

# Validity and Reliability of the Turkish Version of the Smartphone Addiction Scale in a Younger Population

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## ÖZET:

Akıllı Telefon Bağımlılığı Ölçeği'nin Türkçe formunun gençlerde geçerlilik ve güvenilirliği

**Amaç:** Akıllı telefonlar iletişim amaçlı kullanımları yanında internet, fotoğraf makinesi, video-ses kayıt cihazı, navigasyon, müzik çalar gibi birçok özelliğın bir arada toplandıđı günümüzün popüler teknolojik cihazlarıdır. Akıllı telefonların kullanımını hızla artmaktadır. Bu hızlı artış akıllı telefonlara bağımlılığı ve problemli kullanımı beraberinde getirmektedir. Bizim bildiğimiz kadarıyla Türkiye'de akıllı telefonlara bağımlılığı değerlendiren ölçek yoktur. Bu çalışmanın amacı Akıllı Telefon Bağımlılığı Ölçeği'nin Türkçe'ye uyarlanması, geçerlik ve güvenilirliğinin incelenmesidir.

**Yöntem:** Çalışmanın örneklemini Süleyman Demirel Üniversitesi Tıp Fakültesi'nde eğitim gören ve akıllı telefon kullanıcısı olan 301 üniversite öğrencisi oluşturmuştur. Çalışmada veri toplama araçları olarak Akıllı Telefon Bağımlılığı Ölçeđi, Bilgi Formu, İnternet Bağımlılığı Ölçeđi ve Problemli Cep Telefonu Kullanımı Ölçeđi kullanılmıştır. Ölçekler, tüm katılımcılara Bilgi Formu hep ilk sırada olacak şekilde karışık sırayla verilmiştir. Ölçeklerin doldurulması yaklaşık 20 dakika sürmüştür. Test-tekrar-test uygulaması rastgele belirlenmiş 30 öğrenci ile (rumuz yardımıyla) üç hafta sonra yapılmıştır. Ölçeđin faktör yapısı açıklayıcı faktör analizi ve varimax rotasyonu ile incelenmiştir. Güvenilirlik analizi için iç tutarlılık, iki-yarım güvenilirlik ve test-tekrar test güvenilirlik analizleri uygulanmıştır. Ölçüt bağıntılı geçerlilik analizinde Pearson korelasyon analizi kullanılmıştır.

**Bulgular:** Faktör Analizi yedi faktörlü bir yapı ortaya koymuş, maddelerin faktör yüklerinin 0,349-0,824 aralığında deđiştiđi belirlenmiştir. Ölçeđin Cronbach alfa iç tutarlılık katsayısı 0,947 bulunmuştur. Ölçeđin diđer ölçeklerle arasındaki korelasyonlar istatistiksel olarak anlamlı bulunmuştur. Test-tekrar test güvenilirliğinin yüksek olduđu ( $r=0,814$ ) bulunmuştur. İki yarım güvenilirlik analizinde Guttman Split-half katsayısı 0,893 olarak saptanmıştır. Kız öğrencilerde ölçek toplam puan ortalamasının erkeklerden istatistiksel olarak önemli düzeyde yüksek olduđu bulunmuştur ( $p=0,03$ ). Yaş ile ölçek toplam puanı arasında anlamlı olmayan negatif ilişki saptanmıştır ( $r=-0,086$ ,  $p=0,13$ ). En yüksek ölçek puan ortalaması 16 saat üzeri kullananlarda gözlenmiş olup 4 saatten az kullananlardan istatistiksel olarak önemli derecede fazla bulunmuştur ( $p=0,01$ ). Ölçek toplam puanı akıllı telefonu en çok kullanım amacına göre karşılaştırıldığında en yüksek ortalamanın oyun kategorisinde olduđu ancak internet ( $p=0,44$ ) ve sosyal ađ ( $p=0,98$ ) kategorilerinden farklı olmadığı, ayrıca telefon ( $p=0,02$ ), SMS ( $p=0,02$ ) ve diđer kullanım amacı ( $p=0,04$ ) kategori ortalamalarından istatistiksel olarak önemli derecede fazla olduđu bulunmuştur. Akıllı telefon bağımlısı olduđunu düşünenlerin ve bu konuda emin olmayanların toplam ölçek puanları akıllı telefon bağımlısı olduđunu düşünenlerin toplam ölçek puanlarından anlamlı şekilde yüksek bulunmuştur ( $p=0,01$ ).

**Sonuç:** Bu çalışmada, Akıllı Telefon Bağımlılığı Ölçeđi'nin Türkçe formunun akıllı telefon bağımlılıđının değerlendirilmesinde geçerli ve güvenilir bir ölçüm aracı olduđu bulunmuştur.

**Anahtar sözcükler:** akıllı telefon, bağımlılık, geçerlilik, güvenilirlik

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## ABSTRACT:

Validity and reliability of the Turkish Version of the Smartphone Addiction Scale in a younger population

**Objective:** Smartphones have many features such as communication, internet, photography, multimedia and navigation, and are currently one of the most popular technological devices. Usage of smartphones has increased rapidly and this rapid increase has brought about addiction and problematic usage. To our knowledge, there is no scale, which can be used to assess addiction to smartphones in the Turkish population. The aim of this study was to adapt Turkish terminology and to assess the reliability and validity of the Turkish version of the Smartphone Addiction Scale.

**Methods:** The sample was composed of 301 students studying at the Faculty of Medicine, Süleyman Demirel University, who used smartphones. In the study, in addition to the Smartphone Addiction Scale, an Information Form, the Internet Addiction Scale and the Problem Mobile Phone Use Scale were used as tools for collecting data. The scales were given to all attendees in mixed order and the Information Form was always given at the first stage. It took about 20 minutes to complete the scales. Test-retest application was made with 30 randomly selected students (with the help of nicknames) three weeks later. The factor structure of the scale was examined by factor analysis and the Varimax Rotation method. Internal consistency, split-half reliability and test-retest reliability analyses were conducted for the reliability analysis. Pearson correlation analysis was used to analyze criterion-related validity.

**Results:** Factor analysis revealed a seven-factor structure and factor loadings of items that ranged from 0.349 to 0.824. The Cronbach's alpha coefficient was founded to be 0.947 for the scale. Correlations between the Smartphone Addiction Scale-Turkish version and the other scales were statistically significant. The test-retest reliability was high ( $r=0.814$ ). The Guttman Split-half coefficient was calculated to be 0.893 in the split-half reliability analysis. The average total scores for girls were significantly higher than those for boys ( $p=0.03$ ). There was a non-significant negative correlation between age and scale total score ( $r=-0.086$ ,  $p=0.13$ ). Average scale scores were the highest in users who used smartphones for over 16 hours. Average scale scores were significantly higher in users who used smartphones for over 16 hours compared with users of smartphones for less than 4 hours ( $p=0.01$ ). We recorded the highest scale score in the game category. We didn't observe any statistical significance when comparing game scores with those of the internet ( $p=0.44$ ) and social networking ( $p=0.98$ ) categories. Additionally, total scores for gaming were significantly higher than those for voice calling ( $p=0.02$ ), short text messaging ( $p=0.02$ ) and other categories ( $p=0.04$ ). Moreover, the participants who selected the answers 'agree' or 'unsure' as self-rating for smartphone addiction obtained significantly higher scores than the participants who answered 'disagree' ( $p=0.01$ ).

**Conclusion:** In this study, we found that the Turkish version of the Smartphone Addiction Scale is a reliable and valid measurement tool for the evaluation of smartphone addiction.

**Keywords:** smartphone, addiction, validity, reliability

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## INTRODUCTION

Smartphones are a popular technological device, capable of processing more information than other mobile phones and including many features such as internet access, multimedia and navigation in addition to use for communication. The primary difference between plain mobile phones and smartphones is that smartphones provide easy access to the internet and various applications that can be downloaded<sup>1</sup>. Research has suggested that the number of smartphone users in the world is over 1.5 billion, and it is estimated that the number of smartphones to be sold in 2016 is going to be over 1 billion<sup>2</sup>.

Just as individuals can become addicted to various substances such as alcohol or drugs, they can also suffer from behavioral addictions where no physical substance abuse is in question, such as addiction to games, computers, television, shopping or the internet<sup>3</sup>. Similar to internet addiction, the booming use of smartphones and the fact that these phones encompass many features have raised the issue of smartphone addiction<sup>4</sup>. Official diagnostic criteria for smartphone addiction do not exist. However based on the definition of internet addiction, smartphone addiction has been defined as the overuse of smartphones to the extent that it disturbs the users' daily lives. It has been reported that smartphone addiction has many characteristics of addiction such as tolerance, withdrawal symptoms, preoccupation, mood dysregulation, craving and loss of control<sup>5</sup>. Smartphone addiction shows similarities to internet addiction in many respects<sup>6</sup>. Yet, there are also some differences such as the easy portability, real-time internet access and easy and direct communication features of smartphones<sup>5</sup>. In a study conducted in South Korea in 2012, the frequency of smartphone addiction (8.4%) was observed to be higher than the frequency of internet addiction (7.7%). The same study reported that 11.4% of 10-20 year-old individuals and 10.4% of 20-30 year-old individuals suffer from smartphone addiction<sup>7</sup>. It has been argued that especially the internet gaming and

social networking features of smartphones are increasingly becoming a problem<sup>4</sup>. The percentage of users of smartphones is rapidly increasing in the Turkish population. In a 2013 study, the smartphone usage rate was found to be 19% in Turkey<sup>8</sup>. This rapid increase brings about addiction and problematic usage of smartphones. The Smartphone Addiction Scale (SAS) is a self-reported scale developed by Kwon et al. based on internet addiction and the features of smartphones in 2013<sup>5</sup>. The scale consisted of 33 items rated on a 6-point Likert-type scale from 1 to 6. A high total score in the scale, which has no cut-off score, shows a smartphone addiction risk. Nowadays, researchers can find the SAS only in English since it has not been adapted to any other languages yet. Later the short form was developed for adolescents<sup>4</sup>. Furthermore, another scale has been recently developed for smartphone addiction<sup>9</sup>. According to our knowledge there is no scale, which evaluates addiction to smartphones in the Turkish population. The present study aims to adapt the SAS to Turkish and examine the validity and reliability of the scale.

## MATERIALS AND METHODS

### Participants and Practice

The participants in the current study were students of the Süleyman Demirel University School of Medicine. We contacted 438 students studying in the first, third and fifth grades, to represent the population. There was no student, who refused to participate in the study. However, because 108 of them were foreign citizens or did not use a smartphone, they were not included in the study. The final study population included 330 individuals. Twenty-nine of these subjects provided more than one answer to the items in the scale forms or did not provide any answer and their data were not included in the analyses; the analyses were conducted based on the data collected from 301 students. Of these, 167 (55.5%) were female and 134 (44.5%) were male. The average age was  $20.59 \pm 2.35$ . The scales were given

to the students in a random order but with the Information Form always on top. It took 20 minutes for all scales to be completed. For the test-retest procedure, the freshman students were asked to use a nickname that they could remember later. Three weeks later, thirty students randomly selected out of this group were given the scales once again. The research protocol was approved by Süleyman Demirel University Clinical Research Ethics Committee (Decision number: 2013-216). Written informed consent was obtained from all participants.

### Translation

First, one of the developers of the scale, Kwon M., was contacted via e-mail and the required permission was received in writing for the adaptation into Turkish. The scale was translated into Turkish by two linguists, and the final translations were evaluated by five experts in psychiatry and linguistics (three experts in psychiatry and two experts in linguistics who had no interrelation with the translators). Mutual agreement was established in common ways of expression (with a minimum of three experts). Back translation was carried out by two people working in the fields of psychiatry and linguistics. In the next stage of the process, eight research assistants in psychiatry were asked to evaluate the scale in terms of cultural relevance, purpose and understandability.

### Measurement

#### Smartphone Addiction Scale

The Smartphone Addiction Scale (SAS) is a 33-item, six-point Likert-type self-rating scale developed by Kwon et al. based on Young's internet addiction scale<sup>10</sup> and the features of smartphones<sup>5</sup>. The options on this scale range from 1 (definitely not), to 6 (absolutely yes). Higher scores indicate higher risks of smartphone addiction. The total score in the scale can vary between 33 and 198. A cut-off point was not

reported in the original scale. The validity and reliability analysis of the SAS has yielded a six-factor structure. Subscales have been identified as daily-life disturbance, positive anticipation, withdrawal, cyberspace-oriented relationship, overuse and tolerance. The developers of the scale found that the internal-consistency of the scale was Cronbach  $\alpha=0.967^4$ .

#### Internet Addiction Scale

Internet Addiction Scale (IAS), developed by Nichols & Nicki, assesses the presence and level of internet addiction<sup>11</sup>. It is a 31-item, self-report based, five-point Likert-type scale. It has been reported that a total of 93 points or above on the scale is indicative of internet addiction. The Cronbach internal consistency coefficient of the original scale was  $\alpha=0.95$ . The adaptation of the scale into Turkish was carried out by Kayri & Günüş, and the Cronbach internal consistency coefficient of the adapted scale was calculated to be  $\alpha=0.93^{12}$ .

#### Problematic Use of Mobile Phones Scale

The Problematic Use of Mobile Phones Scale (PUMPS), developed by Bianchi & Phillips, assesses the problematic use of mobile phones<sup>13</sup>. It is a 27-item, five-point Likert-type self-reported scale. Higher total scores indicate higher problematic use of mobile phones. The Cronbach internal consistency coefficient of the original scale was  $\alpha=0.93$ . The scale has been adapted into Turkish by Şar & Işıklar, and in this study the Cronbach internal consistency of the Turkish version was calculated to be  $\alpha=0.94^{14}$ .

#### Statistical Analysis

For the examination of structure validity, the Kaiser-Meyer-Olkin (0.938) and Bartlett's tests ( $p<0.001$ ) were utilized with a view to assess the conformity of the data to factor analysis. The factor analysis of the scale was done by using principal components analyses and Varimax Rotation with

the Kaiser Normalization method. Cronbach's alpha coefficient was calculated for internal consistency analysis of the Turkish version of the Smartphone Addiction Scale (TSAS). Furthermore split-half reliability analysis and test-retest reliability analysis were conducted for reliability analysis. Pearson correlation analysis was used for the assessment of convergent validity and test-retest validity. A One-Way ANOVA was conducted in order to determine the effect of variables concerning sociodemography and smartphone use on the TSAS scores. The important mean differences were mutually compared using the Duncan test. Statistical significance was set at a value of  $p < 0.05$ . The SPSS 15.0 software package was utilized for the analysis of all data.

## RESULTS

### Validity Analysis

The results of the analysis extracted a seven-factor structure with the factor loads of items varying between 0.349-0.824. Seven subscales account for the 66.4% of the total variance. Factor 1, "disturbing daily life and tolerance", was composed of eight items (Item 1, 2, 5, 29, 30, 31, 32, 33). Factor 2, "withdrawal symptoms", was composed of seven items (Item 10, 11, 12, 13, 14, 15, 16). Factor 3, "positive anticipation", was composed of five items (Item 6, 7, 8, 9, 20). Factor 4, "cyberspace-oriented relationships", was composed of four items (Item 21, 22, 23, 26). Factor

**Table 1: Principal components analysis and internal consistency of the Turkish version of the Smartphone Addiction Scale (n=301)**

Item	Component						
	1	2	3	4	5	6	7
Item 32	0.824						
Item 31	0.779						
Item 1	0.724						
Item 29	0.715						
Item 2	0.701						
Item 5	0.611						
Item 33	0.584						
Item 30	0.582						
Item 10		0.755					
Item 11		0.745					
Item 13		0.744					
Item 12		0.721					
Item 14		0.550					
Item 15		0.543					
Item 16		0.505					
Item 7			0.804				
Item 6			0.767				
Item 9			0.736				
Item 8			0.718				
Item 20			0.486				
Item 23				0.780			
Item 22				0.665			
Item 21				0.627			
Item 26				0.625			
Item 19					0.615		
Item 28					0.593		
Item 17					0.538		
Item 18					0.391		
Item 24						0.799	
Item 25						0.756	
Item 3							0.714
Item 4							0.679
Item 27							0.349
Cronbach's alpha	0.915	0.891	0.832	0.824	0.694	0.824	0.572
% of variance	16.1	13.1	9.8	8.8	7.1	5.9	5.6
Cumulative % of variance	16.1	29.2	39.0	47.8	54.9	60.8	66.4

5, “overuse”, was composed of four items (Item 17, 18, 19, 28). Factor 6, “social network dependence”, was composed of two items (Item 24, 25). Finally Factor 7, “physical symptoms”, contained three items (Item 3, 4, 27) (Table 1).

### Convergent Validity Analysis

In the convergent validity analysis, the correlations between the TSAS total score and the PUMPS and IAS total scores were examined. The TSAS total score was found to have positive correlations with the PUMPS ( $r=0.744$ ,  $p<0.001$ ) and IAS ( $r=0.646$ ,  $p<0.001$ ) total scores. It was found that the correlations between the TSAS subscales and the PUMPS total scores varied between 0.440-0.710, indicating a statistically significant positive correlation ( $p<0.01$ ). Likewise,

it was found that the correlations between the TSAS subscales and the IAS total scores varied between 0.430-0.620, indicating a statistically significant positive correlation ( $p<0.01$ ).

### Reliability Analysis

In the internal consistency analysis conducted, the Cronbach’s alpha internal consistency coefficient was calculated to be  $\alpha=0.947$ . It was recorded that the correlations between the subscales and the TSAS total score varied between 0.688-0.861, indicating a statistically significant positive correlation ( $p<0.01$ ). In addition, it was found that the correlations among the subscales varied between 0.391-0.659, indicating a statistically significant positive correlation. It was also found that, for all items, the item total

**Table 2: Item and reliability analyses results of the Turkish version of the Smartphone Addiction Scale**

Items	The average scale if item deleted	The variance scale if item deleted	Alpha if item deleted	Item-total correlations	Item-total correlation significance level
1	73.57	636,819	0.945	0.671	0.001
2	73.04	629,875	0.945	0.685	0.001
3	74.07	656,472	0.946	0.474	0.001
4	73.61	644,618	0.946	0.546	0.001
5	73.64	641,524	0.945	0.612	0.001
6	72.99	637,503	0.946	0.594	0.001
7	72.55	638,048	0.945	0.608	0.001
8	73.16	639,468	0.945	0.593	0.001
9	72.74	641,213	0.946	0.531	0.001
10	73.89	646,675	0.946	0.570	0.001
11	73.84	640,139	0.945	0.667	0.001
12	73.86	644,027	0.945	0.657	0.001
13	74.07	650,248	0.945	0.610	0.001
14	73.49	637,251	0.945	0.622	0.001
15	73.85	640,241	0.945	0.699	0.001
16	73.93	641,898	0.944	0.729	0.001
17	73.52	634,304	0.944	0.703	0.001
18	73.78	639,125	0.944	0.720	0.001
19	73.57	645,852	0.947	0.484	0.001
20	73.24	655,621	0.947	0.392	0.001
21	73.92	645,723	0.945	0.633	0.001
22	74.32	654,999	0.946	0.563	0.001
23	74.11	647,582	0.945	0.600	0.001
24	73.23	635,149	0.945	0.624	0.001
25	73.09	630,186	0.945	0.645	0.001
26	74.18	652,066	0.945	0.600	0.001
27	72.58	643,091	0.946	0.522	0.001
28	72.50	637,677	0.947	0.507	0.001
29	72.62	630,883	0.944	0.693	0.001
30	73.16	626,257	0.944	0.777	0.001
31	73.71	639,066	0.945	0.699	0.001
32	73.10	631,417	0.945	0.627	0.001
33	73.51	629,771	0.944	0.707	0.001

correlations have sufficient criteria (on a statistically significant level) and they varied between 0.392-0.777 ( $p < 0.001$ ) (Table 2). Data concerning the item total correlations and Cronbach's Alpha coefficients calculated for each item through an item-exclusion technique can be found in Table 2. In the split-half reliability analysis of the scale, the Guttman Split-half coefficient was calculated to be 0.893. In the test-retest reliability analysis, the data related to 31 individuals were analyzed through the Pearson correlation test and compared with the data obtained three weeks later; the test-retest reliability coefficient of the scale was found to be  $r = 0.814$  ( $p < 0.001$ ).

### TSAS Scores of The Participants

Three hundred and one participants were included in this study. Of these, 167 (55.5%) were female and 134 (44.5%) were male. Their TSAS scores were 78.63 and 72.19, respectively. When the relationship between average TSAS total scores and gender was examined, it was found that the total TSAS score average of females was statistically significantly higher than that of males ( $p = 0.03$ ). When the correlation between the age of participants and the TSAS total scores was examined, a statistically non-significant, negative correlation ( $r = -0.086$ ,  $p = 0.13$ ) was observed. Daily use of the smartphone was less than four hours for 71.4%, between four and sixteen hours for 26.9%, and more than sixteen hours for 1.7%. The highest TSAS score average was identified in individuals who used smartphones more than 16 hours, and their score average was found to be statistically significantly higher than those who used smartphones less than 4 hours ( $p = 0.01$ ). In the self-assessment of smartphone addiction, 40 (13.3%) students considered themselves as addicted to their smartphone, 182 (60.5%) students considered themselves to be not addicted and 79 (26.2%) students were unsure. The total scale points of those who considered that they had smartphone addiction and those who were not sure about it were significantly higher than those who did not consider that they had smartphone addiction

( $p = 0.01$ ). The major purpose of using the smartphones was to have a voice call for 121 (40.2%) participants. This major purpose was followed by "internet access" for 88 (29.2%) participants, "social networking" for 47 (15.6%) participants, "short text-messaging" for 35 (11.6%) participants, "gaming" for 7 (2.3%) participants and other purposes for 3 (1%) participants, respectively. When total scale scores are compared on the basis of the reason why smartphones are mostly used, the highest mean was observed in the "gaming" category, but it was not significantly different from the "internet access" category ( $p = 0.44$ ) or social network dependence ( $p = 0.98$ ). Apart from that, its mean was found to be statistically significantly higher than that of the categories of "voice calling" ( $p = 0.02$ ), "short text-messaging" ( $p = 0.02$ ) or other purposes ( $p = 0.04$ ). When the relationships between the duration of use ( $p = 0.47$ ), the number of smartphones used before the current one ( $p = 0.06$ ) and the total scale score were examined, no statistically significant difference could be found.

### DISCUSSION

At the end of our study, analyses of the TSAS's internal consistency, factor structure and correlations with other scales indicate that this scale is a valid and reliable assessment instrument in the Turkish culture. During the course of our study, the original English scale had not been adapted to any other language. The advantages of the SAS scale can be summarized as: being a short scale, being a multiple-choice, easy to understand, easily applicable and easy to rate. And the disadvantages of the current scale can be listed as: the diagnostic criteria of the smartphone addiction are not accurately certain and some of the items located in the scale are suitable for the young population that is familiar with social networking for friendship. While the factor analysis identified that there was a six-factor structure in the original scale, accounting for the 60.99% of total variance<sup>4</sup>, a seven-factor structure has been identified in our study. It was found by the present study that this



structure accounted for the 66.4% of the total variance. This difference might have resulted from cultural differences such as differences in economic situations and the age range, the frequency of the use of technology and the cyberspace-oriented relationship in Far Eastern societies.

In our study, while the convergent validity analysis was conducted by the examination of the total score correlations of the PUMPS and IAS, a positive correlation has been identified between the scale of the TSAS and the scales of the PUMPS and IAS. Moreover, it was found that the subscales of the TSAS showed statistically significant positive correlations with the total scores of the PUMPS and IAS.

A Cronbach's alpha coefficient higher than 0.70 is considered sufficient for the scales to be used in studies<sup>15</sup>. The Cronbach's alpha internal consistency coefficient of the Turkish form was found to be  $\alpha=0.947$  while it was found to be  $\alpha=0.967$  in the original scale. This result indicates that the Turkish version of the scale has a very high level of internal consistency<sup>4</sup>. Moreover, when the internal consistencies of the subscales in our study were examined, the internal consistencies of six out of seven of the subscales were found to be highly related, with the exception of the seventh factor, the 'physical symptoms' subscale, whose internal consistency is at a medium level. The scale was given to 31 individuals three weeks after the first test in order to identify the time independence of the scale. The test-retest reliability coefficient of the scale was found to be  $r=0.814$  ( $p<0.001$ ). Also, split-half reliability analysis was conducted in our study and the result of this analysis was 0.893. This figure shows that the split-half reliability of the Turkish form of the SAS was also high. It is a known fact that the item total score correlations should be at least 0.30 in scales<sup>16,17</sup>. In our study, it has been identified that the item total correlations for all items have sufficient criteria at a statistically significant level, varying between 0.392 and 0.777 as per the literature.

The validity and reliability study of the original scale was conducted with the participation of 197

participants from two universities and two companies in South Korea<sup>4</sup>. In the study, no difference between the SAS mean scores of genders was observed. However, in our study, the TSAS mean scores of female students were found to be statistically significantly higher than those of male students ( $p=0.03$ ). In South Korea, in another study carried out with the shorter ten-item form of the SAS developed for adolescents, mean scores of female students were found to be statistically significantly higher than those of male students, just like the results of our study suggest<sup>5</sup>. Also, in studies on mobile phone use, problems with mobile phone use were found to be higher among females than they were among males<sup>18,19</sup>. Furthermore, in the study of the original scale, the SAS mean scores were found to be 104.5 in males and 112.7 in females<sup>4</sup>, while in our study they were found to be 72.2 in males and 78.7 in females. This finding was interpreted as suggestive of a lesser risk of smartphone addiction among the Turkish society when compared to the South Korean society. When the relationship between age and TSAS mean scores in our study was examined, a negative relationship that was not statistically significant was observed ( $p=0.13$ ). The finding that smartphone use was more common among younger people, is in conformity with the results of the research carried out by the South Korea National Information Society Agency, which suggests that smartphone addiction is more prevalent among 10-20 year-old individuals when compared to the 20-30 year-old population<sup>7</sup>. In the psychometric examination of the scale, the total SAS scores of those who believed that they had smartphone addiction was found to be significantly higher than those who were not sure or those who believed that they did not have smartphone addiction<sup>4</sup>. In our study, the total scale points of those who believed that they had smartphone addiction and those who were not sure about it were significantly higher than those who did not believe that they had smartphone addiction. Therefore, we are of the opinion that self-reporting on smartphone addiction can be a predictor of TSAS scores. In our study, the finding

**Table 3: Turkish Version of the Smartphone Addiction Scale**

	Kesinlikle hayır	Hayır	Kısmen hayır	Kısmen evet	Evet	Kesinlikle evet
1 Akıllı telefon kullanımım sebebiyle planlanmış işlerimi yetiştiremiyorum.	1	2	3	4	5	6
2 Akıllı telefon kullanımım sebebiyle sınıfta, ödev yaparken veya çalışırken konsantre olmakta güçlük çekiyorum	1	2	3	4	5	6
3 Aşırı akıllı telefon kullanımına bağlı baş dönmesi ya da bulanık görme yaşıyorum.	1	2	3	4	5	6
4 Akıllı telefon kullanırken bileklerimde ya da boynumun arkasında ağrı hissediyorum.	1	2	3	4	5	6
5 Aşırı akıllı telefon kullanımı sebebiyle yeterli uykumu alamıyorum ve kendimi yorgun hissediyorum	1	2	3	4	5	6
6 Akıllı telefon kullanırken sakinleşiyor ve rahatlıyorum	1	2	3	4	5	6
7 Akıllı telefon kullanırken kendimi keyifli ve coşkulu hissediyorum.	1	2	3	4	5	6
8 Akıllı telefon kullanırken kendimi güvende hissediyorum.	1	2	3	4	5	6
9 Akıllı telefon ile stresten kurtulmak mümkündür.	1	2	3	4	5	6
10 Akıllı telefon kullanmaktan daha eğlenceli bir şey yoktur.	1	2	3	4	5	6
11 Akıllı telefonum olmazsa hayatım bomboş olur.	1	2	3	4	5	6
12 Kendimi en çok akıllı telefon kullanırken özgür hissediyorum.	1	2	3	4	5	6
13 Akıllı telefon kullanmak hayatımdaki en eğlenceli şeydir.	1	2	3	4	5	6
14 Akıllı telefonumun olmamasına dayanmam.	1	2	3	4	5	6
15 Akıllı telefonum elimde değilken kendimi sabırsız ve sinirli hissediyorum.	1	2	3	4	5	6
16 Kullanmadığım zamanlarda bile aklımda akıllı telefonum var.	1	2	3	4	5	6
17 Günlük hayatımı büyük ölçüde etkilese bile akıllı telefonumu kullanmaktan asla vazgeçmem.	1	2	3	4	5	6
18 Akıllı telefonumla meşgul iken rahatsız edilmek beni sinirlendirir.	1	2	3	4	5	6
19 Tuvalete acilen gitmek zorunda olsam bile akıllı telefonumu yanıma alırım.	1	2	3	4	5	6
20 Akıllı telefon aracılığıyla daha fazla insanla tanışmak harika bir duygudur.	1	2	3	4	5	6
21 Akıllı telefondaki arkadaşlarımla olan ilişkilerimin gerçek yaşamdaki arkadaşlarımla olan ilişkilerimden daha samimi olduğunu düşünüyorum	1	2	3	4	5	6
22 Akıllı telefonumu kullanamamak bir arkadaşımı kaybetmek kadar acı verici olabilir.	1	2	3	4	5	6
23 Akıllı telefondaki arkadaşlarımla, gerçek hayattaki arkadaşlarıma göre beni daha iyi anladıklarını düşünüyorum.	1	2	3	4	5	6
24 İnsanların Twitter ya da Facebook'taki konuşmalarını kaçırmamak için akıllı telefonumu sürekli kontrol ederim.	1	2	3	4	5	6
25 Twitter ya da Facebook gibi sosyal ağları uyanır uyanmaz kontrol ederim.	1	2	3	4	5	6
26 Akıllı telefondaki arkadaşlarımla zaman geçirmeyi gerçek yaşamdaki arkadaşlarımla ya da diğer aile bireyleriyle zaman geçirmeye tercih ediyorum.	1	2	3	4	5	6
27 Diğer insanlara sormaktansa akıllı telefonumdan araştırmayı tercih ederim.	1	2	3	4	5	6
28 Akıllı telefonumun bataryası tam doluyken bile bir gün gitmez.	1	2	3	4	5	6
29 Akıllı telefonumu planladığımdan daha fazla kullanıyorum.	1	2	3	4	5	6
30 Akıllı telefonumu kullanmayı bıraktıktan hemen sonra yine kullanma ihtiyacı hissediyorum	1	2	3	4	5	6
31 Akıllı telefonumu kullanma süremi kısaltmayı defalarca denedim fakat her defasında başarısız oldum.	1	2	3	4	5	6
32 Akıllı telefon kullanma süremi kısaltmam gerektiğini hep düşünüyorum	1	2	3	4	5	6
33 Çevremdeki insanlar akıllı telefonumu çok fazla kullandığını söylüyorlar.	1	2	3	4	5	6



that the TSAS scores of individuals with more than 16 hours of smartphone use per day was significantly higher than those of the individuals with less than 4 hours of use per day seems to be suggestive of a relationship between the duration of use per day and the risk of addiction. In addition, the highest TSAS scores were observed in individuals who used their smartphones mostly for gaming, internet access and social networking, respectively. This result is similar to that of the original scale study<sup>4</sup>.

Limitations of this study were as follows: first, the sample was small and was not randomized; second, all the participants were university students and they may not represent the all population; third, the literature in this field is not yet rich enough, and fourth, during the course of

our study, the original English scale had not been adapted to any other language.

## CONCLUSION

The present study is important for being the first study examining the validity and reliability of the SAS in a Turkish sample. This study hereby concludes that the Turkish version of the SAS could be used as a valid and reliable instrument in the assessment of addiction to today's popular device, the smartphone.

## Supporting Information

Table 3: Turkish Version of the Smartphone Addiction Scale.

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