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ORIGINAL ARTICLE

The relationship between smartphone addiction and fear of missing out: phubbing as the mediator in students at a university's faculties

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Abstract

Background: Smartphone addiction is a public health problem. The aim of this study was to investigate the relationship between smartphone addiction with fear of missing out and phubbing.

Methods: The universe of this cross-sectional study consisted of all students studying at Fırat University Faculties. 582 students were reached. A questionnaire was used as data collection tools. The questionnaire consists of demographic information form, questions about smartphone use, Smartphone Addiction Scale-Short Version, Fear of Missing Out Scale, and Phubbing Scale. SPSS PROCESS macro version 3.5 (Model 4) was used to test the mediation effect.

Results: 51.5% of the students were women and the mean age of all students was 22.06 ± 2.99. Smartphone addiction score was higher in women ($p < 0.05$). A significant negative correlation was found between smartphone addiction and age ($r = -0.10$). A significant positive correlation was found between smartphone addiction and daily smartphone usage frequency ($r = 0.31$) and daily smartphone usage duration ($r = 0.44$). Fear of missing out and phubbing were significant positive predictors of smartphone addiction. Phubbing had a mediating effect on the effect of fear of missing out on smartphone addiction.

Conclusion: Phubbing as a mediator increases the impact of fear of missing out on smartphone addiction.

Keywords: Smartphone, Addiction, Phubbing, Fear of Missing Out, University Student.

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INTRODUCTION

The number of smartphone users worldwide has exceeded six billion and is expected to increase several hundred million over the next few years (1). The smartphone usage frequency is expected to increase to 73.71% by 2024 in Turkey (2). Despite the advantages of using smartphones, many people overuse their phones in a way that interfere with their daily lives (3). According to the data of Statista 2017 time spent on daily smartphone usage worldwide, almost half of the participants spent five hours or more on their smartphones daily (4). Excessive and problematic use of the smartphone is associated with smartphone addiction (5). Smartphone addiction is a public health problem that affects a significant and increasing number of people (6). Especially young people are more likely to accept new technologies than older generations; and thus, young people are more prone to smartphone addiction compared to adults (7).

The fear of missing out (FoMO) is defined as the person's serious anxiety that others may have satisfactory experiences while he / she is absent. FoMO is characterized by the desire to be constantly aware of what others are doing (8). Fear of missing out encourages people to use social media tools and people who experience this fear use their smartphones to meet their need to stay connected (9), because smartphones are the most frequently used device in the world to access social media accounts, and 78% of people access their social media accounts only from their smartphones (10). More than half of the students participating in a study conducted among university students in Turkey used their social media accounts for 3 hours and more daily via their smartphones (11). The fear of missing out with excessive use of smartphones was an important predictor of smartphone addiction (9).

Phubbing is defined as a situation where an individual looks at their smartphone during a conversation with other people, dealing with the smartphone, and avoiding interpersonal communication (12). This situation may also be related to the increased availability of virtual social environments (13). FOMO forces people to check their smartphones repeatedly to avoid missing something on social media (14). In order to cope with this anxiety, individuals may use their smartphones even when they are physically with others and thus do phubbing behavior (15). Therefore, FOMO is a significant predictor of phubbing (16).

Phubbing is one of the behavior associated with the widespread availability of smartphones (12). In addition, phubbing behavior can be seen everywhere in today's modern society and has now become an accepted norm (17). People with FOMO can use their smartphones as often as they want without hesitation in any environment, thanks to the fact that phubbing behavior is a norm, in order to eliminate these concerns, and this may cause smartphone addiction (17). There are studies in the literature showing a positive and significant relationship between phubbing and smartphone addiction (18, 19).

In conclusion, it is important to investigate possible predictors that may increase smartphone addiction, since smartphone addiction is a public health problem and is more common in young people. Although previous research has identified some predictive factors for smartphone addiction, there is little research investigating the link between fear of missing out and smartphone addiction, and understanding of factors that may help explain this relationship is limited. Therefore, this study aimed to investigate the factors related to smartphone addiction. Mainly, the aim of the study was to examine whether fear of missing out behavior could significantly predict smartphone addiction of university students and to investigate whether phubbing behavior could significantly mediate this relationship. The secondary aim of the study was to examine the characteristics of phubbing and exposure to phubbing. Based on the literature review, we proposed the following hypotheses (Figure 1):

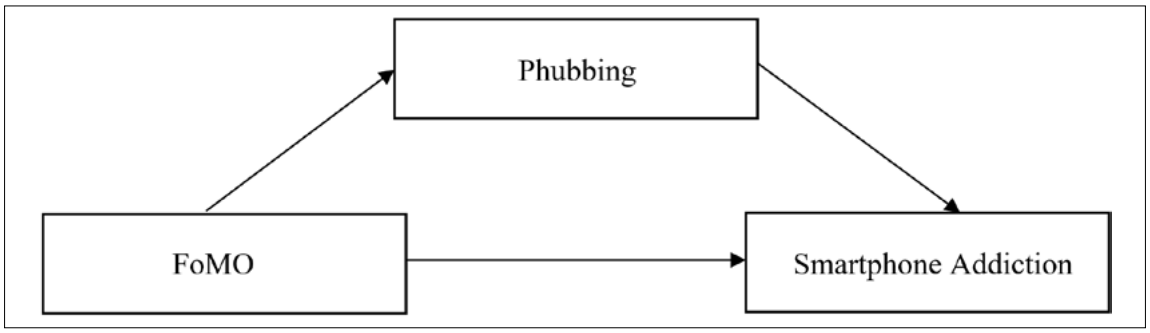

Figure 1. Mediation model

Hypothesis 1. Fear of missing out positively and significantly predicts smartphone addiction.

Hypothesis 2. Fear of missing out positively and significantly predicts phubbing behavior.

Hypothesis 3. Phubbing positively and significantly predicts smartphone addiction.

Hypothesis 4. Phubbing mediates the relationship between fear of missing out and smartphone addiction.

MATERIALS AND METHODS

The universe of this cross-sectional study consisted of all students studying at Fırat University Faculties in the 2018-2019 academic year. There were a total of 16 faculties at Fırat University and 29,635 students studying at these faculties. When the power analysis was performed by taking the significance level of 0.05, the power of 80%, and the correlation coefficient between the two independent variables approximately 0.12 after deducting the margin of error, it was calculated that the sample size should be at least 540 and maximum 600. The number of students to be included in the research from each faculty was weighted and calculated according to the total number of students of each faculty, and students were selected by simple random sampling method in each faculty. Data collection was carried out between April and May 2019. The application of the survey was completed after the necessary explanations were made and informed consent was obtained. As a result, 582 students were reached.

A questionnaire was used as a data collection tool. The questionnaire was applied under direct observation. The questionnaire consisted of four parts. There were demographic information form and questions about smartphone use in the first part, Smartphone Addiction Scale - Short Version in the second part, Fear of Missing Out Scale in the third part, and Phubbing Scale in the fourth part.

1) Smartphone Addiction Scale - Short Version (SAS-SV): It is a six-point Likert-type personal rating scale developed by Kwon et al. (2013) to measure the risk of smartphone addiction in adolescents (7). Scale items are scored from 1 to 6. Scale scores range from 10-60. The increase in the score obtained from the scale means that the risk of addiction increases. The scale has one factor and does not have subscales. The Cronbach alpha coefficient of the original scale was 0.91. The validity and reliability study of the Turkish version of the scale was performed by Noyan et al. (2015) in university students and Cronbach alpha coefficient was 0.86 (20).

2) Fear of Missing Out Scale (FoMO): It is a personal rating scale developed by Przybylski et al. (2013) in participants between 18 and 62 years old, and adapted to Turkish by Gökler et al. (2016) in university students (8, 21). A 5-point Likert scale (1 = Not at all true of me; 5 = Extremely true of me) is used on the scale, which contains 10 items and has a one-dimensional structure. The score that can be obtained from the scale varies between 10-50. As the score obtained from the scale increases, the level of fear of missing out the increases. It was reported that the Cronbach Alpha coefficient ranged from 0.87 to 0.90 for the original scale, and calculated as 0.81 for the Turkish version.

3) Phubbing Scale (PS): The scale developed by Karadag et al. (2015) in university students in Turkey is a Likert-type personal rating scale that evaluates the situation of the person not participating in the chat environment and dealing with his/her smartphone (12). The scale consists of 10 items and 2 sub-dimensions including (i) Communication Disturbances (5 items, α = 0.87) and (ii)

Phone Obsession (5 items $\alpha = 0.85$). Participants evaluate each item on a 5-point Likert scale ranging from 1 for never to 5 for always. The increase in the score obtained from the scale indicates that the level of phubbing increases.

The data obtained in the study were recorded and analyzed using the IBM SPSS for Windows version 21.0 software (IBM Corp., Armonk, NY, USA). Descriptive statistics according to the characteristics of the variables were presented as frequency and percentage for categorical variables, and as mean ± standard deviation or median (with 1st Quarter (Q1) and 3rd Quarter (Q3)) for continuous variables. The conformity of the continuous variables to the assumption of normal distribution was evaluated with the Shapiro Wilk test. It was found that all continuous variables in the study (age, frequency of daily smartphone use, duration of daily smartphone use, years of smartphone use, number of social media accounts used, SAS-SV score, FoMO scale score and Phubbing scale score) did not show normal distribution. To compare continuous variables, the Mann-Whitney U test was used for two independent groups and the Kruskal Wallis H test was used for more than two independent groups. The Spearman correlation coefficient method was used to determine the relationship between two independent variables with a continuous measurement level. It was assumed that phubbing mediated the relationship between FoMO and smartphone addiction. SPSS PROCESS macro version 3.5 (Model 4) was used to test the mediation effect (22). In the model, the FoMO score was the predictor, the PS score was the mediator, and the SAS-SV score was the outcome variable. The indirect effect was estimated for 5000 bootstrap samples with a 95% bias-corrected confidence interval. Confidence intervals that do not include zero indicate effects that are significant. Statistical significance was evaluated as $p < 0.05$.

Ethical permission for the research was obtained from the Fırat University Non-Interventional Research Ethics Committee. The meeting date was 11.04.2019, the meeting number was 06, the decision number was 12. Institutional permission was obtained from the Rectorate of Fırat University.

RESULTS

51.5% of the students included in the study were female, 48.5% were male. The mean age of all students was 22.07 ± 3.00 (min = 18, max = 50) and the median value of age was 22.00 (21.00-23.00).

The median frequency of students using smartphones daily was 20.00 (10.00-40.00) times, the median duration of using smartphones daily was 4.00 (2.50-6.00) hours, the median time of owning a smartphone was 6.00 (4.42-8.00) years. The median values of the scores that the students received from the scales were as follows: 28.00 (21.00-36.00) for SAS-SV, 24.00 (18.00-29.00) for FoMO, 25.00 (20.00-31.00) for PS.

Comparison of SAS-SV, FoMO and PS scores according to the gender of the participants is shown in Table 1. SAS-SV ($p < 0.001$) and PS ($p = 0.017$) scores were higher in women.

Table 1. Comparison of Smartphone Addiction Scale - Short Version, Fear of Missing Out Scale and Phubbing Scale scores according to the gender of the participants

Variables	Smartphone Addiction Scale - Short Version		Fear of Missing Out Scale		Phubbing Scale	
	Median (Q1-Q3)	p	Median (Q1-Q3)	p	Median (Q1-Q3)	p
Gender						
Male	25.0 (19.5-35.0)	<0.001	24.0 (18.0-30.0)	0.067	24.0 (19.0-30.0)	0.017
Female	31.0 (22.0-38.0)		22.0 (18.0-28.0)		25.0 (21.0-31.0)	

The relationship coefficients between continuous variables are given in table 2. A significant negative correlation was found between smartphone addiction and age ($r = -0.10$). A significant positive correlation was found between smartphone addiction and daily smartphone usage frequency ($r = 0.31$), daily smartphone usage duration ($r = 0.44$), number of owned social media accounts ($r = 0.21$), FoMO ($r = 0.43$) and PS ($r = 0.71$) scores ($p < 0.05$). There was a significantly positive correlation between FoMO and PS scores ($r = 0.49$, $p < 0.001$).

Table 2. Spearman correlation coefficients among study variables

Variables	1	2	3	4	5	6	7	8
1.SAS-SV	1							
2.Age	-0.10*	1						
3.Daily usage frequency	0.31***	-0.06	1					
4.Daily usage duration	0.44***	-0.13**	0.35***	1				
5.Years of usage	0.03	0.16***	0.06	0.03	1			
6.Social media	0.21***	-0.06	0.22***	0.28***	0.08*	1		
7.FoMO	0.43***	-0.11**	0.22***	0.27***	0.04	0.24***	1	
8.Phubbing Scale	0.71***	-0.13**	0.31***	0.47***	0.04	0.24***	0.49***	1

*Note: The numbers in the variables row represent the same number of variables in the variables column. SAS-SV = Smartphone Addiction Scale - Short Version score, Daily usage frequency = The daily smartphone usage frequency, Daily usage duration = The daily smartphone usage hours, Years of usage = Years of using smartphone, Social media = Number of social media accounts used, FoMO = Fear of Missing Out Scale score, Phubbing Scale = Phubbing Scale score, *p < 0.05, **p < 0.01, ***p < 0.001.*

The results of the mediation analysis are shown in Table 3. FoMO score positively predicts PS score (β = 0.48, p <0.001) and PS score positively predicts SAS-SV score (β = 0.65, p <0.001). FoMO score and PS score together explain 51% of the change in the SAS-SV score. Phubbing has a mediating effect on the relationship between FoMO and smartphone addiction. The direct effect of the FoMO score on the SAS-SV score is β = 0.11 (p = 0.003), the indirect effect is β = 0.31 (95% CI = 0.25-0.38) and the total effect is β = 0.42 (p<0.001).

Table 3. The mediating effect of phubbing on the relationship between FoMO and smartphone addiction

Predictors	Phubbing Scale		SAS-SV		SAS-SV	
	β	p	β	p	β	p
FoMO	0.48	<0.001	0.11 (direct)	0.003	0.42 (total)	<0.001
Phubbing Scale			0.65	<0.001		
Model R^2	0.23		0.51		0.18	
Model p value	<0.001		<0.001		<0.001	

Note: SAS-SV = Smartphone Addiction Scale - Short Version score, FoMO = Fear of Missing Out Scale score, Phubbing Scale = Phubbing Scale score.

88.8% of the students reported using their phone while communicating face-to-face with someone, and 97.8% reported that they were exposed to phubbing. 94.1% stated that phubbing was not an appropriate behavior and 93.1% stated that phubbing was not seen as appropriate by the society (Table 4).

Table 4. The distribution of the characteristics of phubbing and exposure to phubbing

Variables	n	%
Using the phone while communicating face to face with someone (n = 582)		
Always	12	2.0
Often	35	6.0
Sometimes	178	30.6
Rarely	292	50.2
Never	65	11.2
Phone usage of the other person while communicating face to face (n = 581)		
Always	21	3.6
Often	191	32.9
Sometimes	259	44.6
Rarely	97	16.7
Never	13	2.2
Using a phone while communicating with someone face to face is a suitable behavior (n = 580)		
No	546	94.1
Yes	34	5.9
Using a phone while communicating with someone face to face is seen as an appropriate behavior by others (n = 582)		
No	542	93.1
Yes	40	6.9

DISCUSSION

Little research has investigated the relationship between fear of missing out and smartphone addiction, and the mediating mechanisms underlying this relationship remain largely unknown. The present study investigated the predictive role of fear of missing out to university students' smartphone addiction, and the mediating role of phubbing in this relationship. The results showed that fear of missing positively predicted university students' smartphone addiction, and this relationship was mediated by phubbing.

The median of SAS-SV score was found to be 28.00 (21.00-36.00) in the present study. Similar results were found in another study conducted in Turkey (23) and in studies conducted in The United States of America (24), Japan (25) and United Kingdom (17). In different parts of the world, SAS-SV score has been approximately the same; the use of smartphones has become globalized in the 21st century.

SAS-SV score was significantly higher in women than in men in the present study. It is thought that this situation may be related to the fact that female students maintain their communication and social relations on smartphones, while male students use their smartphones for different purposes such as watching videos and playing games (26, 27). Playability in games that require the use of additional function keys in a coordinated manner is less in smartphones, due to the limited control keys, hardware and screen size compared to computers. This may cause men to be more likely to spend time with devices other than smartphones.

As age decreased, SAS-SV score increased. In the literature, there are studies that found a negative relationship between age and SAS-SV score (28-32).

The median value of the daily smartphone usage duration of the students was found to be 4.00 hours. Assuming that a college student sleeps an average of 8 hours a day, one quarter (4 hours) of the 16 hours they are awake per day is spent using a smartphone and this indicates to overuse. Additionally, there was a significant positive relationship between the SAS-SV score with the daily smartphone usage frequency and duration. In the literature, there are studies that found significant positive relationships between SAS-SV score and daily smartphone check frequency (20, 24, 28) and daily duration of use (20, 33). These findings can be explained by the fact that tolerance in addicts causes increased usage.

There was a positive relationship between the number of social media accounts owned and SAS-SV, FoMO and PS scores in the present study. Similarly, in another study conducted in Spain, it was found that there was a positive relationship between FoMO score and the number of social media accounts owned (34). As the level of fear of missing out the developments on social media increases, people may have more social media accounts and try to overcome their fear and curiosity through these accounts.

According to the model we created in the study, it was seen that FoMO score was found to be a positive and significant predictor of SAS-SV score in the model (Hypothesis 1). This finding is consistent with the literature (9, 17, 35). People who are afraid of missing developments on social media increase their smartphone use, which is an act of fear. As fear levels increase, smartphone usage duration will increase, as smartphone usage duration increases, addiction will develop. In the model, it was determined that fear of missing out was the predictor of phubbing, and hypothesis 2 was confirmed. Other studies in the literature support this finding (36-39). The urge of the individual to check the phone in order not to miss something online causes them to use their phones even when they are physically with others (17, 40). Also, phubbing was not only a consequence of fear of missing out, but also a predictor of smartphone addiction (Hypothesis 3). Although past studies indicate that smartphone addiction is a predictor of phubbing (12, 39), since phubbing is now a norm (41), people can use their smartphones unlimitedly in any environment they want, which can lead to smartphone addiction by facilitating excessive phone use. In addition, consistent with our assumption (Hypothesis 4), phubbing was found to mediate the relationship between fear of missing out and smartphone addiction in university students. The fact that phubbing is now a norm contributes to people who have anxiety due to FoMO to use their smartphones in any environment they want without hesitation.

The fact that 94.1% of the participants in the present study did not consider phubbing behavior appropriate and 93.1% thought that phubbing behavior was not approved by the society, reveals their awareness on this issue. However, it was found that the majority of students (88.8%) practiced phubbing behavior, which shows that their awareness and behavior do not match. Similarly, in a study conducted in a college in Denmark, it was stated that although phubbing behavior is characterized by young people as disrespectful and a behavior that makes the other person feel worthless, they do this behavior (42). In addition, the fact that 97.8% of the participants in this study stated that they were exposed to phubbing behavior shows that this problem is quite common. These high prevalences are becoming more important because of reducing the quality of interpersonal face-to-face interactions. Phubbing behavior by ignoring the other person through a smartphone may cause them to respond to this behavior intentionally or unintentionally. With the repetition of phubbing behavior in response, phubbing is perceived as normative or acceptable (17).

The current study has its limitations. Firstly, the findings of this study are limited to all students studying in faculties at Fırat University. Therefore, the findings cannot be generalized to students at different universities. In future studies, re-examining the subject in different populations will be useful for further clarification of the subject. Secondly, the cross-sectional design of the present study prevents us from making causal inferences. Further studies are needed to find causal relationships between variables. In addition, since smartphone addiction is not yet included in the Diagnostic and Statistical Manual of Mental Disorders-5, a clinical diagnosis of smartphone addiction cannot be made (43), and the scale used in the study is a self-assessment scale and only determines the behavioral characteristics of individuals. Finally, learning about students' smartphone usage characteristics (such as daily smartphone usage time and frequency) through a self-reported questionnaire may cause the result to be underestimated.

This study also has some strengths. As this study covers all faculties of Fırat University, having a wide range of students studying in different fields is a strong aspect of this study. In addition, this study shows that phubbing behavior is a factor that explains how FoMO behavior contributes to smartphone addiction.

As a result, smartphone addiction was found to be more common in women. There was a positive and significant relationship between smartphone addiction and age, daily smartphone checking frequency and duration, number of social media accounts owned, fear of missing out, and phubbing. Fear of missing out and phubbing were significant positive predictors of smartphone addiction. In addition, phubbing had a mediating effect on the effect of fear of missing out on smartphone addiction. In order to better understand and reduce smartphone addiction, it may be necessary to investigate what causes the fear of missing out. Thus, interventions can be made for these reasons. In addition, since it has been determined that an interpersonal communication problem such as phubbing causes smartphone addiction, a solution to smartphone addiction can be found by investigating other communication problems and their causes, especially phubbing.

Declarations

The authors have no conflicts of interest to declare. The authors declared that this study has received no financial support.

Ethical permission for the research was obtained from the Fırat University Non-Interventional Research Ethics Committee. The meeting date was 11.04.2019, the meeting number was 06, the decision number was 12. Institutional permission was obtained from the Rectorate of Fırat University.

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