


# Abstinence-Related Motivational Engagement Scale: Validity and Reliability in Turkish People

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## Abstract

**OBJECTIVES:** This research aimed to conduct a validity and reliability study of the Turkish version of the abstinence-related motivational engagement (ARME) scale.

**MATERIALS AND METHODS:** This study included 122 people and was administered in a smoking cessation clinic. The sociodemographic-smoking status characteristics questionnaire and the ARME scale were used for data collection. A psycholinguistic language adaptation was performed. In the validity, analyses, content, construct, and criterion-related validities were used. For content validity, expert evaluation was performed. For construct validity, principal component analyses (exploratory factor analyses) were performed. Orthogonal (Varimax) rotation was used to explore multiple factors. The Kaiser-Meyer-Olkin test was used to assess the adequacy of the sample size. For criterion-related validity, we compared the ARME scale points of people who were abstinent and had relapse for smoking at the end of the sixth month. In the reliability analysis, standard deviation (SD) and item analysis, internal consistency, and test-retest methods were used.

**RESULTS:** The four factors explain 58% of the total variance. Items have factor loading between 0.409 and 0.805. When the factor structure of the scale was assessed, the items in each factor group have a factor load of at least "0.40." Due to one-dimensional use of the original scale, it has been decided to maintain this scale in its original form. The ARME scale points of people who quit smoking were statistically higher than the points of people who had relapse at the end of the sixth month. Cronbach's alpha coefficients were between 0.846 and 0.763. Significant and positive correlation was found between the test-retest scale scores.

**CONCLUSION:** The Turkish adaptation of the ARME scale, which was developed for adults who quit smoking, is an adequately valid and reliable measurement instrument. It is considered that the scale might be used reliably in different cultures as well.

**KEYWORDS:** Abstinence-related motivational engagement scale, validity, reliability, quit smoking, motivational engagement

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## INTRODUCTION

Smoking is a complicated habitual form of behavior, and it has different types of behavioral components, such as beginning, quitting, maintaining, interruptedly smoking, and relapsing. In contrast, the process of smoking cessation requires a behavioral change [1]. One of the biggest problems with those who quit smoking is the relapsing period [2-4]. Most current smokers are interested in smoking cessation, and each year approximately two out of every three smokers attempt to quit. Many quit attempts are unplanned without any systemic support or program and do not utilize evidence-based treatments. For these reasons, successfully quitting smoking and achieving long-term abstinence is very difficult for smokers [5-8]. The proportion of successful quit attempts and prolonged abstinence achievement for these smokers is estimated at only 3% to 5% [3,6,9]. Therefore, identifying factors that are related to relapse and planning preventive interventions are crucial [4,8,10].

Motivational engagement has been successfully applied to smoking cessation [11]. Motivation is expressed as a critical factor for increasing the intention to quit smoking, facilitating cessation attempts, and maintaining successful abstinence in both the Relapse Prevention Theory and the Transtheoretical models [8]. The motivation level of quitting smoking is one of the important indicators to determine the success of short- and long-term abstinence or relapse [8,9]. Measuring the temporary changes in the motivation after the cessation seems to be helpful in comprehending and analyzing the role of abstinence motivation on smoking relapse. Simmons et al. [9] clinically monitored that smokers are inclined to be immensely involved in the quitting process in the early stage and maybe even weeks after the cessation, but that motivational involvement mostly decreases in time. Lesser motivational involvement might be due to the high rates of smoking relapse. After the smoking cessation, having a relapse in an early period is related to withdrawal symptoms, and it may associate with psychosocial reasons in the long term [9,12,13].

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There have been numerous researches on the evaluation of being prepared for quitting smoking and has received considerable clinical attention. The measures of being prepared to quit smoking, such as contemplation ladder and the stages of change algorithm, have predicted the quit attempts in the future. However, very few researches have been carried out to date for achieving gross motivational changes after a smoker has attempted to quit smoking. The abstinence-related motivational engagement (ARME) scale is a tool that is specifically designed for the people who are ex-smokers or quitted smoking. The study by Simmons et al. [9] supported the ARME construct at first and offers two versions of a reliable instrument to evaluate this construct. ARME has been shown to be a valid tool in measuring the level of abstinence-related motivational engagement.

This study aimed to conduct a validity and reliability study of the Turkish version of the ARME scale for the people who quitted smoking.

## MATERIAL AND METHODS

### Participants and Setting

This study was administered in a smoking cessation clinic of Etlik Cancer Early Diagnosis, Screening and Training Centre (CEDSTC). Ethical approval was received from the Institutional Ethics Committee (1491-193-14/1648-461). To use the ARME scale, we obtained permission from Thomas Brandon by e-mail. The participants were informed about the study; participants provided written informed consent.

### Sample

In scale studies, it is suggested to reach sample size in number of 5-10 times of the scale items [14,15]. The ARME scale includes 16 items and is a 7-point Likert scale scored from 1 to 7. The sample size was calculated according to 16 items and 7 points. We determined the sample size for this study as at least 112. All the individuals who applied to this center to quit smoking, who met the research criteria, and who agreed to participate in the study, were included in the study until the sample size reached. The study included 122 people.

The inclusion criteria were as follows:

- $\geq 18$  years of age
- Having quit smoking for at least 1 week and no longer than 1 year
- Previously smoked  $\geq 10$  cigarettes/day for  $\geq 1$  year

### Study Instruments

#### The sociodemographic and smoking status characteristics

The sociodemographic and smoking status characteristics were collected using a questionnaire prepared by the researchers.

#### The ARME Scale

The scale was designed by Simmons et al. [9]. It evaluates the degree of ongoing engagement in the cessation and maintenance process. Abstinence motivation is reflected by an ex-smoker's daily experience in areas that include cognitive effort, priority, vigilance, and excitement. Simmons et al. [9] did not conceptualize these themes as separate factors or subscales; they conceptualized ARME as a one-dimensional construct. The ARME scale consists of 16 items and designed

in 7-point Likert-type in an order from the weakest "completely disagree: 1" to the strongest "completely agree: 7". Items 4, 6, 12, and 13 are reverse encoded. A higher score indicates higher abstinence motivation. The Cronbach's alpha value was determined as 0.89 [9]. In our study, the Cronbach's alpha value was 0.84. The English and Turkish versions of scale items are shown in Table 1.

### Translation process

#### Psycholinguistic Language Adaptation of the ARME Scale

The ARME scale was translated into Turkish by a researcher and three academicians who had a good command of English. Then, the ARME scale was reviewed by two researchers. The reviewed scale was translated from Turkish to English by an academician who did not know the original copy of the scale; the translated scale was compared with the original scale by another academician and researcher. Since there was no major difference in meaning, the scale was applied to 5 ex-smokers. There were not scale items that misunderstood or inconsistent. Thereafter, the study was started [16].

#### Psychometric Features of the ARME Scale

The reliability and validity study was administered to 122 ex-smokers at Etlik CEDSTC. After 2 weeks, the test-retest reliability was administered to 30 participants who were randomized.

#### Statistical Analysis

In this study, the data were analyzed using SPSS (Statistical Package for the Social Sciences) version 15.0 (SPSS Inc.; Chicago, IL, USA) for Windows Evaluation Version. The results were assessed at 95% confidence interval and significance at a  $p < 0.05$ . To assess the validity and reliability of the Turkish version of ARME scale, several analyses were conducted:

#### Validity

1. Content validity: Expert evaluation
2. Construct validity: Factor analyses
3. Criterion-related validity: ARME scale points of people who quit smoking and relapse

#### Content validity

Content validity was conducted by five experts to validate the given scale in the frame of purpose, clarity, and conformity to the Turkish Culture. Regulations were made in line with the recommendations and critics of the experts.

#### Construct validity

Principal component analyses (exploratory factor analyses) were performed. Orthogonal (Varimax) rotation was used to explore multiple factors (sub-dimensions). To assess the adequacy of the sample size, the Kaiser-Meyer-Olkin (KMO) test was used [17].

#### Criterion-related validity

We compared the ARME scale points of people who quit smoking and relapse at the end of the sixth month.

#### Reliability

1. Standard deviation and item analysis
2. Internal consistency analysis
3. Test-retest reliability

**Table 1.** The Abstinence-Related Motivational Engagement (ARME) Scale (English Version and Turkish Version)

	Items (English/Turkish)
Item 1	Being smoke-free is my highest priority at this time. "Şu anda en önemli önceliğim sigarayı bırakmak."
Item 2	I try to anticipate and prepare for any challenges to being smoke-free. "Sigarayı bırakmayla nasıl mücadele edebileceğimi öngörmeye ve hazırlanmaya çalışıyorum."
Item 3	The thought of being a nonsmoker still excites me. "Sigara içmeyen biri olma düşüncesi beni hala heyecanlandırır."
Item 4	I spend little time thinking about becoming or staying smoke free. "Sigara içmeyen biri olma veya bırakmış olarak kalma üzerinde az düşünürüm."
Item 5	I am doing whatever I can to avoid smoking. "Sigara içmekten kaçınmak için elimden gelen her şeyi yapıyorum."
Item 6	I am no longer all that excited about being smoke-free. "Sigara içmeyen biri olma düşüncesi artık beni heyecanlandırmıyor."
Item 7	I think about quitting smoking, or staying off cigarettes every single day. "Sigarayı bırakma ya da sigara içmeden durma hakkında her gün düşünürüm."
Item 8	Nothing is more important to me right now than being tobacco free. "Benim için hiçbir şey şu anda sigara içmiyor olmaktan daha önemli değil."
Item 9	I am willing to make sacrifices in other areas in order to be free of cigarettes. "Sigarayı bırakmak için hayatımın diğer alanlarında fedakarlık yapmaya razıyım."
Item 10	At this time, I am still very excited by the idea of being smoke-free. "Şu anda, sigarayı bırakma fikri hala beni heyecanlandırıyor."
Item 11	I spend a great deal of time thinking about becoming or staying smoke-free. "Sigarayı bırakma veya sigara içmeden durma düşüncesine çok zaman harcıyorum."
Item 12	I spend very little time preparing myself for any challenges to being smoke-free. "Sigarayı bırakma mücadelesine hazırlanmak için çok az zaman harcıyorum."
Item 13	Compared with other things in my life, fighting the urge to smoke is not the top priority for me right now. "Hayatımdaki diğer şeylerle karşılaştırıldığında, sigara içme isteği ile mücadele etmek, benim için şu anda en öncelikli konu değil."
Item 14	I am willing to spend a lot of mental energy on being smoking free. "Sigarayı bırakmış olmak için; çok fazla kafa yormaya razıyım."
Item 15	I feel energized just thinking about being smoke-free. "Sigarayı bırakmış olduğumu düşününce dahi kendimi enerjik hissediyorum."
Item 16	I am carefully watching out for things that might put me at risk for smoking. "Beni sigara içme riskiyle karşı karşıya getirebilecek şeylere dikkat ederim."

1: completely disagree "kesinlikle katılmıyorum"; 4: neither disagree or nor agree "kararsızım"; 7: completely agree "tamamen katılıyorum"

The scale must reliable and an indicator of consistency or accuracy of measurement values and validity. A higher value indicates that the measuring instrument is more reliable [18,19]. In this study, in the reliability analyses, the internal consistency of the ARME scale was measured by the Cronbach  $\alpha$ -coefficient.

Retest should be applied to the same study group on the same conditions. The time interval must be sufficiently long to prevent significant reminders, but short enough not to allow significant changes in the measured characteristic. In the literature, for reliability, it is stated that 25-50% of the participants in the first measurement are sufficient to participate in retest [14,16,18-20]. Our sample size was 122. Twenty-five percent of our sample was approximately 30. For this reason, retest measurements of 30 randomly selected samples were applied after 2 weeks.

Scores of the two measures were analyzed using paired samples t-test and Pearson's correlation analyses for test-retest reliability.

## RESULTS

### Sample Description

The total number of participants was 122 in the final sample of the study. Of the participants, 59% were men, 41% were women, 81.1% were married, 63.9% were university graduates, and the average age was 44.7 years (SD=1.2; min: 25, max: 71). Furthermore, 42.6% of individuals were workers. Before the smoking cessation, addicts had been smoking approximately 22.9±11.4 cigarettes per day, and they had been smoking for up to 25.8±12.1 years. Participants had started smoking at the age of 18.4±4.8 years and 26.5% of those ad-

**Table 2.** Demographic and smoking status characteristics

Characteristics		n	%
Age (years)	≤45	55	45.1
	>45	67	54.9
min=25, max=71, $\bar{X}$ =44.7±1.17			
Gender	Women	50	41.0
	Men	72	59.0
Marital status	Married	99	81.1
	Single / Widowed	23	18.9
Educational status	Primary education or lower	31	25.4
	Secondary education	13	10.7
	University	67	54.9
	Postgraduate	11	9.0
Working status	Working	52	42.6
	Not working	34	27.9
	Retired	36	29.5
<b>Characteristics (before quit smoking)</b>			
Age to start smoking (n=122)	≤17	59	48.4
	>17	63	51.6
min=6, max=36, $\bar{X}$ =18.43±4.84			
The reason for starting the cigarette (n=147*)	Wonder	18	12.2
	Emulation	33	22.4
	Environment / Other smokers	62	42.2
	Stress	25	17.0
	Other reasons	9	6.1
<b>Cigarettes per day (n=122)</b>	≤1 pack (20 pieces)	75	61.5
	>1 pack (20 pieces)	47	38.5
min=10, max=60, $\bar{X}$ =22.94±11.38			
<b>Years smoked (n=122)</b>	1-9	11	9.0
	10-19	35	28.7
	20-29	15	12.3
	30-39	40	32.8
	≥ 40	21	17.2
The reason for quitting smoking (n=143*)	Family request	20	14.0
	Public request/ALO 171	8	5.6
	Economic reasons	17	11.9
	Current disease/doctor's recommendation	25	17.5
	Fear of being sick in the future	35	24.5
	Beliefs	6	4.2
	Want to have children	7	4.9
	Physical effects/discomforts	16	11.2
	Own wish	9	6.3

\*: multiple answers were given; min: minimum; max: maximum;  
 $\bar{X}$  : arithmetic mean

dicts had started smoking due to psychological pressures in their social environments. The participants who quit smoking had approximately smoked for 25.8±12.1 years (Table 2).

## Validity

### Construct validity

According to the KMO test, the coefficient was 0.802 and the sample size was adequate. According to the Bartlett's test, the ARME scale items were suitable for factor analysis ( $\chi^2=648.751$ ,  $df=120$ ,  $p<0.01$ ).

A principal factor analysis was conducted to assess the factor structure of the ARME scale. Dataset yielded five eigenvalues >1.0; 64% variance percentages were explained by the factors and a scree plot, which visually suggested a five-factor solution. However, when we analyzed the five factors according to the initial principal-components analysis and performed Varimax rotations to standardize the loadings, we found that items in the second and third factors came together to form a consistent meaning, but factors 4 and 5 consisted of only two variables with high factor loadings. Therefore, we decided that the most appropriate solution was the four-factor structure.

According to the Varimax rotations, a second principal-component analysis with the 16 ARME scale items was used to determine structure validity. In the exploratory factor analysis, four factors with an eigenvalue above 1 were found; these factors explained 58% variance percentages. Distribution of items to factors and conceptual structure of the scale were appropriate. Finally, a four-factor structure was acceptable. Factor eigenvalues and variances, Cronbach Alpha values, and factor loadings are presented in Table 3.

The four factors explain 57.5% of the total variance (first factor 17%, second factor 16%, third factor 14%, and fourth factor 10%). Items have factor loading between 0.409 and 0.805. When the factor structure of the scale was assessed, the items in each factor group have a factor load of at least "0.40" (Table 3). Due to one-dimensional use of the original scale, it has been decided to keep this scale in its original form.

According to the factor analysis, the Cronbach Alpha values were 0.846 for total scale, 0.737 for first factor, 0.814 for second factor, 0.653 for third factor, and 0.514 for fourth factor (Table 3).

### Criterion-related validity

The ARME scale points of people who quit smoking (85.78±13.04) were statistically higher than the points of people who relapse (74.59±15.60) at the end of the sixth month ( $t=2.907$ ;  $p<0.05$ ).

### Reliability

#### Standard deviation and item analysis

There is no item with a corrected item-total score correlation of less than 0.20. If fourth and twelfth items are removed from the scale, the Cronbach alpha value rises from 0.846 to 0.849 and 0.850. However, since this is not a significant increase, it was decided to remain on the scale (Table 4).

#### Internal consistency analysis

The internal consistency analysis of the ARME scale with 16 items showed that the Cronbach's alpha coefficients were between 0.846 and 0.763 ( $p<0.01$ ).

#### Test-retest reliability

For the 30 participants, the average test scale scores were 83.67±13.79, and average retest scale scores were 80.50±14.47. No significant difference was found between the test-retest scores ( $t=1.738$ ;  $p=0.093$ ). Significant and positive correlation was found between the test-retest scale scores ( $r=0.752$ ;  $p<0.01$ ).

**Table 3.** Factor structure

Factors	Theme	Items	Factor loadings	Variances %	Eigenvalue	Cronbach alpha
Factor 1	Priority	Item 1	0.646	17.111	2.738	0.737
	Vigilance	Item 2	0.582			
	Priority	Item 8	0.461			
	Priority	Item 9	0.552			
	Excitement	Item 15	0.695			
	Vigilance	Item 16	0.543			
Factor 2	Excitement	Item 3	0.757	15.964	2.554	0.814
	Excitement	Item 6	0.805			
	Excitement	Item 10	0.740			
Factor 3	Cognitive effort	Item 4	0.519	13.981	2.237	0.653
	Effort	Item 7	0.675			
	Cognitive effort	Item 11	0.764			
	Cognitive effort	Item 14	0.595			
Factor 4	Vigilance	Item 5	0.409	10.399	1.664	0.514
	Vigilance	Item 12	0.703			
	Priority	Item 13	0.672			
Total		16 items		57.455		0.846

**Table 4.** Items total points correlations

	Scale items	Average of scale points when item is deleted	Scale variance when item is deleted	Corrected item total score correlation	Scale Cronbach alpha when item is deleted
n=122	Item 1	72.541	252.548	0.502	0.835
	Item 2	72.738	255.303	0.472	0.836
	Item 3	72.492	247.905	0.600	0.830
	Item 4	74.467	267.623	0.213	0.850
Item=16	Item 5	72.812	245.840	0.605	0.829
	Item 6	72.828	256.045	0.401	0.840
Cronbach alpha=0.846	Item 7	73.566	244.198	0.517	0.834
	Item 8	73.812	249.129	0.497	0.835
	Item 9	73.057	251.509	0.496	0.835
	Item 10	72.680	241.657	0.702	0.824
$\bar{X} \pm SD$ 78.17±16.90	Item 11	74.730	250.282	0.522	0.834
	Item 12	74.500	267.012	0.233	0.849
Variance= 285.582	Item 13	74.279	252.517	0.427	0.839
	Item 14	72.959	253.147	0.485	0.836
	Item 15	72.230	263.385	0.389	0.841
	Item 16	72.893	259.253	0.389	0.841

$\bar{X}$  : arithmetic mean; SD: standard deviation

## DISCUSSION

In this study, the validity and reliability of the ARME scale in Turkish ex-smokers were assessed. It is concluded that the scale is an adequately valid and reliable measurement instrument. The results were compared with the study of Simmons et al. [9]. Since no other study using this scale in the literature has been found, we could not make a comparison.

Simmons et al. [9] used the four themes to assess the domain of interest. However, they preferred a one-factor solution because of factor analysis and decided that the instrument was sampling a unitary construct. In scale adaptation studies, various results may be obtained depending on the countries and the characteristics of the individuals participated in the study. In our study, 5 factors, which explain 64% of the total variation, were determined because of the first factor analysis. Since the fourth and fifth factors consisted of only two vari-

ables, four factor solutions were preferred. It is considered that the four factors that were presented in our study comply with the conceptual construct determined for the scale.

The fact that scale reliability coefficient is approximately "1" indicates that the scale is similar to the standard test, and the fact that it is approximately "0" indicates that similarity is weak. Coefficients higher than 0.70 are often considered satisfactory, but coefficients higher than 0.80 are preferable [14,19]. In the original validity study of the scale, the Cronbach's alpha coefficient was 0.89, and in our study, the Cronbach's alpha coefficient was 0.85 [9]. A general evaluation showed that in the present study and the original study, the overall internal consistency of the ARME scale was high, and the scale structure represented the whole well.

In general, the time between two measurements in attitude scales varies according to the features of the measured instrument and it varies between 2-3 and 4-5 weeks; it is considered adequate that the test is repeated on 25-50% of the population [14,16,18-20]. Simmons et al. [9] argues that the instinctive commitment to quit smoking will decline over time. As predicted, ARME was negatively associated with length of abstinence, and this suggested that it is more sensitive to the dynamic aspects of continuing abstinence motivation. Hence, in our study, the test was administered after 2 weeks. Even after 2 weeks, there was a decrease in scores. In our study, when we looked at the test-retest correlations for the ARME scale, significant and positive correlations were found between the ARME scale scores. In conclusion, we found that the reliability of the Turkish version of the ARME scale was adequate.

The items were scored by the interview method when we were not able to observe the task directly. Discussion could be made just with original study. The study had recruited only one type of ex-smoker participants, which is considered a limitation.

In conclusion, findings obtained from validity and reliability studies have shown that the Turkish adaptation of the ARME scale, which was developed for adults who quit smoking, is an adequately valid and reliable measurement instrument. Hence, it is considered that the scale might be used reliably in different cultures as well. We suggest that further studies could be conducted longitudinally with different cultures samples.

**Ethics Committee Approval:** Ethics committee approval was received for this study from the Institutional Ethics Committee (1491-193-14/1648-461).

**Informed Consent:** Written informed consent was obtained from all participants who participated in this study.

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