Developing the Smart Phone Addiction Scale and its Validity and Reliability Study

Ali Haydar ŞAR[1], Tuncay AYAS[2], Mehmet Barış HORZUM[3]

Abstract: The purpose of this research is to develop the smart phone addiction scale and conduct the studies of its validity and reliability. In accordance with this purpose, a literature review was performed and an item pool was generated while developing the Scale and expert view was received for face and content validity and the scale was pilot-applied to the target group. The scale was corrected in line with the pilot application and expert views, and then it was applied to the participants and the studies were performed for factorial and structure validity and reliability. The participants of the research were categorized into two separate groups for two different studies in developing the smart phone addiction scale. The first study was composed of 234 students who study at different high schools in the city center in Sakarya for the exploratory factor analysis. The second study comprised of 228 students who study at ninth grade of different high schools in the city center in Sakarya for the confirmatory factor analysis. For the factorial validity, the scale was firstly analyzed with the exploratory factor analysis and a confirmatory factor analysis was performed to confirm this structure. Convergent and discriminant validity was applied for the structure validity of the scale. As a result, a valid and reliable smart phone addiction scale was obtained.

Keywords: Smart phone, addiction, scale development, high school.

[1] *Sakarya Üniversitesi, Eğitim Fakültesi, Eğitim Bilimleri Bölümü, asar@sakarya.edu.tr*
[2] *Sakarya Üniversitesi Eğitim Fakültesi, Eğitim Bilimleri Bölümü, tayas@sakarya.edu.tr*
[3] *Sakarya Üinversitesi Eğitim Fakütesi, Bilgisayar ve Öğretim Teknolojileri Eğitimi Bölümü, mhorzum@sakarya.edu.tr*

Akıllı Telefon Bağımlılığı Ölçeği Geliştirme; Geçerlik ve Güvenirlik Çalışması

Öz: Bu araştırmanın amacı akıllı telefon bağımlılığı ölçeğinin geliştirilmesi, geçerlik ve güvenirlik çalışmalarının yapılmasıdır. Bu amaç doğrultusunda Ölçek geliştilirken öncelikle literatür taraması ile madde havuzu oluşturulmuş, oluşturulan madde havuzuna yönelik görünüş ve kapsam geçerliği için uzman görüşü alınmış ve ölçek hedef kitleye pilot olarak uygulanmıştır. Pilot uygulama ve uzman görüşleri doğrultusunda ölçeğin düzeltmeleri yapılıp ardından hedef kitleye ölçek uygulanarak faktöriyel ve yapı geçerliği ile güvenirlik çalışmaları gerçekleştirilmiştir. Akıllı telefon bağımlılığı ölçeğinin geliştirilmesinde araştırmanın katılımcıları iki farklı çalışma için iki ayrı grup olarak ele alınmıştır. İlk çalışmada açımlayıcı faktör analizi için Sakarya ili merkezinde yer alan farklı liselerde öğrenim gören 234 öğrenci oluşmuştur. İkinci çalışmada doğrulayıcı faktör analizi için Sakarya ili merkezinde yer alan farklı liselerde öğrenim gören 228 dokuzuncu sınıf öğrencisinden oluşmuştur. Ölçeğin faktöriyel geçerliğinde öncelikle açımlayıcı faktör analizi ile yapısı incelenmiş ve bu yapıyı doğrulamak içinse doğrulayıcı faktör analizi uygulanmıştır. Ölçeğin yapı geçerliği yakınsama ve ayırt edici geçerlik uygulanmıştır. Tüm bu işlemler sonucunda geçerli ve güvenilir bir akıllı telefon bağımlılığı ölçeği elde edilmiştir.

Keywords: Akıllı telefon, Bağımlılık, Ölçek geliştirme, Lise.

Introduction

The rapidly advancing technological tools have changed our daily behaviors and habits on a very wide level including communication and information. While technological tools make our lives easier, they cause certain problems such as technological addiction (Çakır Balta & Horzum, 2008). Smart phones are one of the primary technological tools that facilitate our lives but cause problems related to misuse. Smart phones help people connect to the virtual networks from wherever they are with their characteristics of computer and Internet connection alongside communication with others.

Mobile phones have become an important part of individuals' daily lives and now considered to be a important tool to communicate with others (Brown, 2013; Chen & Katz, 2009; Jones, Johnson-Yale, Millermaier & Perez, 2009; Leena, Tomi & Arja, 2005), call and text the family members, and friends and stay connected with them all the time; connect to Internet; play games; listen to music and spend quality time (Coogan and Kangas, 2001), and access information about different subjects; watch TV, video and take pictures. It was in found the Sönmez's study (2013) that the participants often used their mobile phones to log

into Facebook. It is seen that the use of mobile phones is increasingly becoming popular in terms of these characteristics of use. Given the world's population is over 7 billion; the number of smart phones used actively is over one billion according to data from 2013.

According to the research in Europe by the technology agency (Co-founder and CEO Fa Da social agency), the rate of having mobile phones among teenagers and youngsters has reached 76% and 40% of this rate have a second mobile phone (http://www.radikal.com/saglik). Deloitte (2013a, 2013b) reported that Turkey was on the top of the list concerning the Internet use on mobile phones in the research performed on fifteen countries. According to the 2013 results of Turkish Mobile Consumer Survey, the use of Internet-connected device increased at a rate of 42% compared to previous year and the number of mobile devices per capita is 5.4.

The increasing to overuse of mobile phone has brought a new concept of phobia called Nomophobia in psychology. The concept first coined in United Kingdom in 2008 seems to have turned into a form of phobia commonly used today. Nomophobia which is the fear of being out of mobile phone contact is observed in 76 out of 100 teenagers. Nomophobia, or the fear of being out of mobile phone contact, impacts the daily lifestyles of teenagers who want to continuously connect to the social networks (http://www.stargazete.com/saglik).

This wide use of mobile phone has given rise to many questions such as "Is mobile phone use a habit?", "Is it an impulse disorder?" or "Is it an addiction?". According to DSM-IV-TR (2005), the impulse control disorder is the difficulty to resist performing the recurrent and irresistible behavior and the behavior which is harmful to others. The best example for this, is the pathological gambling. The term "addiction" is a situation recurring with irresistible activities even if they turn out to be harmful to individual's psychological, cognitive or social health. In view of these definitions, it is called substance use disorder if the drugs are abused; it is named as impulse control disorder if it is an action (such as gambling). Habits are activities that do not trouble our current life and enrich our lives. However, it is stated that if these habits make us unsuccessful, cannot be controlled or start to be psychologically, socially or cognitively harmful, they turn out to generate addiction (Öztürk, 1989).

Even if the claim that mobile phone use can cause addiction is criticized by pharmacologists, it can be said that it is a premature criticism (Holden, 2001). Addiction reveals itself as becoming biologically dependent on a certain substance, and a function of the nervous system. However, some researchers argue that there are behavioral addictions just like biological addictions such as alcohol and drug abuse (Comings, 1995; Stein, Hollander, & Cohen, 1994). According to Hollender (1993), mobile phone addiction is defined as the disorder that causes the coercive behavior to eliminate a concern or an impulse similar to obsessive-compulsive disorders. But there is a discrepancy between these two behaviors. Accordingly, while the obsessive-compulsive behavior is rather performed to reduce the concern, behaviors such as problematic use of mobile phone and Internet is for pleasure. It can be concluded from all these explanations that it would be more appropriate to use the term addiction for the case of smart phone.

How does the smart phone addiction reveal itself? It is possible to answer this question using different approaches. According to Griffiths (2003), everything that gives excitement creates addiction. In this term, smart phone use cause addiction because it excites the individual. Another approach that we can use while explaining the smart phone addiction is the behaviorist learning theory. According to the behaviorist approach, if satisfaction or a pleasant situation is achieved after a behavior (positive reinforcer) or a behavior helps in getting rid of a negative behavior such as tension and distress (negative reinforcer), that behavior remains and the individual continues to perform that behavior to take pleasure or get rid of the negativity (Cüceloğlu, 1993). In this sense, smart phone use not only gives pleasure to the users but also saves them from pressure or anxiety.

Such case of reinforcement can be said to cause smart phone addiction. Another approach is Jacobs' (1988) general theory of addictions. According to Jacobs, low or high stimulations, low self-esteem and negative experiences of early childhood cause negative feelings and throw off individual's homeostatic balance. Hence, individuals gravitate towards addictive behaviors to avoid these negative emotions and stabilize the homeostatic balance. The study by Phillips, Ogeil and Blaszczynski (2011) purports to support this theory. They concluded in the study that individuals who used smart phones at high levels had low levels of self-esteem and they frequently used their mobile phones to increase their self-esteem.

It is seen that researches related to mobile phone addiction are based on Internet addiction. In such studies, low self-confidence and problems of social skills are considered to be the main problems that arise in Internet and mobile phone addiction (Kring, Davison, Neale and Johnson, 2007). In previous researches conducted within the scope of phone addiction, the behaviors of anxiety, concern and discomfort of deprivation have been observed in addicted individuals who are out of phone contact (Park, 2005).

When the literature was reviewed, it was seen that there is no measuring tool related to smart phone addiction and suitable for the Turkish culture even though measuring tools are available concerning mobile phone addiction. That is why developing a smart phone addiction scale suitable for the Turkish culture, performing its validity and reliability studies were determined as the purpose of the research.

Method

Model

This study is a scale development study. In a scale development study, first an item pool is generated through a literature review. The expert view is obtained for face and content validity and the pilot application of the scale is performed. Necessary adjustments are made in the scale in accordance with the pilot application and expert views. Next, the scale is applied to the participants and studies of factorial and structure validity, and reliability are conducted. Similar steps were taken in this study.

Participants

Totally 462 participants were categorized into two separate groups for two different studies in developing the smart phone addiction scale. For the exploratory factor analysis, in the first study, 234 students who study at different high schools in the city center in Sakarya were composed of 73 ninth grade students (31.2%), 54 tenth grade students (23.1%), 75 eleventh grade students (32.1%) and 32 twelfth grade students (13.7%). 121 (51.7%) of the participants are female, 113 (48.3%) of them are male. The ages of the students vary between 14 and 18, and the majority of them are 16 years old. The second study comprised of 228 students who study at ninth grade of different high schools in the city center in Sakarya for the confirmatory factor analysis. 126 (55.3%) of the participants are female, 102 (44.7%) of

them are male. The ages of the students vary between 14 and 18, and the majority of them are 16 years old.

Scale

The smart phone addiction scale was developed by the researchers. While developing the scale, the researchers first made a literature review and identified the items that could be suitable for smart phone addiction, and some items were changed appropriately for smart phone addiction when necessary. Then, mobile and smart phone addiction scales (Kwon et al., 2013; Şar & Işıklar, 2012) were investigated and some appropriate items were included in the item pool directly or after being changed. There were 40 items in the first item pool generated by the researchers. 5-point Likert-type grading was chosen for the agreeing level of the item pool, and the grading was determined as "Strongly Agree (5), Agree (4), Neutral (3), Disagree (2) and Strongly Disagree (1)". The validity and reliability studies followed these procedures.

Procedures

The content, face, factorial and structure validity was investigated for scale's validity studies. As the experts to be presented with the scale, scholars from the fields of computer and instructional technologies, assessment and evaluation, psychological counseling and guidance were selected for scale's content and face validity. Four experts reviewed the items and requested two items to be excluded and the statements in three items to be changed. All adjustments emphasized in the expert review were made and two items were excluded from the scale. The scale was composed of total 38 items after the study of content and face validity.

These procedures were followed by the studies of factorial and structure validity, and reliability. For scale's factorial validity, its structure was firstly examined with the exploratory factor analysis (EFA) and a confirmatory factor analysis (CFA) was performed to confirm this structure. Convergent and discriminant validity was applied for the structure validity of the scale. It was determined for the convergence validity whether scale's factor loads and values of average variance extracted (AVE) were equal to or higher than 0.50. The discriminant validity was determined looking up whether the factors were lower than the correlation value between the square root factors of AVE values.

The scale was administered to 490 students for the validity and reliability studies and 478 of the scales were retrieved. Some data set was excluded from the research because a single type of agreeing grade was marked in 16 of them or any of the items in the scale was left blank. Consequently, data of 462 students were added to dataset. EFA and CFA were applied to these data in two separate sets. SPSS 13.0 software package was used for EFA and correlation; Lisrel 8.54 was utilized for CFA.

Results

First of all, EFA and CFA results were presented for the factorial validity. Then, convergence and disciriminant validity results were mentioned for the structure validity. Finally, reliability results were shared and the evidence was presented whether there were differences based on the cut-off points and the gender.

EFA Results

The EFA was performed with 38 items. Kaiser-Mayer-Olkin (KMO) Test which tests the sample fit was used for the analysis. KMO value was found to be .947. Secondly, it was determined through Bartlett's Sphericity Test (χ^2 = 4919.58, p.=.000) that the obtained data are suitable for a factor analysis. The principal component analysis was performed with 38 items in EFA. However, 8 of the items were excluded from the scale because they had factor values below .30 or similar factor loads in multiple items. Another principal component analysis was conducted with 30 items. As a result, the scale turned out to have a four factor structure. It would be more clearly understood by looking at the scree plot of EFA in Figure 1.
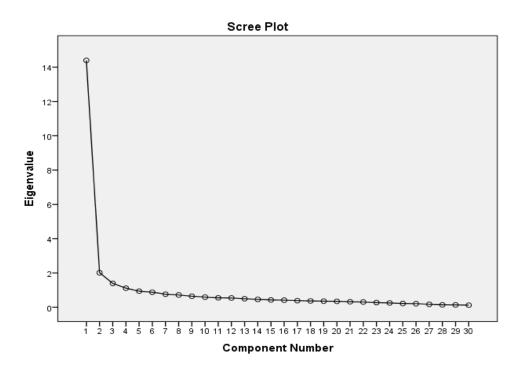
Figure 1. *Scree Plot of Exploratory Factor Analysis*

When the scree plot is examined, it is seen that the components above four had very similar values. The scale exhibits a four factor structure in this term. As a result of the EFA (Table 1) the lowest factor variance value of the items was found to be .397. However, it was also seen that 11 items had high values in multiple factors. Therefore, Varimax (25) rotation was performed. As a result, the scale was found to have a structure of 4 factors and 30 items.

Table 1. Exploratory Factor Analysis Results of Smart Phone Addiction Scale

Item	Common Factor Variance	Factor Load Values			
		Factor 1	Factor 2	Factor 3	Factor 4
M1	.615		.605		
M2	.676		.717		
M3	.622		.765		
M4	.468		.591		
M5	.563		.561		
M6	.452	.557			
M8	.622	.626			
M9	.645	.770			
M10	.645	.759			

Table 1 continued: Exploratory Factor Analysis Results of Smart Phone Addiction Scale

Item	Common Factor Variance	Factor Load Values			
		Factor 1	Factor 2	Factor 3	Factor 4
M13	.676	.758			
M14	.653	.607			
M15.	.692	.664			
M16	.678	.749			
M17	.528	.596			
M18	.559	.624			
M20	.620	.673			
M21	.578	.683			
M22	.741	.761			
M23	.714	.722			
M24	.715	.683			
M25	.699				.786
M27	.566				.579
M28	.695				.701
M31	.688			.721	
M34	.668			.640	
M35	.659			.774	
M36	.663			.620	
M37	.397				.444
Eigenvalue (Tot.= 18.93)		14.40	2.02	1.39	1.12
Explained Variance Total % = 63.06		47.98	6.72	4.64	3.72

The smart phone addiction scale has four factor structure. The first of these factors has 17 items, and their factor loading values ranged from 0.557 to 0.813. The eigenvalue of the first factor is 14.40 and explained variance is 47.98%. This factor is named as "*Relieving Oneself*". The second factor of the scale is "*Physical Impairment and Negligence of Daily Activities*" that is composed of 5 items. Second factor's eigenvalue is 2.02 and explained variance is 6.72%. The factor loading values of five items in the second factor ranged from 0.561 to 0.765. The third factor is composed of 4 items and called "*Obstraction face-to-face communication*" of which eigenvalue is 1.39

and explained variance is 4.64%. The factor loading values of five items in the third factor range from 0.620 to 0.774. The fourth and last factor of the scale is again composed of 4 items and named as "*unrestrainable use*", eigenvalue is 1.12 and explained variance is 3.72%. The factor loading values of four items in the fourth factor range from 0.444 to 0.768. The total eigenvalue of the smart phone addiction scale is 18.93; the total explained variance is 63.06%. The factor loading values of scale's 30 items in the factors range from 0.444 to 0.813.These results show that the scale adequately explains the quality measured by the variance. As a result, the scale was obtained in a structure of 30 items and four factors.

CFA Results

The fit indexes of the scale composed of 30 items and four factors were tested through CFA. CFA was performed with first and second order analyses. As a result of the first-order CFA of the smart phone addiction scale, fit indexes were found as χ^2= 1599.12 (df=399, p.= .000), χ^2 / df= 4.01, RMSEA= 0.087, GFI= 0.79, AGFI= 0.75, CFI=0.97, NFI=0.96 and NNFI= 0.96. In accordance with recommendations obtained from the first-order confirmatory factor analysis, it was decided to make modifications between 1st and 2nd, 10th and 11th, 12th and 13th, and 23rd and 24th items. As a result of the modifications, the fit indexes were found to be χ^2= 1173.95 (df=395, p.= .000), χ^2 / df=2.97 RMSEA= 0.071, GFI= 0.83, AGFI= 0.80, CFI=0.98, NFI=0.97 and NNFI=0.97. It was seen that the modifications contributed to χ^2 and fit indexes.

As a result of second-order CFA, when it was examined whether the four factors that constituted the scale significantly explain the latent variable of smart phone addiction, it was seen that all factors explain latent variable of smart phone addiction significantly. As a result of the analysis, the fit indexes were found to be χ^2= 1606.55 (df=399, p.= .000), χ^2 / df=4.03 RMSEA= 0.086, GFI= 0.79, AGFI= 0.76, CFI=0.97, NFI=0.96 and NNFI=0.96. In accordance with recommendations obtained from the second-order CFA, it was decided to make modifications between 9th and 11th, 12th and 13th, and 23rd and 24th items. It was seen that the modifications

significantly (p<0.05) contributed to χ^2 (Chi-square). The standard solution, T and R^2 values of each item as a result of CFA procedures are shown in Table 2.

Table 2. Results of *CFA, SS, T and* R^2

	SS	TV	R^2		SS	TV	R^2		SS	TV	R^2		SS	TV	R^2
M1	.78	11.96	.61	**M11**	.73	12.46	.53	**M21**	.74	12.66	.55	**M34**	.80	10.05	.64
M2	.81	12.20	.66	**M12**	.80	13.37	.64	**M22**	.86	14.04	.74	**M35**	.65	9.09	.42
M3	.61	10.08	.38	**M13**	.79	13.26	.63	**M23**	.82	13.54	.67	**M36**	.79	10.02	.63
M4	.52	8.86	.27	**M14**	.77	12.97	.59	**M24**	.82	13.58	.67	**M37**	.60	8.03	.36
M5	.70	11.15	.49	**M15.**	.82	13.65	.68	**M25**	.64	8.30	.41	**F1**	.84	9.65	.73
M6	.63	11.08	.40	**M16**	.81	13.49	.66	**M27**	.72	8.68	.52	**F2**	.86	10.73	.70
M8	.74	12.64	.55	**M17**	.71	12.18	.50	**M28**	.63	8.23	.39	**F3**	.86	7.66	.78
M9	.72	12.30	.51	**M18**	.73	12.49	.54	**M31**	.76	9.03	.57	**F4**	.88	8.47	.74
M10	.72	12.35	.52	**M20**	.75	12.76	.57								

It was seen in CFA that the items in four factors had standard solution between .52 and .86. Moreover, the items were found to have a R^2 value between .27 and .74. Since these values were high values, it was decided that all items were important for their factors. Afterwards, t values between factors and items were examined. According to Jöreskog and Sörbom (1996), the fact that no red arrows related to t values are available means that all items are significant (.05). No red arrows in t values showed that all items were significant at the level of .05. T values of the items that varied between 8.03 and 14.04 turned out to be significant at the level of .01.

As a result of the analysis, the fit indexes were found to be χ^2 (df=398, p.= .000) =1278.38, χ^2/df=3.21 RMSEA=0.075, SRMR= 0.054, GFI=0.82, AGFI=0.79, CFI=0.97, NFI=0.96 and NNFI=0.97. The fit index values proposed by Schermelleh-Engel, Moosbrugger and Müller (2003) were taken as basis, and when the fit index values of the scale were examined, χ^2/sd, SRMR, CFI, NFI and NNFI were found to be good fit and RMSEA was found to have an acceptable fit value. However, GFI and AFGI fit indexes were found to be below the acceptable value. The four-factor structure can be considered to have acceptable fit values.

Structure Validity

Convergence and discriminant validities were examined for the structure validity about whether the smart phone addiction scale measured the obtained structure. AVE values were looked up for each factor for the convergence validity. The AVE values of each factor were found to be 0.59, 0.49, 0.56, and 0.43 respectively. It is normally expected that these values would be above .50; however, Bagozzi and Youjae (1988) stated that the values up to .40 can be accepted while values below it should be deleted. In this term, it can be said to have convergence validity. For the discriminant validity, it was investigated whether AVE square roots of the scales were both above the correlation between structures and 0.50 (Fornell and Larcker, 1981), and the scales were found to have discriminant validity.

Table 3. Values of Discriminant *Validity*

Variables	F1	F2	F3	F4
F1	**0.76**			
F2	0.66	**0.69**		
F3	0.59	0.66	**0.75**	
F4	0.58	0.60	0.62	**0.65**

Reliability Results

Cronbach's Alpha internal consistency and composite reliability were used to determine the reliability of the scale. For the whole scale, Cronbach's Alpha value was found to be .962. The following internal consistency and composite reliability values were found for the factors of the scale respectively: .960 and .960; .819 and .818; .837 and .837; and .738 and .744. All internal consistency and composite reliability values being above .70 shows that scale's reliability values are high; in other words, it produces consistent data.

Cut-off points of Smart Phone Scale and Gender Difference

Total scores obtained from the scale form were applied with two-stage cluster analysis based on their homogenous distribution. The cut-off points at every level were revealed in a more detailed way in the cluster analysis. It was deemed that the total score to be obtained from the scale was clustered as 30 – 55, 56 – 78, 79 – 113, and 114 and above. This way, it is possible to measure the addiction levels in a detailed fashion. Johnson (2012) categorized the Internet and device addictions as liking within a continuous measurement, normal usage, habit, obsessive use and addiction. This categorization was generalized into the cluster analysis performed for the scale. In this categorization, the following score ranges were considered for the following users: 30 – 55 for normal smart phone user; 56 – 78 for habitual smart phone user; 79 – 113 for obsessive smart phone user; and 114 and above for addicted smart phone user. In the analysis performed on 234 participants, it was found that 128 (54.7%) students were normal smart phone users, 52 (22.2%) of them were habitual smart phone users; 28 (12%) were obsessive smart phone users, and 26 (11.1%) were addicted smart phone users.

T-test was performed for the independent sample concerning the smart phone addiction levels of students according to gender, and the data obtained from the test are presented in Table 4.

Table 4. Analysis Results of Smart Phone Addiction Scale Factors Scores according to Gender

	Gender	N	$\overline{x}$	SS	sd	t	p
F1	Female	120	38.45	21.47	231	2.47	.014
	Male	113	32.37	15.38			**
F2	Female	120	9.63	4.66	231	0.91	.362
	Male	113	9.09	4.27			
F3	Female	120	8.39	4.80	231	0.82	.415
	Male	113	7.90	4.30			
F4	Female	120	6.61	3.45	231	-0.25	.803
	Male	113	6.73	3.73			
Total	Female	120	63.10	31.45	231	1.92	.057
	Male	113	56.10	23.42			

When Table 4 was examined, it was found that the smart phone addiction factors of participants' genders, second ($t_{(231)}= 0.91$), third ($t_{(231)}= 0.82$), fourth ($t_{(231)}= -0.25$) factors as well as the total score ($t_{(231)}= 1.92$) did not show any significant difference statistically. On the other hand, the relieving oneself factor ($t_{(231)}= 2.47$) was found to have a statistically significant difference ($p<.05$). Accordingly, relieving oneself levels of female students were significantly higher than male students.

Conclusion

In accordance with technological developments, many innovations are commonly used by individuals because they facilitate their lives. The misuse and problematic use of technological developments cause certain problems. The use of smart phones other than for communication purposes such as surfing the Internet, taking photos, writing something down, drawing pictures and playing games on gaming applications, etc. may cause smart phone addiction which has started to be considered a new problem in individuals' lives. The Smart Phone Addiction Scale was developed to determine the smart phone addiction of individuals and its psychometric properties were examined in this study. The Smart Phone Addiction Scale is composed of 30 items and four factors. Exploratory and confirmatory factor analyses were performed to determine scale's factorial validity and convergence and discriminant validity analyses were conducted to determine the structure validity. When Cronbach's Alpha internal consistency coefficients and Donald's Omega were examined for scale's reliability study, it was seen that the scale could be used reliable. A cluster analysis was also performed during the scale development studies. As a result, scale were categorized on the basis of individuals according to their addiction levels. Consequently, it showed that the Smart Phone Addiction Scale developed within the scope of this research can measure the smart phone addiction levels of secondary and high school students.

The first factor of the scale is composed of 17 items and factor loading values of the items in the factor range from 0.557 to 0.813. The internal consistency coefficient of this factor was calculated to be .960. The second factor which has five items had factor loading values from 0.561 to 0.765. The internal consistency coefficient for this factor was calculated to be .819. Scale's third factor comprises of four items. The factor loading values of these items range from 0.620 to 0.774. The internal consistency coefficient for this factor was determined to be .738. Scale's fourth factor is composed of four items. The factor loading values of these items in the factor range from 0.444 to 0.786. The internal consistency coefficient of this factor was found to be .744.

The scale developed can be used in three different ways. For the first two uses, total score can be obtained from the scale items, making comparisons between the groups. For the second use, all items are added to obtain a general smart phone addiction while total score is obtained from the items in four factors, comparing the four factors. For the third use of the scale, total scores gained by each individual are identified and it can be determined into which categories obtained from the cluster analysis the individuals fall into.

Based on the results obtained from the psychometric studies performed within the scope of scale development studies, it can be argued that the scale can be used as a valid and reliable tool for determining the smart phone addiction levels of individuals. Eventually, the smart phone addiction scale is a scale of which validity and reliability studies were conducted with high school students but that is also suitable for the secondary school students in terms of item statements. In future studies, the scale can be utilized to determine the smart phone addiction levels of secondary and high schools, whether the levels exhibit difference according to various variables, and to associate this addiction with psychological variables that predict it or are predicted. In addition, it is recommended that whether the scale is

appropriate for primary school students and adults can be investigated through the validity-reliability studies.

References

Bagozzi, R., & Youjae, Y. (1988). On the evaluation of structural equation models. *Journal of The Academy of Marketing Science, 16*(1), 74-94.

Brown, C. (2013). Are we becoming more socially awkward? An analysis of the relationship between technological communication use and social skills in college students. *Psychology Honors Papers*. Paper 40.

Chen Y. F., & Katz J. (2009). Extending family to school life: College students use of the mobile phone, *International Journal of Human-Computer Studies, 67*(2), 179–191

Comings, D. E. (1995). Tourette's syndrome: A behavioral spectrum disorder. In W.J. Weiner & A.E. Lang (eds.), *Behavioral Neurology of Movement Disorders* (pp. 293-303). New York: Raven Press.

Coogan, K., & Kangas, S. (2001). Nuoret ja kommunikaatioakrobatia, 16-18-vuotiaiden nuorten k. annykk . a- ja internetkulttuurit. Nuorisotutkimusverkosto ja Elisa ommunications. Elisa tutkimuskeskus. Raportti 158

Cüceloğlu, D.(1993). *İnsan ve davranışı*. İstanbul: Remzi Kitapevi Yayınları.

Çakır Balta, Ö. & Horzum, M.B. (2008). Web tabanlı öğretim ortamındaki öğrencilerin internet bağımlılığını etkileyen faktörler. *Ankara Üniversitesi Eğitim Bilimleri Fakültesi Dergisi, 41*(1), 185-203.

Deloitte. (2013a). The state of the mobile consumer. Retrieved 28 May 2015 from: *www.deloitte/globalmobile2013.*

Deloitte. (2013b). Türkiye mobil tüketici anketi. Retrieved 28 May 2015 from: www.deloitte/globalmobile2013.

DSM-IV-TR (2005). *Tanı ölçütleri baş vuru el kitabı*. (Çev: Ertuğrul Köroğlu). Ankara: Hekimler Yayın Birliği.

Fornell, C., & Larcker, D. F. (1981). Evaluating structural equation models with unobservable variables and measurement error. *Journal of Marketing Research, 18*, 39-50.

Griffiths, M. D. (2003). Internet gambling: Issues, concerns and recommendations. *Journal of Cyber Psychology & Behavior*, *6*(6), 557-568.

Holden, C. (2001). Behavioral addictions: Do they exist? *Science*, *294*, 980-982.

Hollander, E. (1993). *Obsessive-compulsive related disorders*. Washington, DC: American Psychiatric Press.

http://www.radikal.com.tr/Radikal.aspx? (27 Nisan Cuma 2012)

http://www.stargazete.com/saglik/fobi-cebe-girdi/haber-534492. (10 Nisan Salı. 2012)

Humprehys, L. (2003). *Can you hear me now? A field study of mobile phone usage in public space.* Unpublished Master Thesis. Penssylvania: University of Pennsylvania.

Jacobs, D. F. (1988). Evidence for a common dissociative-like reaction among addicts. *Journal of Gambling Behavior*, 4(1), 27-37.

Jones, S., Johnson-Yale, C., Millermaier, S., & Pérez, F. S. (2009). US college students' Internet use: Race, gender and digital divides. *Journal of Computer-Mediated Communication*, 14(2), 244-264.

Johnson, N. F. (2012). *The multiplicities of internet addiction: The misrecognition of leisure and learning.* Cornwall: Ashgate Publishing, Ltd.

Kring, A. M., Davison, G. C., Neale, J. M., & Johnson, S. L. (2007). *Abnormal psychology* New York: John Wiley & Sons.

Kwon, M., Lee, J. Y., Won, W. Y., Park, J. W., Min, J. A., Hahn, C., ... & Kim, D. J. (2013). Development and validation of a smartphone addiction scale (SAS). PloS one, 8(2), e56936.

Leena, K., Tomi, L. & Arja, R. (2005). Intensity of mobile phone use and health compromising behaviors -how is information and communication technology connected to health-related lifestyle in adolescence? *Journal of Adolescence*, 28, 35-47.

Mass, F. (2013). IDC finds worldwide smartphone shipments on pace to grow nearly 40% in 2013 while average selling prices decline more than 12%. Retrieved 28 May 2015 from: http://www.idc.com.

Öztürk, O. (1989). *Ruh sağlığı ve bozuklukları* (2.Baskı). İstanbul: Evrim Basım Yayım Dağıtım.

Phillips, J. G., Ogeil, R. P. & Blaszczynski, A. (2011). Electronic interests and behaviors associated with gambling problems. *International Journal of Mental Health Addiction*, 1(2), 33-42.

Sönmez, B. (2013). Sosyal medya ve ortaöğretim öğretmenlerinin Facebook kullanma alışkanlıkları. Yayımlanmamış Doktora Tezi. Antalya: Akdeniz Üniversitesi.

Stein, D. J., Hollander, E., & Cohen, L. (1994). Neuropsychiatry of obsessive compulsive disorder. In: Hollander, E., Zohar, J., Marazzati, D., & Olivier, B. (eds). Current insights in Obsessive Compulsive Disorder (pp. 167-182). Chichester: John Wiley & Sons.

Şar, A. H., & Işıklar, A. (2012). Adaptation of problem mobile phone use scale to Turkish. *International Journal of Human Sciences, 9(2),* 264-275.