

Determinants of phubbing, which is the sum of many virtual addictions: A structural equation model

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Background and aims: Phubbing can be described as an individual looking at his or her mobile phone during a conversation with other individuals, dealing with the mobile phone and escaping from interpersonal communication. In this research, determinants of phubbing behavior were investigated; in addition, the effects of gender, smart phone ownership and social media membership were tested as moderators. **Methods:** To examine the cause–effect relations among the variables of the theoretical model, the research employs a correlational design. Participants were 409 university students who were selected via random sampling. Phubbing was obtained via the scales featuring mobile phone addiction, SMS addiction, internet addiction, social media addiction and game addiction. The obtained data were analyzed using a correlation analysis, multiple linear regression analysis and structural equation model. **Results:** The results showed that the most important determinants of phubbing behavior are mobile phone, SMS, social media and internet addictions. **Discussion:** Although the findings show that the highest correlation value explaining phubbing is a mobile phone addiction, the other correlation values reflect a dependency on the phone. **Conclusions:** There is an increasing tendency towards mobile phone use, and this tendency prepares the basis of phubbing.

Keywords: phubbing, phubber, addiction, mobile phone, social media, Internet, structural equation model

INTRODUCTION

A number of problems have arisen through the use of computers, but those have been shifted to a new dimension with the inclusion of smart phones. Smart phones, which have the properties of pocket computers, possess various features, from Internet to camera, from writing and drawing programs to game applications, and they have caused new trouble in real life: *phubbing*.

Phubbing can be described as an individual looking at his or her mobile phone during a conversation with other individuals, dealing with the mobile phone and escaping from interpersonal communication. The word *phubbing* emerged when it was included in an update of the famous *Macquarie Dictionary*. The update team created the word *phubbing* by merging the words *phone* and *snubbing* for this smart phone addiction, which might be considered the disturbance of the age. Due to the structure of smart phones, phubbing is a disturbance that is at the intersection of many addictions. While there is not enough evidence related to this phenomenon, smart phones carrying the features of a computer and internet access led us to think that phubbing has a multi-dimensional structure. These dimensions are (i) mobile phone addiction, (ii) Internet addiction, (iii) social media addiction and (iv) game addiction. When carefully examined, it can be seen that all these addictions have a nested and complex structure. It should be noted that phubbing is more common than has been thought, and its possible effects can be more devastating. For example, an average of 36 phubbing cases are observed in a restaurant during lunch; this is equivalent to spending 570 days alone while being with others; 97% of the individuals perceive the taste of their meals as worse

while phubbing; and 87% of adolescents prefer to communicate via messages over face to face communication (<http://stopphubbing.com>).

Mobile phone addiction

The technology that facilitates human life causes problems in human life as well. In the industrialized world, human life requires faster access to various kinds of data, faster interaction and communication, and thus, many concepts, such as time, the perception of needs, and a sense of fun are subject to change. The hunger for more technology has consequences such as excessive technology usage (Davis, 2001), high level of involvement in technology (Charlton & Danforth, 2007) and finally technology addiction (Turel, Serenko & Giles, 2011). A technology addiction has been defined by the addiction criteria of the DSM-IV, and it has been described within the definition of addictive behavior as a psychological problem related to the use of technology inharmoniously. This addiction mostly depends on factors that largely entered human life with the computers. Smart phones equipped with computer features have a significant effect among these factors as an addiction object.

Phubbing is a concept with many possible dynamics, such as showing a disrespectful attitude towards the person

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or persons with whom one is in communication, disregarding them, and preferring virtual environments to real-life ones. It can be based on applications, such as the Internet or games, which were transferred from the computer to the mobile phone, but it also possesses intrinsic properties of the mobile phone. In addition, the fact that we can now access the Internet and games through mobile phones has shifted the Internet addiction to another point. Hence, the phone and Internet addiction are in a circular relationship, triggering each other. For example, if the time spent surfing the Internet increases, so does the phone addiction. However, problematic phone usage is seen as a behavioral addiction identical to cell phone use even in prohibited environments, such as traffic (Bianchi & Phillips, 2005). Researchers investigating phone addiction have shown that the phone is used as a tool to fulfill loneliness and the need of managing oneself; anxiety, worry and deprivation disorder behaviors were observed in addictive individuals who were separated from their phones (Park, 2005); impulsivity (Billieux, van der Linden, d'Acremont, Ceschi & Zermatten, 2007; Billieux, van der Linden & Rochat, 2008), and the stimulation requirement (Leung, 2007) affects phone addiction. Therefore, these cases indicate that phubbing is associated with phone addiction.

Internet addiction

In addition to offering many conveniences offered for daily life, the computer causes negative effects on humans by offering the variety and convenience of surfing the Internet and playing games. Individuals' exaggerated behaviors towards the use of computers have led researchers to investigate the concept of computer addiction (Griffiths, 2000; Shaffer, 2002; Shotton, 1991). These studies suggest that the computer alone is not a problem, but it causes problems because of the applications within it. Playing games (Charlton & Danforth, 2007; Weinstein, 2010; Wood, 2008) and staying online for a long time (Chou & Hsiao, 2000; Lin & Tsai, 2002; Yang & Tung, 2007) are examples of such cases.

In the past decade, the duration and frequency of the Internet use have increased (Dong, Lu, Zhou & Zhao, 2011; Smahel, Brown & Blinka, 2012) and the question as to whether the increased duration of computer usage enslaves people has gained importance. Internet addiction research, which began with an e-mail sent by Dr. Ivan Goldberg (1996) to his friends, joking about excessive Internet usage by modifying the agents of pathological gambling disorder can be found in DSM-IV (1995). Combined with the fact that the duration of the time spent on the Internet triggers pathological Internet use (Nalwa & Anand, 2003), Internet addiction became a new and impressive research topic (Ceyhan, 2008; Ghamari, Mohammadbeigi, Mohammad-salehi & Hashiani 2011).

The studies have been grouped around two different views. The first view (*i*) considers Internet addiction to be a new disorder, whereas the second (*ii*) advocates that it is the accessed content (porn, games, e-mail), which is related to problematic Internet use (Yellowlees & Marks, 2007). As a result of various research, it can be said that the reasons that individuals spend a lot of time on the Internet is the desire for things such as sexual content (Frangos, Frangos & Kioshos, 2010; Griffiths, 2012; Pallanti, Bernardi & Quercioli,

2006), games and entertainment (Ceyhan, 2010; Gilbert, Murphy & McNally, 2011; Öztürk & Özmen, 2011), and communication and socialization (Akçay, 2011; Balcı & Gülnar, 2009; Ceyhan, 2011). In summary, the increase in time spent on the Internet (Smahel et al., 2012; Lin & Tsai, 2002), improved access to the Internet (Hall & Parsons, 2001), and the desire to access vast amounts of content via the Internet (Hawi, 2012) show that Internet use may become a problem. However, there is no consensus for naming the existing problems.

In the literature, there are a wide variety of definitions for the problems caused by the Internet. Although excessive Internet use, which is one of those problems, is mostly defined as excessive or poorly controlled preoccupation, urges or behaviors regarding computer use and Internet access that lead to impairment or distress (Weinstein & Lejoyeux, 2010), it is used synonymously with Internet addiction in some research (Hansen, 2002; Hardie & Tee, 2007). Some researchers suggest that considering excessive Internet users as Internet addicts is wrong; the reason they use the Internet so excessively is to satisfy other addictions, such as sex and communication (Griffiths, 1999). To express the negative usage patterns, the term "irregular Internet use" is also used, which is defined as a media consumption evolving with a lack of self-regulation (La Rose, Lin & Eastin, 2003). Improper Internet use is a term mostly used for defining the use of the Internet to access content that can be regarded as undesirable or negative, such as porn, gambling, or similar content (Durkin, 1997; Hope, 2007; Khazaal et al., 2012; Parker, Taylor, Eastabrook, Schell & Wood, 2008; Tsitsika et al., 2009). Different definitions, based on various factors, such as the degree and nature of Internet usage habits, are not limited to these. Pathological Internet use (Davis, 2001; Morahan-Martin & Schumacher, 2000), problematic Internet use (Caplan, 2002; Odacı & Çıkrıkçı, 2014; Shapira, Goldsmith, Keck Jr, Khosla & McElroy, 2000; Shapira et al., 2003), problematic Internet behavior, excessive Internet use (Bener et al., 2011; Wright et al., 2005), Internet abuse (Young & Case, 2004) and cyber addiction are other terms that are used (Hua, 2005). In summary, although there are different approaches, it can be said that there is a consensus in the literature that the Internet can be addictive. Moreover, the Internet, which allows access to all media tools, is an addiction object itself, which also leads to the development of a powerful new type of addiction: social media.

Social media addiction

Social media, which almost became an addiction (Karaiskos, Tzavellas, Balta & Paparrigopoulos, 2010; Turel & Serenko, 2012), is a communication channel where highly complex interactions are intertwined, which can have a substantial impact on people. Social media, which includes many elements such as games, communication, information exchange, and sharing of multimedia, and which encourages people to stay online, carries its followers from computers to smart phones as well. Social media on computers requires being at the desk or table, but with smart phones, which can be carried everywhere, at all times, it is becoming a continuous, integral part of the individual. On smart phones, whose utilization rate has increased compared to other phones (Smith, 2012), application usage is also an important object

of use (Falaki et al., 2010). The most frequently used applications are game applications along with the applications of social media sites. In other words, social media has a significant place among the addiction objects of smart phones (Kwon et al., 2013). Despite the fact that people access social media through their phones, it should not be forgotten that social media is just one of the addiction objects within the mobile phones and that the phone addiction would still survive even if social media did not exist.

Facebook (Andreassen, Torsheim, Brunborg & Pallesen, 2012) and Twitter (Malita, 2011) are on the top of the list of social sharing sites whose habitual usage becomes an addiction. Facebook (Dhaha, 2013), which is motivated by entertainment and social interaction, is a complex blend of many multimedia tools. Facebook, which allows access to many options such as pictures, music, videos, information transfer, entertainment, online gaming, inclusion in social groups, transferring views or agreeing with others' views, communicating with familiar and unfamiliar people, and video calls, has become a way of life in parallel to the real-life of individuals. Although Facebook's initial purpose was to communicate with friends who had not been seen for a long time, research shows that the most common reason for using Facebook is to see others' profiles (69.57%) and look at their photos (58.70%) (Pempek, Yermolayeva & Calvert, 2009). Getting in contact with many people at the same time, tweets coming in an undefined and short time period, and instant responding have made Twitter the addiction object of the people who follow someone or who are followed by someone – people who have answers or who generate ideas about subjects (Malita, 2011). In summary, smart phones allow social networks, such as Facebook and Twitter, which are important addiction objects in computers, to be with us at any moment without having to access the computer. Thus, individuals can make social media a real-time part of their life. In other words, individuals make an effort to maintain their presence in the social networking site while they live their real lives, but at the same time, they are degrading their activities in real life. This case clearly illustrates the functioning of phubbing. In phubbing, individuals' efforts to announce their presence in the real world through social media are nested within various multimedia sharing and within some specific applications. The most common ones are gaming applications. However, gaming is an important factor that can be addictive both in and beyond social media contexts.

Game addiction

Among the factors affecting phubbing, a game addiction is another source of addiction that is as important as the phone addiction. Individuals who lack time management skills use it to escape from problems and as a mental relaxation tool (Wood, 2008). Game addiction (Weinstein, 2010), which refers to online games (Charlton & Danforth, 2010; Kim, Namkoong, Ku & Kim, 2008; Lo, Wang & Fang, 2005; Young, 2009), video games (Chiu, Lee & Huang, 2004; Kim, Namkoong, Ku & Kim, 2008), and computer games (Grüsser, Thalemann & Griffiths, 2006), all of which have substantially the same origin, refers to playing computer games to the extent that it affects everyday life and is regarded as addictive behavior. Factors, such as being en-

gaged with a game for long periods of time, immediately being rewarded even for the smallest progress in the game, levels varying according to a person's performance, increase addiction to a game. Chou and Ting (2003) stated that a sense of flow has a significant impact on the individuals' addiction. Gaming has a significant place among the phone, internet and computer interactions that lead to phubbing. Although phones or computers are the tools for the game addiction in these situations, these kinds of addictions have mutual relationships and interactions and are therefore hard to separate from each other. Another example of these mutual relationships is the game and social media addiction. Games such as Candy Crush (Walsh, White & Young, 2008) and Angry Birds (Böhmer, Hecht, Schöning, Krüger & Bauer, 2011), which are among the most widely played games on Facebook, can now be reached by millions of people and are becoming almost addictive. It seems that social media, especially Facebook, is the medium for spreading many of these and other similar games.

Research hypothesis

The review of the components that comprise phubbing shows that each entails problems with independent addiction objects. Games, Internet, social media and phones can survive in the daily lives of individuals independent of each other. Currently, the phubbing concept, which was proposed as a combination of the mentioned addictions, has begun to become an addiction; however, a review of the literature shows that there is no research featuring it. In light of this shortcoming, this research investigates the determinants of phubbing behavior and the effects of moderators such as gender, smart phone ownership and social media membership. All components of phubbing and the hypothesis were formed according to the structural equation model (see Figure 1). In this context, the research hypotheses tested included the following:

- H_1 Mobile phone addiction has a positive effect on phubbing behavior.
- H_{1a} Mobile phone addiction affects phubbing behavior in women more than men.
- H_{1b} Mobile phone addiction affects phubbing behaviors of those who own a smart phone more than the ones who do not own one.
- H_2 SMS addiction has a positive effect on phubbing behavior.
- H_{2a} SMS addiction affects phubbing behavior in women more than men.
- H_3 Social media addiction has a positive effect on phubbing behavior.
- H_{3a} Social media addiction affects phubbing behavior in women more than men.
- H_{3b} Social media addiction affects phubbing behaviors of those who own a smart phone more than the ones who do not own one.
- H_4 Internet addiction has a positive effect on phubbing behavior.
- H_{4a} Internet addiction affects phubbing behavior in women more than men.
- H_{4b} Internet addiction affects phubbing behaviors of those who own a smart phone more than the ones who do not own one.

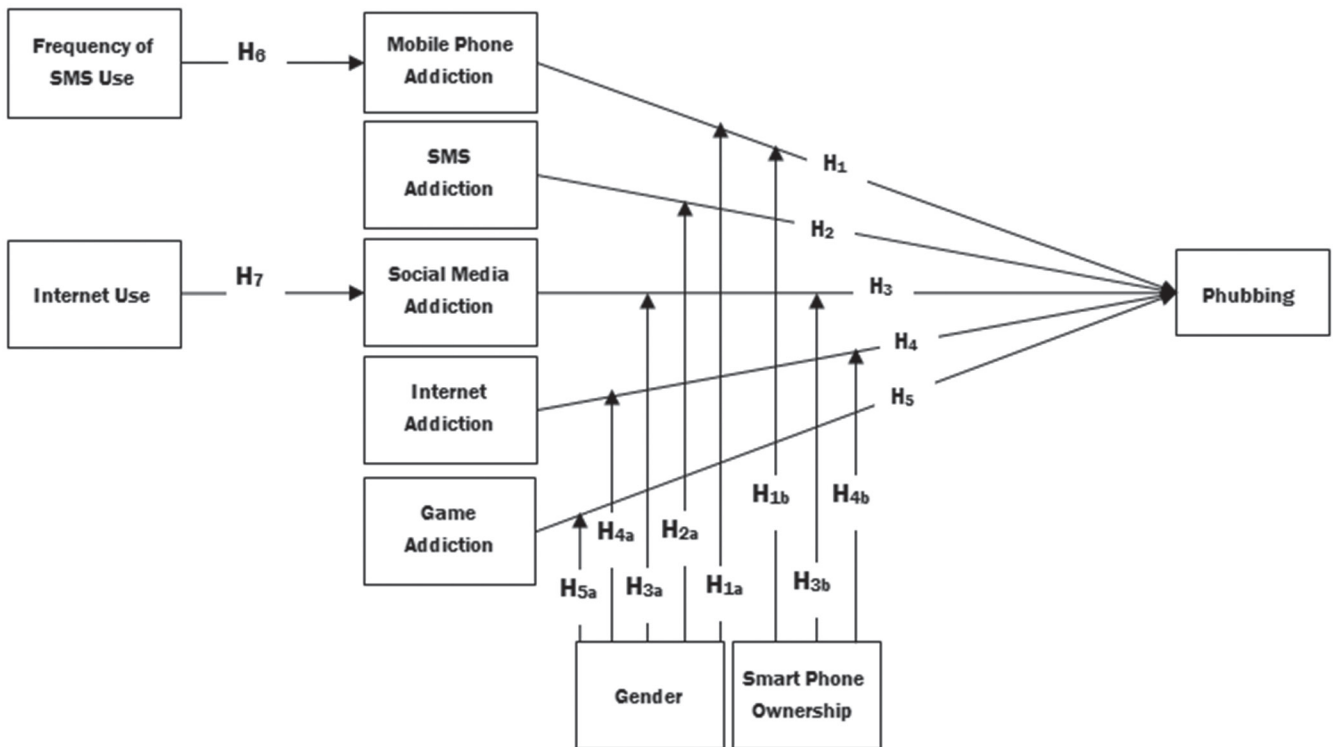


Figure 1. Research model and hypotheses in this research

- H_5 Game addiction has a positive effect on phubbing behavior.
- H_{5a} Game addiction affects phubbing behavior in women more than men.
- H_6 SMS use frequency has a positive effect on mobile phone addiction.
- H_7 Internet usage time has a positive effect on social media addiction.

METHODS

Research design

In this research, we aimed to explain determinant factors of phubbing behavior via a structural equation model. To examine relations among the variables of the theoretical model, the research employed a *correlational design*.

Participants

The research has been conducted with 409 randomly selected university students. The data obtained from 8 students (who gave the same score to all items and who were believed to have responded dishonestly), which might affect the reliability of the research negatively, were removed before the start of the analysis. Thus, data from 401 participants were used in the research. Of the participants, 114 were male (28,4%), 287 were women (71.6%), and their average age was 21.9. In total, 70% of the participants owned a smart phone, 92% were using social media and 75% were spending 2 hours or more on the Internet.

Measures

Data were collected through the use of 6 scales and a structured review. The Likert-type scales that were developed within the present research and controlled for validity and reliability measures include (i) *The Phubbing Scale* to determine the phubbing behaviors, marked by an individual looking at his/her mobile phone during a conversation with other individual(s), dealing with his/her mobile phone and escaping from interpersonal communication; (ii) *Mobile Phone Addiction Scale* to determine phone addiction; (iii) *SMS Addiction Scale* to determine the SMS addiction; (iv) *Social Media Addiction Scale* to determine social media addiction; (v) *Internet Addiction Scale* to determine Internet addiction; and (vi) *Game Addiction Scale* to determine game addiction. The findings related to the validity and reliability of the scales are presented in the Results section, while the scales can be found in the Appendix.

In addition to the scales, 6 structured questions were asked. These questions are related to the (i) ages, (ii) sexes, (iii) having a smart phone, (iv) having a social media membership, (v) the number of hours for daily Internet use, and (vi) the number of SMS used in a day.

Procedure

The main purpose of this research is to test the determinants of phubbing behavior via a *structural equation model*. The structural equation model aims to test whether the data obtained in relation to a theoretical model fit with the model (Karadağ, 2009). The statistical methodology of the research consists of the following stages:

The creation of the theoretical model

Within the research, a structural equation model showing the relations between the determinants, namely, (i) mobile phone addiction, (ii) SMS addiction, (iii) Internet addiction (iv) social media addiction and (v) game addiction and phubbing was formed (see also the research hypotheses). Because the model was formed by the observed variables, the variables were represented by rectangles; the effects of variables on the other variables were represented with one-way linear lines (see Figure 1).

Statistical analysis

At this stage, a statistically compatible model, in which the relationships between variables have been defined, was obtained. The following goodness of fit indices were used in the research: Comparative Fit Index (CFI), Goodness-of-Fit Index (GFI), Adjusted Goodness-of-Fit Index (AGFI), Root mean square error of approximation (RMSEA), Chi square (χ^2), degrees of freedom (*df*), the ratio of χ^2/df and *t* coefficient. Standard measurement compliance values of these indices are as follows: the coefficients obtained from CFI, GFI, and AGFI range from 0 to 1. Although there is not a clear consensus in the literature, a coefficient value higher than .85 (Anderson & Gerbing, 1984; Cole, 1987; Marsh, Balla & McDonald, 1988) or .90 (Kline, 2005; Schumacker & Lomax, 1996) is accepted as a good fit. The values obtained from RMSEA also vary between 0 and 1. In contrast to the situation in CFI, GFI, and AGFI, the value obtained from RMSEA, which represents the error margin between the observed and generated matrix, should be closer to 0 for compatibility. Values of 0.1 or less obtained from RMSEA indicate compatibility. A χ^2/df ratio between 2 and 5 represents a good fit, whereas values under 2 represent a perfect fit (Jöreskog & Sörbom, 2001). Furthermore, the variables are associated with the statistically determined structures, so the relationships between the variables and structures of the model are confirmed.

Ethics

All subjects were informed about the research, and all provided informed consent. The study procedures were carried out in accordance with The APA Ethics Code. The Institutional Review Board Approval has been given by the Ethics Board of Educational and Humanitarian Sciences in Eskişehir Osmangazi University, Eskişehir, Turkey (Assembly Date: 20/03/2014, Assembly Issue: 2014-2).

RESULTS

Within the research, a structural equation model was created to determine the relationships between mobile phone, SMS, Internet, social media and game addictions and phubbing behavior. Before testing the theoretical model, correlation and regression analyses were conducted to determine the linear relationships between the variables. As a result of the Pearson product-moment correlation analyses to check for multicollinearity (and VIF see also Table 3) among the independent variables [mobile phone, SMS, Internet, social

media and game addictions], all correlations were less than .70 (see also Table 2). According to these values, there is no multicollinearity among the variables (Field, 2009; Tabachnick & Fidell, 2013). When the error terms and scatterplots for independent variables were examined, the error terms met the homoscedasticity assumption. In addition, the error terms, which are defined as the difference between the predicted and observed values, related to the dependent variable [phubbing] were checked for normality by examining *Q-Q* plots, and the distribution was normal. Additionally, the distribution was found to be normal as a result of the examination of skewness and kurtosis and Kolmogorov-Smirnov ($p > .05$) test results. When both the multicollinearity and normal distribution are taken into consideration, the data were suitable for Multiple Regression Analysis. Following this, the goodness-of-fit indices regarding the theoretical models were calculated to determine the consistencies of the models and the effects of the variables. LISREL 8.51 and SPSS 21 packet programs were used for all these procedures.

Sample description

This research was conducted on 401 participants. Of the participants, 114 were male (28,4%), whereas 287 were female (71.6%). Their average age was 21.9. In total, 70% of the participants owned a smart phone, 92% were using social media, and 75% were spending 2 hours or more in the Internet.

Findings related to the validity and reliability of the scales

Phubbing scale [PS]. Phubbing can be described as an individual looking at his or her mobile phone during a conversation with other individuals, dealing with the mobile phone and escaping from interpersonal communication. As there is no scale for the concept of phubbing in the literature, the items were developed through the use of data obtained from focus group interviews. The scale consists of 10 items, graded from 1 (never) to 5 (always) on a 5-point Likert scale. *Exploratory factor analysis* of PS has been conducted in six stages using the data obtained from the participants. These stages included the following: (i) the scales that had the same score for each item and that were believed to be filled dishonestly were removed from the research content (e.g., the ones who have a pattern for the scoring), the data identified as false entry as a result of the frequency analysis were marked as missing data, and a complete data set was formed by assigning the *series mean* to the missing data. (ii) The normality of the data was checked, and extreme values were removed using z-scores ($n = 27$). Z-scores of each item were checked, and data with a z-score higher than |3.29| were excluded from data analysis (Tabachnick & Fidell, 2013). (iii) To determine the number of factors, a *principal component analysis* and *Horn's parallel analysis* were used together (Horn, 1965). (iv) An *exploratory factor analysis* was performed by using a principal axis factor analysis with an Oblimin rotation. The rationale for the use of the Oblimin rotation was the assumption that different factors may be related. (v) To assign the items to the factors, factor loads were analyzed, and theoretical suitability was considered. Correspondingly, the items with factor loadings

less than $|\lambda| \geq .40$ for all the factors or a difference less than $|\lambda| \geq .10$ for at least two factors were eliminated. (Field, 2009; Tabachnick & Fidell, 2013). (vi) Cronbach Alpha reliability coefficients were calculated for each factor. As a result of the principal component analysis, a two (2)-factor structure, explaining 56.19% of the variance was proposed (KMO = .87, Bartlett's test = $p < .01$). As the result of the exploratory factor analysis performed by using the Oblimin principal axis rotation, 10 items were loaded over $|\lambda| \geq .40$ in only one factor (see Table 1).

Table 1. Results of Factor Analysis Phubbing Scale

Factor	Communication Disturbances	Phone Obsession
Item Number	Factor Loading	Factor Loading
Item 3	.81	.12
Item 4	.81	.19
Item 10	.74	.27
Item 2	.77	.22
Item 1	.61	.32
Item 8	.23	.80
Item 7	.30	.77
Item 6	.27	.67
Item 9	.12	.55
Item 5	.29	.45
Eigen Value	4.44	1.17
Variance	44.44	11.74

At the end of the exploratory factor analysis performed using the scale consisting of 10 items, graded from 1 (never) to 5 (always) in a 5-point Likert scale, the following 2 factors were found: (i) Factor 1 (5 items; $\alpha = .87$) and (ii) Factor 2 (5 items; $\alpha = .85$). The content of these factors can be summarized below:

- (i) Communication disturbance: Higher scores indicate that participants often disturb their existing communications by dealing with their mobile phones in a face-to-face communication environment. Examples of this factor's items are as follows:
 - (1) My eyes go to the phone when I'm together with others.
 - (2) I'm dealing with my mobile phone when I'm with my friends.
- (ii) Phone obsession: Higher scores indicate that participants constantly need their mobile phone in environments lacking face-to-face communication. Examples of this factor's items are as follows:
 - (1) My phone is always within my reach.
 - (2) When I wake up in the morning, I first check my messages on my phone.

Mobile phone usage addiction scale. Because the research was conducted on participants whose native language was Turkish and there is no scale used for mobile phone addiction in Turkish, the items were developed using the data obtained from the focus group interviews. The scale consists of 15 items, graded from 1 (never) to 5 (always) on a 5-point Likert scale. Using the data obtained from university students, an *exploratory factor analysis* was performed using a principal axis factor analysis with an Oblimin rotation. As a result of the principal component analysis, a three

(3)-factor structure explaining 42.70% of the variance was proposed (KMO = .82, Bartlett's test = $p < .01$). As a result of the exploratory factor analysis conducted using the Oblimin rotation and principal axis factoring, we found that 15 items were loaded over $|\lambda| \geq .40$ in just one factor. The 3 factors are (i) *deprivation* (7 items, $\alpha = .86$), (ii) *control difficulties* (3 items, $\alpha = .78$), and (iii) *application* (5 items, $\alpha = .85$).

For the concurrent validity of the scale, the frequency of daily use of a mobile phone, which the participants calculated, was used. It was anticipated that there would be a positive and high relationship between the scores of mobile phone addiction and the time for mobile phone use. The scale would have the concurrent validity if the anticipated relationships occurred. When the concurrent validity of the scale was examined, it was found that the time for daily mobile phone use had positive relationships with the factors *deprivation* ($r = .91$; $p < 0.01$), *control difficulties* ($r = .89$; $p < 0.01$) and *application* ($r = .78$; $p < 0.01$) of mobile phone addiction. The fact that the positive relationships are between .78 and .91 indicates that the scale has the concurrent validity.

SMS addiction scale. Because the research was conducted on participants whose native language is Turkish and there is no scale used for the SMS addiction in Turkish, the items were developed using the data obtained from the focus group interviews. The scale consisted of 6 items, graded from 1 (never) to 5 (always) on a 5-point Likert scale. Using the data obtained from university students, an *exploratory factor analysis* was performed using a principal axis factor analysis with an Oblimin rotation. As the result of the principal component analysis, a one (1)-factor structure, explaining 51.33% of the variance was proposed (KMO = .82, Bartlett's test = $p < .01$). As the result of exploratory factor analysis performed by using the Oblimin principal axis rotation, it was found that 6 items were loaded over $|\lambda| \geq .40$ in only one factor ($\alpha = .80$).

For the concurrent validity of the scale, the frequency for daily use of SMS, which the participants calculated, was used. It was anticipated that there would be a positive and high relationship between the scores of SMS addiction and the amount of SMS use. The scale would have concurrent validity if the anticipated relationships occurred. When the concurrent validity of the scale was examined, we found that the number of daily SMS had a positive relationship ($r = .95$; $p < 0.01$) with SMS addiction. The fact that the positive relationship is high indicates that the scale has concurrent validity.

Social media addiction scale. Because the scales related to the social media addiction in Turkish are specific to just one social media (e.g., Facebook, Twitter), it was decided to develop a social media addiction scale within the research. The items of the scale were developed using the data obtained from the focus group interviews. The scale consisted of 10 items, graded from 1 (never) to 5 (always) on a 5-point Likert scale. Using the data obtained from university students, an *exploratory factor analysis* was performed using a principal axis factor analysis with an Oblimin rotation. As a result of the principal component analysis, a two (2)-factor structure explaining 54.25% of the variance was proposed (KMO = .87, Bartlett's test = $p < .01$). As a result of the exploratory factor analysis performed using the Oblimin

principal axis rotation, we found that 10 items were loaded over $|\lambda| \geq .40$ in only two factors. The 2 factors are (i) *sharing* (6 items, $\alpha = .82$) and (ii) *control* (4 items, $\alpha = .79$).

For the predictive validity of the scale, the Bergen Facebook Addiction Scale (Andreassen et al., 2012) was used. It was anticipated that the scores of social media addiction would have predicted the Facebook addiction considerably. When the predictive validity of the scale was examined, the scores of social media addiction predicted the scores of Facebook addiction ($R^2 = .66$; $p < 0.01$). The fact that the degree of prediction is high indicates that the scale has predictive validity.

Internet addiction scale. Because the scales related to the Internet addiction in Turkish have too many items, when it is considered that there are six variables and one scale for each within the present research, the number of valid scales from the participants would be effected, we decided to develop an internet addiction scale within the research. The items of the scale were developed using the data obtained from the focus group interviews. The scale consists of 6 items, graded from 1 (never) to 5 (always). Using the data obtained from university students, an *exploratory factor analysis* was performed using a principal axis factor analysis with an Oblimin rotation. As a result of the principal component analysis, a one (1)-factor structure explaining 54.82% of the variance was proposed (KMO = .78, Bartlett's test = $p < .01$). As a result of the exploratory factor analysis performed using the Oblimin principal axis rotation, we found that 6 items were loaded over $|\lambda| \geq .40$ in only one factor ($\alpha = .83$).

For the concurrent validity of the scale, Young's Internet Addiction Test (Young, 1996) was used. It was anticipated that there would be a positive and high relationship between the scores of Internet addiction and Young's Internet Addiction Test. The scale would have the concurrent validity if the anticipated relationships occurred. When the concurrent validity of the scale was examined, we found that there was a positive and high correlation ($r = .88$; $p < 0.01$) between the two scales. The fact that the positive relationships are between .78 and .91 indicates that the scale has concurrent validity.

Game addiction scale. The scale consists of 8 items, graded from 1 (never) to 5 (always). The items were derived from the qualitative research conducted by the researchers. Using the data obtained from the university students, an *exploratory factor analysis* was performed using a principal axis factor analysis with an Oblimin rotation. As a result of the principal component analysis, a one (1)-factor structure, explaining 61.66% of the variance was proposed (KMO = .82, Bartlett's test = $p < .01$). As a result of the exploratory factor analysis performed by using the Oblimin principal axis rotation, we found that 8 items were loaded over $|\lambda| \geq .40$ in only one factor ($\alpha = .90$).

The results of correlation analysis related to theoretical model

Table 2 shows the mean and standard deviation values of the variables and the correlation coefficients among them. The highest mean score is for *mobile phone addiction* [$X = 2.89$, $SD = .75$], whereas the lowest mean score is for *game addiction* [$X = 2.05$, $SD = 0.91$]. The review of the correlation coefficients showed that there are positive relations between phubbing and the variables [from $r = .33$ to $r = .65$]. In addition, the correlation coefficients between all the variables covered in the research are positive [from $r = .32$ to $r = .65$].

The results of multiple regression analysis related to theoretical model

Table 3 shows the results of the multiple regression analysis, which was performed to determine the prediction level of the mobile phone, SMS, Internet, social media and game addictions on phubbing. The table reveals that the combination of independent variables of mobile phone, SMS, Internet, social media and game addictions significantly predicted phubbing and explained 54% of the variance in phubbing [$R = .740$, $R^2 = .54$, $F = 95.64$, $p < .01$]. The order of importance of the predictor variables on the dependent variable was mobile phone, social media, SMS and Inter-

Table 2. Correlation matrix between research variables

Variables	<i>X</i>	<i>SD</i>	1	2	3	4	5	6
1. Phubbing	2.76	0.72	–	.65*	.62*	.50*	.46*	.33*
2. Mobile phone addiction	2.89	0.75		–	.55*	.46*	.52*	.36*
3. SMS addiction	2.74	0.86			–	.42*	.48*	.32*
4. Internet addiction	2.56	0.86				–	.61*	.47*
5. Social media addiction	2.60	0.75					–	.38*
6. Game addiction	2.05	0.91						–

$n = 401$, * $p < .01$

Table 3. Multiple regression matrices between phubbing and other variables

Phubbing	<i>B</i>	<i>SH_B</i>	β	<i>t</i>	<i>p</i>	VIF
Constant	0.53	0.11		4.91	0.00	
1. Mobile phone addiction	0.37	0.04	0.39	8.73	0.00	1.70
2. SMS addiction	0.28	0.03	0.33	7.80	0.00	1.58
3. Internet addiction	0.15	0.04	0.18	3.84	0.00	1.87
4. Social media addiction	0.45	0.04	0.36	8.71	0.00	1.88
5. Game addiction	0.00	0.03	0.03	0.11	0.91	1.35

$n = 401$, $R = .74$, $R^2 = .54$, $F = 95.64$, $P < .01$

net addiction. The examination of regression coefficients' significance showed that all variables, except the game variable, are significant predictors of phubbing.

Parameter estimates and goodness-of-fit indices

Table 4 shows goodness-of-fit indices, representing the contribution of each variable to the model that was created for the causal relations between phubbing and other variables. The goodness of fit for the theoretical model developed was determined with RMSEA, χ^2 and χ^2/df , GFI, AGFI, CFI, and NFI. RMSEA included the mean of the covariance and variance that was not explained by the model, and in the research, the RMSEA value was found to be .06, which was enough for goodness of fit (MacCallum, Browne & Sugawara, 1996). The arrows showing the variance that was not explained for each latent variable – in other words, the parameters regarding the errors – were included in the structural model. The variance explained for each latent variable in the model can be determined by its relationship with the other latent variables. Therefore, the variance explained for each latent variable and thus the variance which was not explained accordingly – that is, the error values – can be regarded as part of the structural model rather than as part of the measurement model. In the research, the ratio of χ^2/df was calculated as 3.20. This ratio demonstrates an indicator of goodness of fit between the observed and increased covariance matrices (Hair, Black, Babin & Anderson, 2010; Jöreskog & Sörbom, 2001). CFI, which assumes that all latent variables are uncorrelated and compares the sample covariance matrix with the null hypothesis, was .94. In addition, the GFI indicates both the relational degree of the covariance and the variance explained collectively by the

model. In the research, the GFI value was calculated as .92, and the AGFI goodness-of-fit value was also calculated as .92. This result also demonstrates that the theoretical models of GFI and AGFI goodness-of-fit values were appropriate to the data collected (Hoyle & Panter, 1995; Kline, 2005; Schumacker & Lomax, 1996).

Table 4. Goodness-of-fit indices: Structural equation model of research

Fit Parameters	Coefficient
CFI	.94
GFI	.92
AGFI	.91
RMSEA	.06
df	27
χ^2	86.5
χ^2/df	3.20

The formation of the theoretical model, an acceptable, independent structural model reflecting the relations between phubbing and mobile phone, SMS, Internet, social media and game addictions, is displayed in Figure 2. Figure 2 also includes parameter estimates for the resulted model.

The review of the hypothesis regarding the values in Figure 2 showed that all hypotheses were accepted except H_{4a}. The summary of the related test results is displayed in Table 5. As seen in Table 5 and Figure 2, phubbing behavior was positively affected by mobile phone addiction ($\gamma_1 = .50$), SMS addiction ($\gamma_2 = .34$), social media addiction ($\gamma_3 = .24$), Internet addiction ($\gamma_4 = .17$), and game addiction ($\gamma_5 = .05$). In addition, the Phubbing behavior was observed more frequently among females, smart phone owners and social media members.

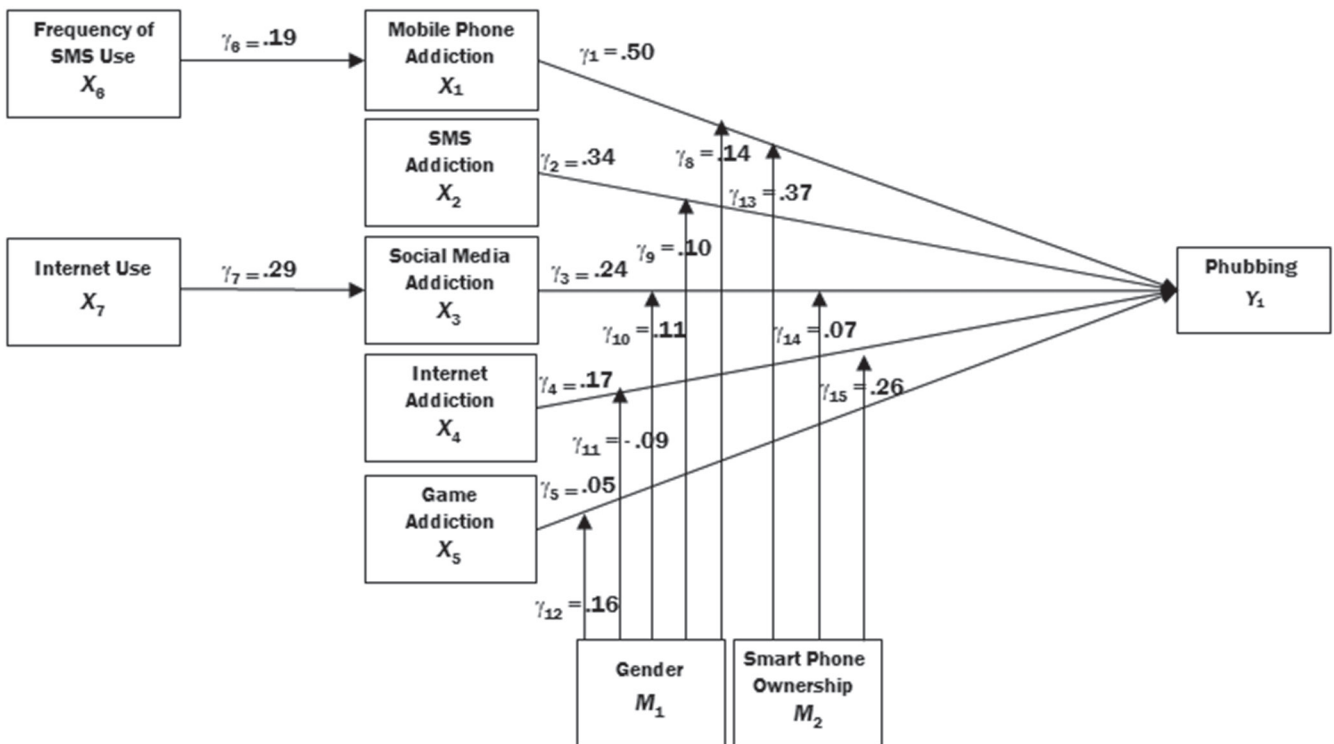


Figure 2. Structural equation diagram model of research and path coefficients

Table 5. Summary of hypothesis testing results

	Path		Hypotheses	Effect Size	Results	
<i>Determinants</i>						
H ₁	MPA	→	Phubbing	Positive	.50	Accepted
H ₂	SMS	→	Phubbing	Positive	.34	Accepted
H ₃	SMA	→	Phubbing	Positive	.24	Accepted
H ₄	IA	→	Phubbing	Positive	.17	Accepted
H ₅	GA	→	Phubbing	Positive	.05	Accepted
H ₆	Frequency of SMS use	→	MPA	Positive	.19	Accepted
H ₇	Internet use	→	SMA	Positive	.29	Accepted
<i>Gender Moderator</i>						
H _{1a}	MPA	→	Phubbing	Female > Male	.14	Accepted
H _{2a}	SMS	→	Phubbing	Female > Male	.10	Accepted
H _{3a}	SMA	→	Phubbing	Female > Male	.11	Accepted
H _{4a}	IA	→	Phubbing	Female > Male	-.09	Rejected
H _{5a}	GA	→	Phubbing	Male > Female	.16	Accepted
<i>Smart Telephone Ownership</i>						
H _{1b}	MPA	→	Phubbing	Yes > No	.37	Accepted
H _{3b}	SMA	→	Phubbing	Yes > No	.07	Accepted
H _{4b}	IA	→	Phubbing	Yes > No	.26	Accepted

MPA: mobile phone addiction, SMS: SMS addiction, SMA: social media addiction, IA: Internet addiction, GA: game addiction frequency of SMS use

DISCUSSIONS, THEORETICAL AND PRACTICAL IMPLICATIONS

In this research, we found that mobile phone, SMS, Internet, SM and GA significantly predict phubbing. In the analysis of the structural equation model formed within the research, goodness-of-fit indices were adequate. As a result of the research, all of the hypotheses, except H_{4a}, were accepted.

H₁ suggests that mobile phone addiction has a positive effect on phubbing. Findings confirm this hypothesis. Considering that the new generation of mobile phones, smart phones, is rapidly replacing the previous generation of mobile phones, the association between mobile phone ownership and phubbing is quite natural. Although the findings show that the highest correlation value explaining phubbing was observed for mobile phone addiction, the other correlation values show that they are dependent on the phone. Previous research has shown that individuals have a tendency to use their mobile phones in many environments, both appropriate and inappropriate (Bianchi & Philips, 2005). The fact that there is a lack of research on phubbing, which is the focus of the present research, restricts our interpretations, especially of the statistical (the variance explained by regression) and phenomenological causalities. Nevertheless, it can be said that there is an increasing tendency towards mobile phone use, and this tendency makes up the basis of phubbing.

H₂, suggesting that SMS addiction has a positive effect on phubbing, was confirmed. SMS addiction is an example of the widespread adoption of increasing computing needs through a variety of communication channels. Although there is not sufficient research on SMS addiction, which is a subjective type of communication (Hassanzadeh & Rezaei, 2011), there are studies suggesting that the SMS feature is one of the reasons for the frequent use of mobile phone (Economides & Grousopoulou, 2008; Mante & Piris, 2002; Özaşçılar, 2012; Zulkefly & Baharudin, 2009). Similar to many features com-

monly used in mobile phones, SMS became an object of phubbing to the point of addiction. Phubbing, consisting of a combination of many virtual addictions, is a new and different kind of addiction, and it is affected by the addictive form of SMS usage. However, our young student sample might have created a positive bias in the emergence of this result. Because SMS usage frequency and habits of all phone users are not similar to students' habits, research that will carry this issue to different sample groups is needed.

H₃ suggests that social media addiction has a positive effect on phubbing. Findings show that the third hypothesis is also valid. Social media is a new and rapidly developing addiction area (Hansen, 2002; Hardie & Tee, 2007) of the Internet environment, which is an addiction object itself (Karaïskos et al., 2010; Turel & Serenko, 2012). Social sharing sites, such as Facebook, Twitter and Instagram, which allow sharing of photos, videos, audio, text and images, provide the opportunity to receive appreciation, approval and opinions from third parties (Malita, 2011; Pempek et al., 2009) and encourages satisfaction from the very quick virtual feedback received by social interaction via computer. Moreover, these sites allow interaction with thousands of people, not limited by acquaintance, and thus provide the opportunity to see the effects of the individual's views, ideas and desires in a wider environment than the real environment. In this context, people's interest in these sites is becoming addictive (Kwon et al., 2013). It is quite expected that the social media phenomenon, which created such a deep addiction to the computer environment, was transformed to a new form via smart phones, which is always next to the individual.

The fourth hypothesis (H₄) of the research suggested that Internet addiction is a contributor to phubbing. Results show that Internet addiction is one of the factors affecting phubbing. Internet addiction, which is a new and deep research topic (Ceyhan, 2008; Ghamari et al., 2011), has a strong effect as the creator of many addictions related to the

Internet. For example, social media addiction (Andreassen et al., 2012; Malita, 2011) is fed entirely from the Internet, and a portion of game addiction (Böhmer et al., 2011; Walsh et al., 2008) is also fed from the Internet. As a result, Internet addiction is one of the strongest determinants of phubbing. According to the finding of this research, the effect of social media addiction on phubbing is greater than the effect of Internet addiction, but the fact that Internet was the origin of social media should not be ignored. In other words, although social media is a major factor that triggers phubbing today, another Internet-based factor, which has not emerged yet, may have the potential to evolve into the determinant of phubbing in the future. Because the Internet is a boundless field of development, which is fed from the imagination and intelligence of humans, what the future will reveal cannot be predicted today. In this context, unless a broader scope of technologies that will cover our current and future Internet environment are developed, the Internet will continue to be a permanent factor of phubbing. These results indicate that future phubbing research should continue with the Internet and Internet-related factors.

Another hypothesis (H_2) of the research suggested that game addiction has an effect on phubbing. Findings validated this hypothesis too, but they showed that this effect is considerably low. The main reason is the hierarchical relation of the game addiction first within social media, then the Internet and finally within the phone addiction. In other words, the game addiction that was believed to affect phubbing includes only a specific type of online game addiction (Charlton & Danforth, 2007; Kim et al., 2008; Lo et al., 2005; Young, 2009) or computer game addiction (Grüsser et al., 2006) that was referred in the literature. The games, such as Half Life and Counter-Strike, which require navigation and coordinated utilization of additional function keys, cannot be played on new generation phones because of the limited control keys and equipment. Strategy games cannot be played on smart phones because they require continuous following and management of multi-functional menus, and a large area should be monitored on a large screen. As a result, it can be seen that the game addiction which falls into the category of computer game addiction is different than the game addiction mentioned in phubbing. The game addiction type that affects phubbing includes games such as Candy Crush (Walsh et al., 2008) and Angry Birds (Böhmer et al., 2011), that are located in the phone memory and exist in social media rather than computer games. In this context, it is natural for game addiction, which is a specific type of social media addiction, to have a low-level impact, because the user has to enter the Internet first and then enter a social media environment in order to play the game. This explains the detected low-level effect.

The suggestion of hypothesis H_6 , that SMS use frequency has a positive effect on mobile phone, was validated. The sample of this research consisted of young university students and showed that SMS use became an addiction, which has become more common during the studentship period where economic independence has not been obtained yet and economic challenges have been experienced. Frequently sending SMS to communicate economically requires dealing with the phone physically and mentally while sending the message, as well as waiting for the answer, which leads to a phone addiction. Consequently, when dealing

with SMS frequently, a person must wait for the answer, and the response acts as reinforcement, so it can be argued that SMS usage turns into an addiction in accordance with the principles of operant conditioning. A similar result has been obtained for hypothesis H_7 , predicting that Internet use has a positive effect on social media addiction.

The Internet contains many multimedia tools. It is an environment that causes people to spend a long time on the computer. Research has shown that the time spent on the Internet is a factor triggering addiction (Nalwa & Anand, 2003). Similarly, individuals using the Internet for long periods of time start to interact with more objects, such as sexual content (Frangos et al., 2010; Griffiths, 2012; Pallanti et al., 2006), games and entertainment (Ceyhan, 2010; Gilbert et al., 2011; Öztürk & Özmen, 2011), communication and socialization (Akçay, 2011; Balcı & Gülнар, 2009; Ceyhan, 2011), and after a while, this transforms into an addiction. Virtual environments that appeal to all the senses manipulate people's feelings and expectations and encourage staying at the computer for longer periods of time (Hawi, 2012). The most obvious example of this is social media. The menu of Facebook and re-tweet count of Twitter inform people about how much reaction the shared item has received. The expectation of getting more likes, the desire of announcing oneself in a virtual environment by getting more reaction, and the desire to show one's existence by looming large in social media may be the factors amplifying this addiction.

Regarding the effect of gender as a moderator, we found that mobile phone [H_{1a}], SMS [H_{2a}], and social media [H_{3a}] addictions in women affect their phubbing behavior more strongly. However, internet [H_{4a}] and game [H_{5a}] addiction in men affect their phubbing behavior more strongly compared to women. It can be said that the reason that women's social media addiction is greater is their desire to be liked and their willingness to share their lives. Because men usually play more games on the computer and phone, there are more games for men; in this respect, they may be more likely to be addicted to a game. There are similar results in the literature (Cooper & Weaver, 2003; Jackson, Ervin, Gardner & Schmitt, 2001; Joiner et al., 2005; Junco & Cole-Avent, 2008; Morgan & Cotten, 2003).

When the research findings are taken into consideration as a whole, it can be concluded that the research variables overlap and have circular relationships, that especially SMS and social media addiction affect phone addiction, and that consequently, this phone addiction effects phubbing. As Griffiths (2000, 1999) states, the activities trigger addiction.

LIMITATIONS AND DIRECTIONS FOR FUTURE RESEARCH

In this research, we found that the most important determinants of phubbing behavior were mobile phone, SMS, social media and Internet addiction; in addition, gender and smart phone ownership were important moderators of this effect. In this context, the recommendations developed for theoretical and application areas and future research are as follows:

A comparative research can be conducted on a group of students from lower-level socioeconomic groups who own cell phones and a group of students owning smart phones to reveal the phubbing disturbance on different groups.

A qualitative research conducted on women and men may help to capture the details that might be lost during quantitative studies and to reveal the reasons that women are more inclined to engage in phubbing.

Research on secondary school, high school and university, as well as on various non-student groups, may reveal among which groups phubbing is more common and whether it is active in non-student groups. Thus, the outcomes needed for advanced research about the triggers of phubbing can be obtained.

Phubbing can be seen in different age groups; however, the variables that cause phubbing on these age groups should be determined.

In this research, 54% of the phubbing behavior was explained with the existing variables. In this context, it should be considered that the unexplained variance may be due to different variables. As a result of the fact that the participants are approximately the same age (*min*: 20, *max*: 24) and that this results in insufficient variance, exclusion of the moderator variable of *age* is required in this research. In this research, data were collected from only one country and evaluated. From this perspective, the generalizability of the findings is limited.

The interpretation and recommendations are limited as a result of the lack of research on phubbing, which is the focus of the present research, and because the variables overlap and are entirely dependent of each other, e.g., a phone is needed for SMS and being a phubber. The statistical (the variance explained by regression) and phenomenological causalities are the most important restrictions of the findings. For these reasons, phubbing may be considered as an independent phenomenon in future research.

The main reason for this limitation is because we collected the data from just one source (university students). This situation may have caused the observed correlations to increase factitiously. Although the limitation cannot be completely removed from the researches, the errors can be minimized. For this reason, the necessary precautions were taken into consideration during the data collection process. First of all, the validity and reliability of the scale used for data collection were tested. Secondly, the participants were told that the scales would be kept confidential and would not be shared to anybody under any circumstances. Additionally, the questionnaires were designed such that the items related to the independent variables took place before the items related to the dependent variables.

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APPENDIX

Phubbing Scale

1. My eyes start wandering on my phone when I'm together with others.
2. I am always busy with my mobile phone when I'm with my friends.
3. People complain about me dealing with my mobile phone.
4. I'm busy with my mobile phone when I'm with friends.
5. I don't think that I annoy my partner when I'm busy with my mobile phone.
6. My phone is always within my reach.
7. When I wake up in the morning, I first check the messages on my phone.
8. I feel incomplete without my mobile phone.
9. My mobile phone use increases day by day.
10. The time allocated to social, personal or professional activities decreases because of my mobile phone.

Mobile Phone Usage Addiction Scale

1. I check over the screen [messages, calls, etc.] of my mobile phone on all occasions.
2. I feel anxious when I don't have my mobile phone with me.
3. I never turn off my mobile phone.
4. I cannot concentrate on any other things when I send a text message or play a game.
5. I had times when I was so busy with the mobile phone and I lost the track of time.
6. I cannot think of a life without my mobile phone.
7. I had times when I forgot things to do since I was very busy with the mobile phone.
8. I feel safe when I use my mobile phone.
9. The people around me say that I spent too much time dealing with the mobile phone.
10. I put the mobile phone somewhere to be reached easily during my sleep.
11. I follow the upcoming mobile phone applications.
12. I take into consideration the number of the applications a mobile phone supports when I want to buy one.
13. I am interested in the applications my friends prefer to use in their mobile phones.
14. I keep my mobile phone applications update.
15. The applications in my mobile phone make my daily works easier.

Internet Addiction Scale

1. I spend time using the Internet more than I plan to.
2. The people around me say that I spent too much time dealing with the Internet.
3. I think that life would be boring, purposeless and monotonous without the Internet.
4. I prefer to spend time on the Internet rather than go out with others.
5. I can't wait to use the Internet if I don't have an access to the Internet for a long time.
6. I feel anxious when I don't have an access to the Internet.

Social Media Addiction Scale

1. I check over my social media [e.g. Twitter, Facebook] accounts even if I have something else to do.
2. I check over my social media accounts whenever possible.
3. I share what I did, what is going on with life and momentary events in social media.
4. I follow activities, momentary events, popular videos and trend topics in social media.
5. I check over the accounts of the people I know in social media.
6. I check over the accounts of the people I don't know in social media.
7. I communicate with my friends through social media rather than talk to them face to face.
8. I wonder whether my friends read my posts or not.
9. I follow the daily events and current affairs using social networks.
10. I prefer to use social media rather than watch television.

Game Addiction Scale

1. I have a need to replay a game aiming to win if I lost one.
2. I dream about the times to play game when I don't play a game.
3. After the game is over, I think about the mistakes I have made during the game.
4. I am not tired of playing games.
5. I lose track of time when I play games.
6. I delay eating in order to finish the game I am playing.
7. I delay sleeping hours when I play a game.
8. I cannot stop playing a game although I want to.

SMS Addiction Scale

1. I check whether I have new incoming messages [SMS] or not on every occasion.
2. I am unable to sleep till the late hours since I write messages to the friends.
3. I feel a need to reply the messages instantly.
4. I keep online the messaging applications all the time.
5. I wake up at nights to reply the messages.
6. I prefer to send text messages rather than speak to them.