards smoking. It can also be used for early risk assessment in school-based programs. By determining students' attitudes towards smoking, school psychological counselors and guidance teachers can plan anti-smoking awareness programs more effectively. Additionally, the scale can be applied in experimental studies to evaluate the effectiveness of interventions aimed at altering attitudes toward smoking. Furthermore, public health experts can use this scale to evaluate the effectiveness of anti-smoking awareness campaigns. By monitoring smoking tendencies and attitudes over time, awareness strategies for the community can be better shaped. In these processes, the scale should be anonymized to allow adolescents to respond objectively. Cross-cultural adaptation studies could be conducted to assess the validity and reliability of the SAS across different populations. However, particular attention should be given to preventing loss of meaning in the translation and back-translation processes, the impact of cultural differences on the understanding of scale items, and the potential effects of culture-specific elements on the factor structure of the scale.

Author statements

Ethical approval

Ethical approval for the study was obtained from Afyonkarahisar Health Sciences University Clinical Research Ethics Committee (Date: June 2, 2023, Issue: 2023/270). Informed consent was obtained from both the participants and their parents.

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Competing interests

The authors do not declare any conflict of interest.

Data availability

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

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.puhe.2025.105757.

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