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Chapter 10
Investigation of Smartphone Use Addiction in Generation Y

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ABSTRACT

In recent years, rapidly developing of communication technology, increasing of internet and social networking applications usage have led to an increase in the level of smartphones dependence. Transformation of smartphone use from habit to addiction and spread of this addiction especially among young adults emphasize seriousness of the matter. In this context, the main purpose of this research is the investigation of smartphone use and addiction in Generation Y that are a part of the digital world. An online survey was conducted with 887 respondents who own a smartphone from Turkey. Five dimensions of smartphone addiction were extracted from the factor analysis, namely tolerance, accompany/fellowship, withdrawal, social network dependence, and health problems. In order to classify smartphone addiction groups, K-means cluster analysis was used on the extracted factors. Four groups named "nonaddicts," "heavy addicts," "realistic addicts," and "emotional addicts" were determined.

INTRODUCTION

In the digital age, mobile devices have become essential for people around the world and smartphone owners are becoming increasingly reliant on their devices, especially because of such devices' advanced capabilities. Even though the smartphone revolution is relatively young, every year the smartphone access becomes more penetrating. Smartphones are essential and it accompanies and participates in most people's daily rituals. In this regard, smartphone penetration continues to increase with each passing day (Ericsson, 2015a; Deloitte, 2015).

Research on mobile phone/smartphone usage reveal this distinct penetration all over the world. Ericson Mobility Report (2016) stated that the total number of mobile subscriptions at the end of 2015 was

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around 7.3 billion; there was an increase of 68 million subscriptions during fourth quarter of 2015. Global mobile penetration reached 100% in the same period. The number of smartphone users is forecasted to grow from 1.5 billion in 2014 to around 2.5 billion in 2019 and over 36% of the world's population is projected to use a smartphone by 2018 with an increase from about 10% in 2011 (Statista, 2015a).

A Consumers and Mobile Financial Services Report (2015) focused on consumers' use of mobile technology to access financial services and make financial decisions; according to the report, 87% of adults in the United States (US) has a mobile phone and 71% of mobile phones are smartphones, a substantial increase of smartphone use over the 61% rate in 2013. In addition, smartphone adoption is higher among 18-29 year olds than 30-44 year olds (Federal Reserve Board, 2015).

According to findings of a Pew Research Center's (2016) survey, gathered from among 45,435 respondents from 40 nations from March 25, 2015 to May 27, 2015, there was a noticeable rise over the past two years in the percentage of people who own a smartphone in the emerging and developing nations. Smartphone ownership rates have rapidly increased in many countries since 2013 from 21% to 37% in 2015. Additionally, within nearly every country, people who are between the ages of 18-34 are more likely to be internet and smartphone users. South Korea is noticiable country with the highest smartphone ownership rate of 88%. The smartphone ownership rate is 58% in China, 39% in Japan, 72% in the US, 67% in Canada, 68% in the United Kingdom, 60% in Germany, 77% in Australia, and 45% in Russia.

Approximately 29.5% of the global population used smartphones in 2014 and there were 196.6 million smartphone users in Europe, 163.9 million smartphone users in the US, and 944 million smartphone users in China (RapidValue, 2014). TNS/Google's (2014) Connected Consumer Study report is a global research which contains 57 country and helps to provide a better understanding of media markets and media related infrastructures. Findings from this report revealed that Singapore has a 85% smartphone penetration rate, the U.K. has a rate of 68%, Germany of 50%, and France of 49%.

It is predicted that around 90% of mobile data traffic will be from smartphones by the end of 2021 (Ericsson, 2015b). Furthermore, the Asia Pacific region will have the largest share of total smartphone traffic and smartphone subscriptions in the Middle East and Africa regions will grow more than 200% in 2021. The number of smartphone users in China which is the most populous country in the world is forecasted to grow from around 480 million in 2013 to almost 690 million in 2019 (Statista, 2015a). Around half of the Chinese population is projected to use a smartphone by 2018. Moreover, the number of smartphone users was around 170 million in US in 2014. By 2019, this number is expected to increase to 236 million.

Smartphones have become indispensable to daily life in Turkey too. Between July 2011 and July 2012 Turkey was one of the top ten fatest growing smartphone markets in the world (The Boston Consulting Group, 2013). The Our Mobile Planet Turkey report involved interviewing 1,000 Turkish adults between 18 and 64 years of age (Google Iposos MediaCT, 2013). Smartphone penetration was 14% in the first quarter of 2011, with this rate increasing to 30% in the first quarter of 2013 (Google Ipsos MediaCT, 2013) and increasing again to 56% in 2015 (Consumer Barometer Report, 2015). According to TNS/Google's (2014) Connected Consumer Study report, smartphone penetration in Turkey is 39%.

There have been significant increases in the number of people who have access to the internet in Turkey where 72% of people use the internet at least occasionally or own a smartphone, up from 41% in 2013 (Pew Research Center, 2015). Smartphone usage is higher among younger generations than older with a 93% of Turkish millennials (ages 18-34) owning a smartphone compared with 53% of Turkish people who were 35 or older (Pew Research Center, 2016). In 2016, the number of smartphone users in

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Turkey is estimated to reach 35.2 million while this number was 16 million in 2013. By 2019 the number of smartphone users in the Turkey is expected to increase to 48 million (Statista, 2015b).

Mobile Addiction

Mobile addiction is a disease of modern age and it has negative physical, psychological, and social impacts on people's lives (Hayatı Kaçırma, 2015). The term "addiction" is mostly explained in relation to specific objects and a narrow pattern of behavior such as alcoholism, heroin dependence, or cocaine dependence (Shaffer, 1996). However, this term is used widely to explain behavioral addictions such as gambling and excessive Internet, gaming, and mobile phone use (Kwon et al., 2013).

Behavioral addiction for mobile phones/smartphones is defined as obsessive use of a mobile phone/smartphone (Davey & Davey, 2014), and it has various names, including mobile phone dependence (Nikhita, Jadhav, & Ajinkya, 2015; Toda, Monden, Kubo, & Morimoto, 2006), mobile phone addiction (Babadi-Akashe, Zamani, & Hedayati, 2014; Chen, Yan, Tang, Yang, Xie, & He, 2016; Chung, 2011; Chóliz, 2012; Hong, Chiu, & Huang, 2012; Leung, 2008), problematic mobile phone use (Augner & Hacker, 2012; Beranuy, Oberst, Carbonell, & Chamarro, 2009; Bianchi & Phillips, 2005; Billieux, Van Der Linden, & Rochat, 2008; Takao, 2014; Hadlington, 2015), and smartphone addiction (Kwon, et al., 2013; Kwon, Kim, Cho, & Yang, 2013; Aljomaa, Al.Qudah, Albursan, Bakhiet, & Abduljabbar, 2016; Bian & Leung, 2015; Darcin, Kose, Noyan, Nurmedov, Yılmaz, & Dilbaz, 2016; Davey & Davey, 2014; Pavia, Cavani, Di Blasi, & Giordano, 2016).

The characteristics of mobile phone/smartphones addiction are excessive use, problems with parents related to excessive use of mobile phones/smartphones, interference with school or personal activities, emotional changes (Chóliz, 2012), physical disorders, withdrawal symptoms, developing tolerance to overuse, and deviant behavior (Chung, 2011).

People who can not stop using their phone even though it is harming their daily life are on the pathway to mobile phone/smartphones addiction (Heid, 2016). A survey based on 15,747 US smartphone owners found that 51% of women and 41% of men admitted they cannot live without their smartphone (Ligato, 2015). Approximately 15% of Americans between the ages of 18 and 29 are heavily dependent on a smartphone for online access and 46% of smartphone owners say that it is something they "couldn't live without" (Pew Research Center, 2015). Furthermore, 72% of people in one survey state that there is a very little chance that they will ever be more than 5 feet away from their phone (Addictiontips, 2015).

Most research suggests that people spend lots of time on their phones and check their device without receiving any notification (Heid, 2016). About 80% of the people in one study have experienced false vibrations and around 30% have heard ringing that simply did not exist. According to a 2013 internet study, the average mobile phone user checks their device 150 times a day while the more addicted check their phones as much as 900 times a day and they swipe the screen to unlock their phone an average of 110 times every day (Ligato, 2015; Addictiontips, 2015). U.K. consumers, especially younger age groups, look at their smartphones 400 billion times a year. In addition, 30% of smartphone owners check their phones unprompted "very often" or "almost always" to see whether any messages or updates have arrived (Deloitte, 2015).

According to one survey conducted between April 13-26, 2015 with 1000 US adults, 44% of respondents say that they could not make it through the day without their mobile device (Bank of America, 2015). People who were between the ages of 25-34 years old and between ages of the 35-49 years old are more dependent on their smartphones. In addition, 36% of repondents say that they check their smartphone

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constantly each day. Younger millennials (54%) who were between ages of the 18-24 are more likely to constantly check their mobile phones. Findings also revealed that 82% of adults considering returning home for their smartphone if they left it at home.

Most people in one survey believed that phones helps them feel normal and reduce their panic (Addictiontips, 2015). This study found that 58% of men and 47% of women felt fearful without their smartphone.

Problematic use of smartphones also influences the health of users. According to HuffPost/YouGov survey (2014), 38% of US smartphone owners reported that they fall asleep with a smartphone or other digital device in bed with them and that number was approximately 41% among those adults between the ages of 18-29. In another study, 80% of people between 18-24 slept with their phones right next to them (Addictiontips, 2015). Smartphone use late at night is associated with less sleep, less engagement at work, and morning depletion. Furthermore, many car accidents occur as a result of people using their phones while driving (Flynn, 2014; Addictiontips, 2015).

Symptoms of mobile addiction have been reported in Turkey too. According to Google Ipsos MediaCT's (2013) Our Mobile Planet Turkey report, 76% of Turkish people do not leave home without their devices. Deloitte's Global Mobile Consumer Survey 2015 reveals significant data related to mobile addiction among 1000 Turkish people between 18-50 years of age. The report indicates that Turkey has high rates of mobile addiction. More than 80% of participants were addictive above the average level. The highest level of mobile addiction occurred around the age of 30. According to the survey findings, 71.7% of smartphone owners looked at their devices more than 50 times a day and 47% of participants checked their smartphones "very often" about 100 times a day. One in three smartphone owners reaches for their devices after waking whithin 5 minutes and 28% of them do this immediately. Roughly 20% of smartphone owners used their devices while driving and crossing the road. Such use also influences the social life of Turkish people, with 41% of smartphone owners using their devices to talk with their family and friends (Deloitte, 2016).

Literature Review on Mobile Addiction

Increasing attention has been given to mobile addiction including mobile phone and smartphone addiction in literature. Most of these studies suggest the importance of personality, psychological, and physical effects of mobile phone/smartphone addiction. Bianchi and Phillips (2005) predicted problematic mobile phone use from extraversion, self-esteem, and neuroticism. Data were gathered from 195 participants ages at 18 to 85 years. Findings revealed that extraversion and low self-esteem were important factors in predicting problematic mobile phone use, especially for young people. James and Drennan (2005) explored addictive use of mobile phones through ten semi-structured interviews and a focus group with six participants. They found that attitudinal characteristics of addictive mobile phone users include believing in the importance of mobile phone in one's life, a sense of self identity with mobile phone, fear of group exclusion, and the device's entertainment or hedonistic value. Behavioral characteristics related to addictive mobile phone include impulsiveness, mounting tension prior to using the device, failure of control strategies, and withdrawal symptoms.

Toda, Monden, Kubo, and Morimoto (2006) found associations between the intensity of mobile phone use and health-related lifestyle. In addition, Billieux et al. (2007) found that urgency and lack of perseverance were positively correlated with perceived dependence on mobile phones among 108 female undergraduate psychology students. The following year, Billieux, Van Der Linden and Rochat

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(2008) developed and validated a new questionnaire of problematic mobile phone use and explored the link between problematic mobile phone use (e.g., prohibited use, dangerous use, dependence, financial problems) and impulsivity containing urgency, lack of premeditation, lack of perseverance, and sensation seeking. They found that high urgency and lack of perseverance were significant predictors of dependence on mobile phones, high urgency and high sensation seeking were predictors of dangerous use of mobile phones, low premeditation was a predictor of prohibited use of mobile phones, high urgency was a predictor of dependence on mobile phones, and high urgency and low perseverance were predictors of financial problems due to mobile phone use. Ha et al. (2008) researched the psychological and behavioral characteristics of excessive cell phone use and related behaviors among 595 high school students in Korea. The participants classified as the excessive user group were strongly addicted to their cellular phone and had more depressive symptoms, higher interpersonal anxiety, and lower self-esteem.

Leung (2008) examined mobile phone addiction symptoms and its relationship with psychological attributes, such as leisure boredom, sensation seeking, and self-esteem, among 402 teenagers and young adults aged 14–20 in Hong Kong. According to the findings, 27.4% of participants were identified as mobile phone addicts and had leisure boredom, sensation seeking issues, and poor self-esteem. In another study, Takao, Takahashi, and Kitamura (2009) investigated the relationship between problematic mobile phone use and personality traits among 444 Japanese university students who owned and used a mobile phone regularly. High self-monitoring and approval motivation predicted problematic mobile phone use, while loneliness did not predict problematic mobile phone. Beranuy, Oberst, Carbonell, and Chamarro (2009) explored maladaptive use of the internet and mobile phones and its relationship with psychological distress and mental disorders among 365 undergraduate students in Spain. Maladaptive use of internet and mobile phones were related to psychological distress.

Chung (2011) investigated the relationship between the use of mobile phones and the maintenance of interpersonal solidarity among 188 female adolescents in Korea. Results revealed that adolescents who have a greater tendency to be addicted used mobile phones excessively and that they did so to maintain interpersonal solidarity. Hong, Chiu, and Huang (2012) explored the relationship between psychological characteristics, mobile phone addiction, and mobile phone usage among 269 female university students in Taiwan. The study's findings revealed that there is a stronger relationship between female students' psychological characteristics and their mobile phone addiction. Moreover, there was a positive correlation between social extroversion and anxiety and mobile phone addiction. Augner and Hacker (2012) examined the associations between excessive use of mobile phones and certain indicators of psychological and physical health among 196 students in Austria. High chronic stress and low emotional stability were the best predictors of high problematic mobile phone use; depression and extraversion were also positively related to problematic mobile phone use. A similar study was conducted by Babadi-Akashe, Zamani and Hedayati (2014) who focused on the mobile phone addictive behavior and mental health among 296 university students in Iran. They found an inverse relationship between mobile phone addiction and behavioral problems, anxiety, depression, and psychosis.

Çağan, Ünsal and Çelik (2014) found that as daily use of mobile phone increases, the level of dependence on mobile phone increases as well and as the level of mobile phone dependency increases, the severity of depression and academic failure increases among Osmangazi University Health high schol students in Turkey. Takao (2014) examined the correlation between problematic mobile phone use and the big-five personality domains of extraversion, neuroticism, openness-to-experience, agreeableness, and conscientiousness. Problematic mobile phone use was linked to extraversion, neurosis, and openness-to-experience. Lee, Chang, Lin, and Cheng (2014) explored the relationships between psychological

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traits and stress and the compulsive behaviors of smartphone users. Compulsive usage of smartphones was positively correlated with an external locus of control, materialism, social interaction anxiety, and the need for touch. Furthermore, the findings revealed that compulsive usage of smartphone can trigger stress among smartphone users. Hadlington (2015) investigated the link between internet addiction and problematic mobile phone use, as well as the relationship with cognitive failures among 210 participants between the ages of 18 and 65. Internet addiction and problematic mobile phone use were positively related to higher scores on the cognitive failures in daily life; individuals with higher levels of problematic mobile phone use and internet addiction also had a lower working memory capacity and poorer attentional control.

Bian and Leung (2015) investigated roles of psychological attributes, such as shyness and loneliness, in symptoms of smartphone addiction and the effects of smartphone usage and smartphone addiction on social capital among 414 university students in China. Smartphone addiction was associated positively with loneliness and shyness. Darcin et al. (2016) examined Turkish university students' smartphone use and addiction and its relationship with social anxiety and loneliness. Social anxiety and loneliness were related to excessive smartphone use and loneliness was correlated with smartphone addiction. Participants who used their smartphones to access social networking sites have a higher risk for smartphone addiction than participants who used their smartphones mainly for Internet surfing or making phone calls. Chen et al. (2016) focused on the prevalence of mobile phone addiction among young adults, the differences between mobile phone addicts, possible mobile phone addicts, and nonaddicts in terms of their mobile phone use, and the mediating role of interpersonal problems in the relationship between mobile phone addiction and negative emotions among 1089 young adults in China. The findings revealed that 4% of young adults were mobile phone addicts, more than 58% were possible mobile phone addicts, and 37% were nonaddicts. Mobile phone addiction level was a positive indicator of negative emotions, like depression and social anxiety, and interpersonal problems mediated the relationship between mobile phone addiction levels and negative emotions. Aljomaa et al. (2016) focused on the frequency and indices of smartphone addiction among 416 university students in Saudi Arabia. Findings of the study revealed that 48% of students were addicted to their smarthpone and males used smartphones more often than females. Moreover, overuse and technological dimensions were the strongest predictors of smartphone addiction compared to the psychological-social, preoccupation with smartphones, and the health dimensions.

Studies have also been doncuted on the to effects of mobile addiction on academic performance. Chen (2006) examined the relationships between mobile phones use, mobile phone addiction, social capital, and academic performance among 166 college students in Taiwan. Results showed that mobile phone usage adversely affected heavy mobile phone users' academic performance and learning whereas light mobile phone users' academic performance and learning were influenced less. Findings also revealed that participants valued their mobile phones as a means to improve their relationships with their friends and family; therefore their mobile phones were used as communication tools to enhance their social capital. Lepp, Barkley, and Karpinski (2014) researched the link between cell phone use and academic performance, anxiety, and satisfaction with life among 536 undergraduate students in the US Cell phone use was negatively related to academic performance and satisfaction with life and positively related to anxiety. Participants who used cell phones frequently had lower academic performance, lower satisfaction with life, and higher anxiety. Hawi and Samaha (2016) examined the effects of smartphone addiction on academic performance among 293 university students. Approximately 44.6% of students at high risk for smartphone addiction had low academic performance.

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Salehan and Negahban (2013) investigated the effect of using social networking mobile applications on mobile phone addiction. The use of mobile social networking applications was a significant predictor of mobile addiction. Furthermore, Roberts, Petnji Yaya, and Manolis (2014) examined the association between cell-phone activities and cell-phone addiction among 184 college students; the number of calls made a positive effect on cell-phone addiction. Findings also revelaed that women spend an average of 600 minutes on their cell-phone every day compared to 459 minutes for males. Women were more addicted to using their cell-phone than men. Nikhita, Jadhav, and Ajinkya (2015) studied the prevalence of mobile phone dependence among 415 secondary school adolescents in India. Findings revealed that mobile phone dependence was associated with gender, family type, type of mobile phone used, average time per day spent using mobile phone, and years of mobile phone usage. Most of these studies suggest that young people, particularly students, tended to become more addictive to their mobile phone/smartphone. In this regard, the main purpose of this study is to investigate smartphone use and addiction among Generation Y in Turkey.

RESEARCH METHODOLOGY

The aim of this study was to investigate smartphone use and the addiction profile of Generation Y (ages 18-34). An online questionnaire was administered and data were gathered from 970 respondents. The first question of the survey was a filter question about smartphone ownership. Approximately 21 respondents indicated that they did not own a smartphone and 62 participants were not from Generation Y, and they were excluded from data analysis. As a result, a total of 887 usable responses were included in data analysis. Among the 887 participants, 666 were 18-24 and 221 were 25-34. Other demographic characteristics of respondents are shown as frequencies and percentages in Table 1.

There were four frequency questions asked concerning smartphone usage, such as duration of daily smartphone use (recorded in hours), frequency of looking at smartphone in one day, unprompted checking of smartphone in one day, and average monthly paid smartphone service charge. These questions were adapted from Deloitte (2015), Pew Research Center (2015), and Salesforce (2014).

There were 34 items on smartphone addiction used to identify the mobile addiction profile of participants which were measured on a seven-point Likert-type scale (1= "strongly disagree" to 7= "strongly agree"). Six of these items were adapted from Kwon et al.'s (2013) study, 18 were adapted from Kwon, Kim, Cho, and Yang's (2013) study, four were adapted from Bianchi and Phillips's (2005) study, four were adapted from Roberts, Petnji Yaya, and Manolis's (2014) study, two were adapted from Chung's (2011) study, and two were adapted from Chóliz's (2012) study. Data were analyzed with The Statistical

Table 1. Demographic profile of respondents

		N	%			N	%
Gender	Male	371	41.8		Formal education	661	74.5
	Female	516	58.2		Open education	15	1.7
Age	18-24	666	75.1	**Education**	Distance education	6	.7
	25-34	221	24.9		Master program	143	16.1
					Doctor of philosophy program	62	7.0

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Package for Social Science (SPSS) version 20. The reliability of the scale that measured smartphone addiction was 0.934 (Cronbach's Alpha).

FINDINGS OF THE STUDY

Smartphone Usage Profile of University Students

Findings related to the duration of smartphone usage, frequency of looking at smartphone, and unprompted checking of smartphone in a day were predictors of dependency on smartphone. Furthermore, 28.2% of students used their devices between 4 and 6 hours, and 21.3% used their devices over 6 hours in a day. Approximately 24% of students looked at their smartphones between 50 and 100 times, 11% looked at their devices between 100 and 150 times, and 11.5% looked at their devices over 150 times a day. Of the students, 40.8% "often" checked their smartphones without any notification and 6.7% of students checked their smartphones "very often". More than half of students paid monthly smartphone service charges of over 30TL (~ $10.46). The smartphone usage profile of respondents are presented as frequencies and percentages in Table 2.

Categorization of Smartphone Addiction

In order to analyze the structure of the smartphone addiction questionnaire, factor analysis was used and the 21 items of smarphone addicton were appropriate for the analysis. The Kaiser-Meyer-Olkin measure of sampling adequacy value was 0.908. Five factors were extracted from the factor analysis and all of factors had eigenvalues greater than 1. The extracted five factors explain 64.98 of the total variance and are named: tolerance, accompany/fellowship, withdrawal, social network dependence, and health

Table 2. Smartphone usuge profile of respondents

		N	%			N	%
Duration of daily smartphone use (hours)	<1	29	3.3	**Unprompted checking of smartphone in a day**	Never	21	2.4
	1-2	133	15.0		Sometimes	445	50.2
	2-4	286	32.2		Often	362	40.8
	4-6	250	28.2		Very Often	59	6.7
	>6	189	21.3				
Frequency of looking at smartphone in a day	Never	2	.2	**Average mounthly paid smartphone service charge**	<20TL	45	5.1
	Under 25 times	88	9.9		20-30TL	371	41.8
	25-50 times	222	25.0		30-40TL	187	21.1
	50-100 times	213	24.0		40-50TL	109	12.3
	100-150 times	98	11.0		50-60TL	66	7.4
	150-200 times	44	5.0		60-70TL	39	4.4
	Over 200 times	58	6.5		>70TL	70	7.9
	Don't know	162	18.3				

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problems. Results of factor analysis are included in table 3. Tolerance (6 items) explained 18.089% of the variance and has reliability of 0.841 (Cronbach's Alpha). This factor described lack of time management and inability to prevent increasing use of smartphones. Accompany/fellowship (6 items) explained 14.795% of the variance and has reliability of 0.857 (Cronbach's Alpha). This factor refered to the positive feelings about smartphones and frequent use of it, as well as the belief that smartphones are good for owners and provide a good time to them especially when owners feel lonely or bored. Withdrawal (4 items) explained 13.804% of the variance and has reliability of 0.797 (Cronbach's Alpha). This factor described being anxious, uneasy, and uncomfortable without one's smartphone or when the battery is reduced. Social network dependence (3 items) explained 11.365% of the variance and has reliability of 0.785 (Cronbach's Alpha). This factor referred to the importance of making friendships on one's smartphone's social network applications rather than in real life. Health problems (2 items) explained 6.927% of the vaiance and has reliability of 0.684 (Cronbach's Alpha). This factor included health problems due to excessive use of smartphones, such as experiencing lightheadedness, blurred vision, or feeling pain in different areas of the body.

As shown in Table 3, results revealed that accompany/fellowship ($\mu = 4.64$) and withdrawal ($\mu = 4.34$) were the strongest predictors of smartphone addiction and tolerance ($\mu = 3.90$). The main criterions in defining smartphone addiction among university students are that they use their smartphone rather than talk to others when they feel isolated or lonely ($\mu = 5.44$), they think that the most fun thing is to use their smartphnes ($\mu = 4.52$), and they look at their smartphone fruquently ($\mu = 4.93$). Other significant indicators of smartphone addiction among university students include withdrawal symptoms containing anxious feelings when the battery is low ($\mu = 5.04$) and getting agitated when their smartphone is not in sight ($\mu = 4.75$). Tolarance was also a predictor of smartphone addiction which refers the lack of time management for reducing smartphone use ($\mu = 4.44$) and that they spent more time on their smartphones than they intended ($\mu = 4.03$).

Clustering of Smartphone Addiction Groups

In order to classify smartphone addiction groups, K-means cluster analysis was used on the extracted factors. Four groups were determined and classified into "nonaddicts", "heavy addicts", "realistic addicts", and "emotional addicts". To determine whether there were group differences between smartphone addiction in terms of tolerance, accompany/fellowship, withdrawal, social network dependence, and health problems, One Way Analysis of Variance (ANOVA) was used. Results revealed that tolerance, accompany/fellowship, withdrawal, social network dependence, and health problems were signicantly different from each other, with the biggest difference found for withdrawal.

The final cluster centers shown in Table 5 represent the mean values of the four groups and allow for the differentiation between the characteristics of clusters in terms of smartphone addiction.

Cluster 1-Nonaddicts: Students in this cluster represent 25.1% of total university students who not dependent on their smartphones. Although they think using their smartphone is fun, they do not experience the lack of time management related to failing to reduce smartphone use, are not anxious, uneasy, or uncomfortable without their smartphone, experience no health problems due to excessive use of smartphones, and do not prefer to make friendships on smartphone's social network applications.

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Table 3. Results of factor analysis

Factors and Items	Factor Loading	Mean	Cronbach Alpha α	Eigenvalue
Factor 1: Tolerance		**3.90**	**.841**	**7.44**
Missing planned work due to smartphone use	.737	3.73		
Having a hard time concentrating in class, while doing assignments, or while working due to smartphone use	.759	3.74		
Always thinking that I should shorten my smartphone use time	.755	4.44		
The people around me tell me that I use my smartphone too much	.617	3.02		
I spend more time than I should on my cell phone.	.813	4.03		
Having used my smartphone when I am not supposed to (in class, during a meeting, etc.)	.439	3.78		
Factor 2: Accompany/Fellowship		**4.64**	**.857**	**2.18**
Constantly checking my smartphone so as not to miss conversations between other people on Twitter or Facebook	.565	4.36		
I look at my mobile phone frequently	.621	4.93		
When I have my mobile phone with me, I can't stop using it	.497	4.14		
I have used my mobile phone to talk to others when I was feeling isolated	.651	5.44		
There is nothing more fun to do than using my smartphone	.783	4.52		
Feeling great meeting more people via smartphone use	.775	4.46		
Factor 3: Withdrawal		**4.34**	**.797**	**1.90**
When out of range for some time, I become preoccupied with the thought of missing a call	.766	4.07		
I become irritable if I have to switch off my mobile phone for meetings, dinner engagements, or at the movies	.665	3.52		
I become anxious when the battery is low	.680	5.04		
I get agitated when my cell phone is not in sight	.776	4.75		
Factor 4: Social Network Dependence		**2.12**	**.785**	**1.09**
Feeling that my relationships with my smartphone buddies are more intimate than my relationships with my real-life friends	.819	2.24		
Preferring talking with my smartphone buddies to hanging out with my real-life friends or with the other members of my family	.833	2.09		
I have argued with my parents or family members about the cost of my mobile phone	.751	2.04		
Factor 5: Health Problems		**2.90**	**.684**	**1.01**
Experiencing lightheadedness or blurred vision due to excessive smartphone use	.710	2.41		
Feeling pain in the wrists or at the back of the neck while using a smartphone	.742	3.39		

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Table 4. ANOVA Table Based on Cluster Analysis

	Cluster		Error		F	Sig.
	Mean Square	df	Mean Square	df		
Tolerance	423.430	3	1.216	883	348.151	.000
Accompany/Fellowship	292.377	3	.930	883	314.548	.000
Withdrawal	469.496	3	1.032	883	454.800	.000
Social Network Dependence	131.287	3	1.580	883	83.071	.000
Health Problems	435.548	3	1.229	883	354.534	.000

Cluster 2-Heavy Addicts: This cluster involves 22% of university students who are excessively addicted to their smartphones. They feel fun or excitement when they use their devices and they would rather use their devices when they feel lonely than talk to others. They check their smartphones and look at their smartphones frequently. They have an inability to prevent themselves from using smartphone at an increasing frequency. Moreover, they feel anxious without their smartphone and they become agitated when the battery is reduced. They have problems related to controlling smartphone use and they experience some health problems due to excessive use of smartphones. They also believe that friendships made through smartphones are more intimate than real life friends.

Cluster 3-Realistic Addicts: Realistic addicts represent 15.7% of university students and they believe that the smartphone is a good fellow and can help them feel good so they look at and check their devices frequently. They experience lack of time management, inability to prevent increasing use of the smartphone, and also have health problems. They have less withdrawal symptoms. Their social network dependence level is very low and they do not believe that friendship made through smartphones are more intimate than real life friends.

Cluster 4-Emotional Addicts: They represent 37.2% of university students. Their social network dependence level is very low, they do not experience health problems due to excessive use of smartphones, and they experience lack of time management slightly. Conversely, they feel anxious, uneasy, and uncomfortable without their smartphone and they believe that the smartphone is a good fellow and helps them feel good.

Table 5. Final cluster center analysis of smartphone addiction

	Cluster			
	Nonaddicts (N=223)	Heavy Addicts (N=195)	Realistic Addicts (N=139)	Emotional Addicts (N=330)
Tolerance	2.26	5.61	4.67	3.68
Accompany/Fellowship	3.19	5.96	4.25	5.02
Withdrawal	2.57	5.77	3.41	5.11
Social Network Dependence	1.64	3.37	1.72	1.90
Health Problems	1.73	4.43	4.48	2.13

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CONCLUSION

Research on mobile addiction revealed that smartphone addiction is becoming more prevalent, especially among adolescent and university students. The present study revealed significant information associated with smartphone use and addiction among Generation Y who were university sudents aged 18-34 in Turkey. The findings revealed that 28.2% of students used their devices between 4-6 hours and 21.3% used their devices over 6 hours a day. Furthermore, 22.5% of students looked at their devices over 100 times a day and 40.8% of students "often" checked their smartphones without receiving any notifications.

In order to analyze the structure of the smartphone addiction questionnaire, factor analysis was performed. Five factors were extracted from the factor analysis, explaining 64.981% of the total variance. The factors included tolerance, accompany/fellowship, withdrawal, social network dependence, and health problems. Accompany/fellowship and withdrawal were the strongest predictors of smartphone addiction. In this context, smartphone is a good fellow for students so they use their smartphone rather than talk to others when they feel isolated or lonely; they think that the most fun thing to do is to use their smartphones. Moreover, they experience withdrawal symptoms, such as anxious feelings, when the battery is low and become agitated when their smartphone is not in their sight.

To classify smartphone addiction groups and reveal the smartphone addiction profile of university students, cluster analysis was used on the extracted factors. The analysis provided significant understandig of smartphone addiction among university students. Four groups were identified, including "nonaddicts", "heavy addicts", "realistic addicts", and "emotional addicts". Nonaddicts comprised 25.1% of the total university students. Roughly 74.9% of university students have indicators of smartphone addiction. This percentage denotes that the smartphones have become indispensable for life among university students. Being isolated from real life, having an inability to prevent themselves from using smartphone, problems with parents, having withdrawal symptoms, having problems related to controlling smartphone, experiencing lack of time management and health problems are the most significant issues related to excessive use of smartphones.

Today not only university students but also adolescents and children experience these problems. It is crucial that there is a strong trend of children owning and using a smartphone and, they grow up dependent on their phones. Future studies should investigate compulsive use of smartphone among children and give advice for parents to reduce smartphone addiction of children.

This study gives explanation about profile of smartphone users and, provides important information related to their addictive use. Future researches should also investigate factors that trigger and increase mobile addiction among children and adolescents.

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