

## Intention to Quit Smoking Scale: Development and Validation\*

Sigarayı Bırakma Niyeti Ölçeği: Geçerlilik ve Güvenilirlik Çalışması

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### ABSTRACT

Smoking cessation efforts are made in many countries and the results of these efforts should be measured. Therefore, there is a need for a short, feasible, and validated scale that can measure the intention to quit smoking. This study aims to investigate the psychometric properties of the "Intention to Quit Smoking Scale (IQSS)". The validity and reliability properties of the scale were examined. A total of 497 participants were included in the study. First, 20 candidate items were prepared based on literature review and expert opinions, and the scale with candidate items was subjected to a pilot test. The dimensional structure was determined statistically using exploratory factor analysis and confirmed by confirmatory factor analysis. Cronbach's  $\alpha$  coefficient, CR, and AVE values were calculated to examine internal consistency, composite reliability, and convergent validity. A scale with one factor consisting of eight items was obtained. The fit indices of the single factor structure were at an acceptable level (X<sup>2</sup>/df 1.77, GFI 0.94, AGFI 0.88, CFI 0.98, NFI 0.97, RMSEA 0.079). Cronbach's alpha for IQSS was 0.943. CR was 0.95 and AVE was 0.96. The test-retest consistency of the scale was high ( $r=0.856$ ). Correlations with the "Smoking Cessation Success Prediction Scale" and its sub-dimensions showed that the scale provided concurrent validity ( $r=0.669$ ; 0.698; 0.721 respectively). The IQSS is a short, reliable, and valid scale that can measure the intention to quit smoking at the time of measurement and it can be easily used in future studies.

**Keywords:** Psychometrics, Smoking, Smoking Cessation, Validation Study

### ÖZ

Birçok ülkede sigara bıraktırma çalışmaları yapılmaktadır ve bu çalışmaların sonuçlarının ölçülmesi gerekmektedir. Bu nedenle sigarayı bırakma niyetini ölçebilecek kısa, uygulanabilir ve geçerliliği sağlanmış bir ölçeğe ihtiyaç vardır. Bu çerçevede, bu çalışmanın amacı "Sigarayı Bırakma Niyeti Ölçeği (SBNÖ)"nin psikometrik özelliklerini incelemektir. Ölçeğin geçerlilik ve güvenilirlik özellikleri incelenmiştir. Çalışmaya toplam 497 kişi dahil edilmiştir. İlk olarak, literatür taraması ve uzman görüşlerine dayanarak 20 aday madde hazırlanmış ve aday maddelerin yer aldığı ölçek pilot teste tabi tutulmuştur. Açımlayıcı faktör analizi kullanılarak boyutsal yapı istatistiksel olarak belirlenmiş ve doğrulayıcı faktör analizi ile doğrulanmıştır. İç tutarlılık, bileşik güvenilirlik ve yakınsak geçerliliği incelemek için Cronbach's  $\alpha$  katsayısı, CR ve AVE değerleri hesaplanmıştır. Sekiz maddeden oluşan tek faktörlü bir ölçek elde edilmiştir. Tek faktörlü yapının uyum indeksleri kabul edilebilir düzeydedir (X<sup>2</sup>/df 1,77, GFI 0,94, AGFI 0,88, CFI 0,98, NFI 0,97, RMSEA 0,079). IQSS için Cronbach's alpha değeri 0,943'tür. CR 0,95 ve AVE 0,96'dır. Ölçeğin test-tekrar test tutarlılığı yüksektir ( $r=0,856$ ). "Sigarayı Bırakma Başarısı Öngörü Ölçeği" ve alt boyutları ile korelasyonlar ölçeğin bağlam geçerliliğini sağladığını göstermiştir (sırasıyla  $r=0,669$ ; 0,698; 0,721). SBNÖ, ölçüm anında sigarayı bırakma niyetini ölçebilen kısa, güvenilir ve geçerli bir ölçektir ve gelecekteki çalışmalarda kolaylıkla kullanılabilir.

**Anahtar Kelimeler:** Psikometri, Sigara, Sigarayı Bırakma, Validasyon Çalışması

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## INTRODUCTION

Smoking stands out as one of the most important risk factors for many of the diseases that cause premature death and for preventable causes of death globally.<sup>1</sup> Every year, thousands of people die due to tobacco-related diseases, and millions of people live with serious illnesses related to smoking.<sup>2</sup> Smoking causes cardiovascular diseases, respiratory system diseases, and various cancers. According to a study conducted in England, smoking triples the overall mortality and doubles the age-specific mortality in middle and old age. According to these findings, smoking shortens life expectancy by 10 years. Quitting smoking at age 60 increases life expectancy by 3 years, quitting at 50 by 6 years, quitting at 40 by 9 years, and quitting at 30 by 10 years.<sup>3</sup>

A global struggle is being waged and some precautions are being taken in order to prevent people from smoking. However, people continue to die due to the preventable diseases caused by smoking, the burden of diseases increases, and a huge financial burden arises both at the individual and family level and on a societal and global scale. In addition, smoking increases the effects of poverty due to spending on cigarettes.<sup>4</sup> It also causes an increase in health expenditures and an economic burden due to health problems and deaths caused by smoking.<sup>5</sup>

Smoking increased rapidly in the early twentieth century in developed countries. However, after the increase of public attention to and awareness of smoking-related problems and the introduction of some smoking prevention practices, smoking decreased towards the end of the same century. On the other hand, in the same period, it has continued to increase in low and middle-income countries, and most of the deaths due to smoking have occurred in low and middle-income countries.<sup>6,7</sup> Although there is a global decrease in the prevalence of smoking, it is predicted that the increase will continue in low- and middle-income countries where 80% of smokers live.<sup>8</sup> More than one billion people

worldwide smoke cigarettes. The majority of smokers live in Asian countries such as India, China, and Indonesia. In ten countries, including Türkiye, smokers constitute two-thirds of the total population of smokers.<sup>9</sup>

Türkiye is among the countries with the highest number of smokers. The rate of smoking among individuals aged 15 and over in Türkiye was 26.5% in 2016. As a result of the efforts made, smoking was reduced from 33.4% in 2006 to 23.8% in 2012. However, after this year, there has been an increase in smoking again and this rate fluctuates periodically.<sup>10</sup>

Within the framework of the fight against smoking, there are two basic methods: preventing individuals who are not smokers and helping individuals who smoke for cessation. Türkiye signed and became a part of the Framework Convention on Tobacco Control (FCTC) in 2004 and within this framework, many strategies have been developed in terms of combating smoking.<sup>11</sup> Besides, the World Health Organization (WHO) released the MPOWER package in 2008. This package includes six basic strategies to prevent people from smoking and to offer people help to quit smoking.<sup>12</sup> Although there are many strategies for tobacco control, promoting smokers to quit smoking is one of the main strategies.<sup>13</sup> Various attempts are made depending on these methods. When it comes to individuals who already smoke, they must first have an intention for smoking cessation. Only individuals who intend to quit smoking can be encouraged to take action in this direction. Therefore, the intention to quit smoking stands out as an important point.

The literature review showed that there are limited studies on this topic and there is no measurement tool with proven validity and reliability that can measure the intention to quit smoking in both Turkish and international literature. Therefore, this research aimed to develop a scale to measure the intention to quit smoking at the time of measurement.

## MATERIALS AND METHODS

This study is a cross-sectional and methodological research.

### Participants and Procedure

Convenience, purposeful, and snowball sampling methods were used together as a sampling method in the research. For each stage, questionnaire forms were created online and distributed to the people who were known to smoke through the researchers' networks. Then, these people were asked to deliver the online form to people they knew were smokers. A sample of 152 people for exploratory factor analysis and 124 people for confirmatory factor analysis were reached. In order to ensure the concurrent validity of the scale, 165 participants were reached. In the analysis of test-retest consistency, IQSS was applied to a group of 56 people twice, at three-week intervals. The sample size was calculated using the ten times method, which is frequently used in scale development studies. The number of items before factor analysis was 12. Therefore, the sample sizes were sufficient for each analysis.<sup>14,15</sup>

The main purpose of the research was to develop the "Intention to Quit Smoking Scale (IQSS)". Content validity, construct validity, concurrent validity, internal consistency, and test-retest consistency of the scale were ensured. A literature review was conducted and expert opinions were consulted for content validity. Exploratory and confirmatory factor analyses were used to ensure construct validity. In order to test the concurrent validity, the Smoking Cessation Success Prediction Scale (SCSPS) developed by Aydemir et al. was used.<sup>16</sup> (Permission to use the scale has been obtained). Cronbach's  $\alpha$  coefficient, composite reliability (CR), and Average Variance Extracted (AVE) values were calculated to determine internal consistency, composite reliability, and convergent validity. Finally, correlation analysis was used in order to reveal test-retest correlation. Exploratory factor analysis, reliability analysis, and correlation analysis were performed in SPSS 20.0, and

confirmatory factor analysis was performed in AMOS 20.0.

Informed consent was obtained from all individual participants included in the study.

### Measures

Questionnaire forms were used as data collection tools in the research. First, the IQSS form, consisting of an item pool, was used to obtain expert opinions. Afterward, a questionnaire form containing IQSS was used to ensure construct validity. IQSS and SCSPS were used together for concurrent validity.

While the IQSS was initially in the form of a pool of twenty and later twelve questions, it became a one-dimensional scale consisting of eight items after the construct validity was provided. It is a 5-category Likert-type scale (1=strongly disagree, 5=strongly agree). There is no reverse statement in the scale.

SCSPS is a five-category Likert-type scale (1=Very low, 5=Too many). It consists of ten items and two sub-dimensions. Items 1,2,6,8,9,10 are in the sub-dimension of stability and readiness, and items 3,4,5,7 are in the sub-dimension of health perception and appropriate environment. There is no reverse statement in the scale. The minimum score that can be obtained is 10 and the maximum score is 50.<sup>16</sup>

### Item Generation and Content Validity

In order to ensure content validity, two methods can be used: literature review and expert opinion.<sup>17</sup> In the literature review, it was determined that intention measurements were made in different ways. For example, in a study, there are answer options such as "Yes, definitely", "Yes", "No" and "Absolutely no" for the question of whether there is an intention to quit smoking.<sup>18</sup> Similarly, in a previous study, "No", "Probably no", "Probably yes" and "Yes" were given as answer options for the question about the intention to quit smoking within six months.<sup>19</sup> Similarly in Butler et al. (2018),

two answer options were given as “Yes” and “No” to the question “Do you seriously consider quitting smoking”.<sup>20</sup> In another study, two questions were asked about the intention to quit smoking within six months and within thirty days, and the answer options were similarly presented as “Yes” and “No”.<sup>21</sup> In addition to these examples, there are also studies in which there is only one question about the intention to quit smoking and there are 5 choices<sup>22,23</sup> and 7 choices response options.<sup>24</sup> Although single-item measures attract the attention of researchers due to their brevity and lack of properly developed scales or the absence of secondary data sets that can be used<sup>25</sup>, it should be considered that psychometric evaluation of such scales is difficult and in some cases impossible.<sup>26</sup>

A total of thirty-one studies in the literature in Turkish and English were examined and the question pool was created with the contribution of researchers and field experts. Forty statements were included in the item pool at the beginning. Then, the evaluation phase of the item pool consisting of forty statements was initiated. Here, experts evaluated the suitability of each item for the scale's purpose. In this context, experts from the fields of health management, social services, public health, nursing, and psychology were asked to evaluate each statement. As a result of the first round of expert evaluation, it was stated that the scale should be in a five-category Likert format, and the number of items in the scale was reduced to twenty.

After examining and revising the first draft of the scale, the second round of expert opinion was consulted for the scale consisting of twenty statements. Three of them were experts in health management, three in biostatistics, one in nursing, one in family medicine, one in measurement and evaluation, one in pulmonology, and one in public health. In line with the opinions of eleven experts, a scale form consisting of 12 candidate items was obtained to test the construct validity.

### **Ethical Approval**

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards. Besides, this study was approved by Selçuk University Faculty of Health Sciences Non-Interventional Clinical Research Ethics Committee (Date: 01/02/2021, No: 2021/2000).

### **Limitations**

There are some limitations in the research. First of all, due to the ongoing pandemic during the period of the research, the data of the research could be collected online at every stage. The research is limited to the statements in the scale and the answers given to these statements. The relevant literature could be reviewed in Turkish and English.

## **RESULTS AND DISCUSSION**

### **Construct Validity**

In the construct validity phase, exploratory factor analysis (EFA) was performed using the principal factor method and varimax rotation. Of the participants, 41.4% were female and 58.6% were male. 44.1% were married and 55.9% were single. The duration of smoking was 10 years or more for 44.7% of the participants, 5-10 years for 24.3%, 1-5 years for 21.7%, and 0-

1 year for 9.2%. The mean age of the participants was 30.68±9.52 years. Kaiser-Meyer-Olkin (KMO) sample adequacy criterion was 0.920 and the Bartlett sphericity test was significant ( $p<0.05$ ). These results indicated that the sample size obtained for EFA was sufficient.<sup>27</sup> In the two-factor structure formed as a result of EFA, the first factor consisted of nine statements and the second factor consisted of three statements. Since the second dimension was not



compatible with the research purpose, it was removed from the scale based on third-round expert opinion and EFA was repeated with the remaining nine items. In the analysis performed, the KMO sample adequacy criterion was 0.934 and the Bartlett sphericity test was significant ( $p < 0.05$ ). As a result of

EFA, it was determined that there was no item that did not contribute to the structure and disrupted the factor structure. The single factor explained 67.34% of the total variance.

The items and item factor loads obtained as a result of EFA are shown in Table 1;

**Table 1. Factor structure of the IQSS**

Factor	Statements	Factor Loads	Explained Variance
Intention to Quit Smoking	S.5. I am planning to quit smoking.	0.903	67.34%
	S.7. I will try to quit smoking.	0.901	
	S.8. I dream about quitting smoking.	0.884	
	S.1. I want to quit smoking.	0.837	
	S.11. Quitting smoking is important to me.	0.813	
	S.2. I will quit smoking soon.	0.812	
	S.9. I'm doing research on quitting smoking.	0.755	
	S.4. I intend to speak to a healthcare professional regarding smoking cessation.	0.730	
	S.12. If I knew how to do it, I would quit smoking.	0.729	

It was determined that there was no item in the scale with a factor load of less than 0.50 or overlapping. Based on the item-total correlation, there was no item with a low correlation and no items were deleted. Therefore, the one-dimensional and nine-statement structure revealed by EFA was tested by confirmatory factor analysis (CFA). Of the participants in this part of the study, 33.9% were female and 66.1% were male. 28.2% were married and 71.8% were single. The duration of smoking was 10 years or more for 30.6% of the participants, 5-10 years for 22.6%, 1-5 years for 30.6%, and 0-1 year for 16.1%. The mean age of the participants was  $28.08 \pm 10.72$  years. The explanatory power between observed variables and latent variables was evaluated with standardized regression coefficients. 12th statement, whose coefficients were not suitable for the CFA results and spoiled the goodness of fit of the model, was removed from the scale and the model's goodness of fit was increased.

In order to improve the goodness of fit in the CFA stage, covariance between items one and eight and between items two and eleven was established. The acceptable values for the fit indices and the index values obtained

as a result of the analysis are summarized in Table 2.<sup>28,29</sup>

**Table 2. Fit indices of the IQSS**

Name of the Indice	Acceptable Values	Value in the Model
X <sup>2</sup> / df	<3	1.767
GFI	>0.85	0.939
AGFI	>0.80	0.878
CFI	>0.90	0.984
NFI	>0.85	0.965
RMSEA	<0.08	0.079

It was determined that the fit indices values obtained within the scope of CFA were acceptable, and the model showed a good fit. The final scale consisted of eight statements and one sub-dimension. The structure with one dimension and eight statements constituted 69.69% of the total variance.

### Concurrent Validity

In order to test the concurrent validity, a total of 165 participants were included in this part of the study. Correlation analysis was used to investigate concurrent validity for IQSS. The results of the analysis are summarized in Table 3;

**Table 3. Correlations for Concurrent validity**

	Steadiness and readiness	Health perception and appropriate environment	SCSPS
IQSS	0.669*	0.698*	0.721*

\*p<0.01

It was determined that there were statistically significant relationships between IQSS and both SCSPS and its' sub-dimensions. A statistically significant, positive, and moderate relationship was found between IQSS and SCSPS's sub-dimensions "steadiness and readiness" and "health perception and appropriate environment" (p<0.01 and r=0.669; 0.698, respectively). A statistically significant, positive, and strong correlation was found between IQSS and SCSPS total scores (p<0.01; r=0.721). These results showed that the concurrent validity of the IQSS was provided.<sup>30</sup>

### Internal Consistency

Cronbach's  $\alpha$  coefficient, composite reliability (CR), and Average Variance

Extracted (AVE) values were used for the internal consistency, composite reliability, and convergent validity of the IQSS. The obtained values are summarized in Table 4. The internal consistency coefficient of IQSS was found to be 0.943. CR was 0.95 and AVE was 0.96. Based on these values, the scale provided internal consistency, composite reliability, and convergent validity.<sup>31</sup>

### Test-Retest Consistency

In order to test the consistency of the IQSS over time, the scale was administered to a group of 56 participants at three-week intervals. According to the results of the analysis, it was determined that there was a statistically significant, positive, and strong relationship between the test and retest mean scores (p<0.05; r=0.856). Therefore, it was determined that the test-retest consistency of the scale was high.<sup>30</sup>

**Table 4. The final structure of the IQSS**

Factor	Statements	Factor Loads	CR	AVE	Explained Variance	Cronbach's Alpha
Intention to Quit Smoking	1. I want to quit smoking.	0.846	0.95	0.76	69.69%	0.943
	2. I will quit smoking soon.	0.829				
	3. I intend to speak to a healthcare professional regarding smoking cessation.	0.727				
	4. I am planning to quit smoking.	0.906				
	5. I will try to quit smoking.	0.905				
	6. I dream about quitting smoking.	0.881				
	7. I'm doing research on quitting smoking.	0.766				
	8. Quitting smoking is important to me.	0.802				

This research was carried out to develop the "Intention to Quit Smoking Scale (IQSS)" consisting of eight items and one dimension, and to evaluate its psychometric properties. As a result of the factor analyses performed, it was determined that the single dimension of the IQSS constituted 69.69% of the total variance. This percent should be at least 50% and therefore it is well enough to represent the concept.<sup>32</sup> Item factor loadings were higher than 0.50 and differences between item-load values were at least 0.10. Therefore, item factor loadings were found to be high.<sup>33</sup> As a result of confirmatory factor

analysis, it was determined that eight statements and the one-dimensional structure had a good model fit. IQSS was found to be moderately correlated with SCSPS sub-dimensions and strongly correlated with SCSPS overall scale score, which indicated that the scale provided concurrent validity<sup>34</sup>. IQSS had high internal consistency, composite reliability, and convergent validity with Cronbach's alpha=0.89, CR=0.95, and AVE=0.96.<sup>31</sup> At the same time, a strong test-retest correlation (r=0.856) indicated that the scale was consistent over time.<sup>34</sup>

## CONCLUSION AND RECOMMENDATIONS

Today, efforts to combat smoking continue intensively. To sustain these efforts more effectively, they need to be based on measurements. The intention to quit smoking can provide important data in this sense. The results of the study show that IQSS is a very good scale that can be used to measure participants' intention to quit smoking at the time of measurement. It is psychometrically valid and reliable. The facts that it is very short and can be completed quickly and

easily indicate that the scale is practical. It is also considered to be comprehensive enough to measure a one-dimensional structure. Therefore, it can be used as a research topic alone or in combination with other scales. It is anticipated that future research will not need to remove or add any statement. It has to be addressed that eight-item IQSS can be completed in 1 minute and is therefore very feasible for use in busy environments.

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APPENDIX 1. TURKISH FORM OF THE IQSS

SİGARAYI BIRAKMA NİYETİ ÖLÇEĞİ* <sup>+</sup>	Kesinlikle katılmıyorum	Katılmıyorum	Ne katılıyorum ne katılmıyorum	Katılıyorum	Kesinlikle katılıyorum
1. Sigarayı bırakmayı planlıyorum.					
2. Sigarayı bırakmayı deneyeceğim					
3. Sigarayı bırakmakla ilgili hayaller kuruyorum.					
4. Sigarayı bırakmak istiyorum.					
5. Sigarayı bırakmak benim için önemli.					
6. Sigarayı yakın zamanda bırakacağım.					
7. Sigarayı bırakmakla ilgili araştırmalar yapıyorum.					
8. Sigarayı bırakmayla ilgili olarak bir sağlık profesyoneli ile görüşmeye niyetliyim					

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