

# The Effect of Problematic Internet Use and Social-Appearance Anxiety on the Smartphone Addiction of Adolescents

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## Abstract

**BACKGROUND/AIMS:** According to the World Health Organization, the use of technological tools, such as the internet, computers, and smartphones, is increasing every day all over the world. The widespread use of the Internet and technological devices among children today shows the risks which children carry in terms of problematic internet use and smartphone addiction. This study examined the effects of problematic internet use and social-appearance anxiety on the smartphone addiction of adolescents.

**MATERIALS AND METHODS:** The study was designed to collect descriptive, correlational, predictive, and cross-sectional data on 700 adolescents. The data were collected using the Problematic Internet Use Scale, the Social-Appearance Anxiety Scale, and the Smartphone Addiction Scale. Numbers, percentage analysis, and correlation and regression analyses were employed to evaluate the data.

**RESULTS:** A strong positive relationship was found between adolescents' problematic internet use and their smartphone addiction ( $r=0.651$ ,  $p<0.001$ ), while a moderate positive relationship was observed between social-appearance anxiety and smartphone addiction ( $r=0.454$ ,  $p<0.001$ ). Of the variables identifying smartphone addiction, 48% were associated with problematic internet use and social-appearance anxiety.

**CONCLUSION:** This study determined that adolescents with high problematic internet use and high social-appearance anxiety were more likely to have smartphone addiction. This study found that 48% of smartphone addiction was explained by problematic internet use and social-appearance anxiety.

**Keywords:** Pediatric nursing, adolescents, problematic internet use, social-appearance anxiety, smartphone addiction

## INTRODUCTION

According to the World Health Organization (WHO), 2016, the use of technological tools, such as the internet, computers, and smartphones, is increasing every day all over the world.<sup>1</sup> The Household Use of Information Technology Survey (2019)<sup>2</sup> conducted in Turkey revealed that the rate of computer and internet use among individuals in the 16-year-old age group was 81.8%, with 87.9% of households having internet access and 96.8% of the population were determined to have a mobile phone or smartphone.<sup>3</sup>

The widespread use of the internet and technological devices among children today shows the risks which children carry in terms of problematic internet use.<sup>4,5</sup> Problematic internet use, which is seen as a social problem throughout the world, is defined as the use of the internet to the extent that it affects daily life adversely and the individual's inability to control their use of the internet.<sup>6</sup> Although problematic internet use can be seen at any age, adolescents are among the most important at risk groups.<sup>7</sup> Adolescents are also accepted as a group that promptly adopts new technologies and the social media

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tools that these technologies introduce, and yet are more vulnerable to their potential adverse effects. In adolescence, when physical and psychological changes occur, the emergence of behaviors such as problematic internet use will adversely affect the development of adolescents.<sup>8</sup>

Problematic internet use affects the development and social life of adolescents negatively, as well as their psychological health. This situation may harm both the school life and family life of adolescents. Therefore, determining and preventing problematic internet-use related factors in adolescents is emphasized to be important to the individual and society. Adolescents tend to meet their socialization needs especially on the internet.<sup>9</sup> Some studies emphasized that adolescents, who especially have social-appearance anxiety, make use of the internet for socialization in this period of their lives when peer interaction and making friends are important.<sup>10,11</sup> Studies in the literature emphasize that there is a significant relationship between problematic internet use and social-appearance anxiety.<sup>12-14</sup> Interest in, liking, and attention to the sharing of adolescents who have high social-appearance anxiety leads to increased popularity among friends, which, in turn, escalates the internet usage of adolescents each day, resulting in problematic internet use.<sup>15</sup>

Social-appearance anxiety is the tension and anxiety experienced by the individual when their physical appearance is evaluated by others.<sup>16</sup> In their meta-analysis study on social-appearance anxiety and internet use in adolescents, Prizant-Passal et al.<sup>17</sup> found that adolescents with high social-appearance anxiety used the internet because they felt comfortable and secure in the internet environment and that the internet provided privacy of identity. As social-appearance anxiety increases in adolescents, the use of the internet gradually increases and this causes problematic internet use, and the use of the internet via smartphones today also causes an increase in smartphone addiction. There is limited research in the literature investigating the effects of internet addiction and social-appearance anxiety on smartphone addiction.<sup>18</sup> For this reason, this study examined the effects of problematic internet use and social-appearance anxiety on smartphone addiction in adolescents.

## MATERIALS AND METHODS

### Participants and Procedures

This study was a descriptive, correlational, predictive, and cross-sectional study of high school students. The study was conducted between January 2019 and June 2019 on students attending ninth, 10<sup>th</sup>, and 11<sup>th</sup> grades in three high schools selected using the simple random-sampling method among high schools affiliated to the Fatih District National Education Directorate of İstanbul Provincial Directorate of National Education. The sample size of the study was calculated to be 615 adolescents on the GPOWER version 3.0.1 (Heinrich-Heine-Universität, Düsseldorf, Germany) statistical software package based on regression analysis using the Type 1 error of 0.01, the Type 2 error of 0.01 (99% power), and the moderate effect size of 0.15. However, to better understand the relationship between the variables, 730 adolescents who agreed to participate in this study, who had parental consent, and who met the inclusion criteria were included in this study. However, 700 adolescents were included in the study as the data forms of 30 adolescents could not be obtained during the data collection process.

### Inclusion Criteria

a) adolescents between 14 and 18 years of age; b) they or their parents had a smartphone; c) they had internet access at home or at school; and

d) they agreed to participate voluntarily in this study, and their parents gave written consent.

### Exclusion Criteria

a) they did not have access to the internet from home or school; b) they did not use a smartphone; c) they had special learning difficulties; d) they wished to withdraw from the study at some stage; and e) they could not obtain parental consent. Table 1 provides information about their demographic variables.

### Data Collection

The data were collected during classes at the high schools. Participants were asked to fill out the survey forms anonymously after informed consent was obtained by the researchers. Volunteer participants took part in the study, and they were free to leave the study at any point. The data were collected from each class in a separate lesson (each lesson was 40 minutes). The scales were administered by the researcher in the classroom during a lesson with the permission of the teacher.

### Instruments

The Descriptive Information Form was designed by the researchers in accordance with the literature.<sup>10</sup> It consists of items requesting socio-demographic information about the participants-age, gender, grade, parents' education level, monthly income level, and internet and smartphone use.

### The Problematic Internet Use Scale-Adolescent Form (PIUS-A)

The Problematic Internet Use Scale-Adolescent Form (PIUS-A) was developed by Ceyhan & Ceyhan<sup>19</sup> to assess the problematic internet use of high school students. The scale consists of 27 items to be scored as "not appropriate at all" (1 point), "barely appropriate" (2 points), "slightly appropriate" (3 points), "reasonably appropriate" (4 points), and "fully appropriate" (5 points). The possible scores range from 27 to 135. Higher scores obtained on the scale indicate excessive and unhealthy problematic internet use. The overall internal consistency coefficient of the scale was reported to be 0.93,<sup>19</sup> and Cronbach's alpha value of the scale was determined to be 0.92, thus, this scale was judged to be a valid and reliable instrument to identify problematic internet use of high school students in the Turkish population. In this study, the Cronbach alpha value of the scale was determined to be 0.920.

### The Social-Appearance Anxiety Scale (SAAS)

The Social-Appearance Anxiety Scale (SAAS) was developed by Hart et al.<sup>20</sup> to measure the social-appearance anxiety of individuals. The validity and reliability of the scale were conducted by Doğan.<sup>21</sup> It consists of 16 items and only one sub-dimension. Each item on the scale is scored as 1=not appropriate at all, 2=inappropriate, 3=slightly appropriate, 4=appropriate, and 5=fully appropriate. Higher scores obtained from this scale indicate more pronounced social-appearance anxiety. SAAS is a self-reporting scale developed to measure emotional, cognitive, and behavioral concerns that individuals experience about their appearance. The KMO value of the scale was reported to be 0.94. The factor loadings of the scale varied from 0.34 to 0.78. The fit indices were the Root Mean Square Error of Approximation is a Parsimony-Adjusted Index (RMSEA)=0.066; Comparative Fit Index (CFI)=0.95; Incremental Fit Index (IFI)=0.95, Normed Fit Index (NFI)=0.93, and Goodness-of-Fit Index (GFI)=0.93 ( $\chi^2=311.89$ ,  $p<0.001$ ).<sup>21</sup> The Cronbach's alpha coefficient of the scale was 0.91. The scale was judged to be a valid and

reliable scale for use in adolescents. The Cronbach's alpha value of the scale in this study was determined to be 0.940.

### The Smartphone Addiction Scale (SAS)

The Smartphone Addiction Scale was developed by Şar et al.<sup>22</sup> to determine the level of smartphone addiction among adolescents. It consists of 30 items and four sub-dimensions. It has a 5-point Likert-type structure scored as "strongly agree" (5 points), "agree" (4 points), "neutral" (3 points), "disagree" (2 points), and "strongly disagree" (1 point). The factor loadings of the scale varied between 0.44 and 0.81. The KMO value of the scale was 0.947,  $\chi^2=4,919.85$ , and  $p=0.000$ . The Cronbach's alpha value of the scale was 0.96. The Model Fit Indices of the scale were RMSEA=0.075, CFI=0.97, NFI=0.96, and NNFI=0.97. As a result of the analysis, the scale was concluded to be a valid and reliable scale.<sup>22</sup> In this study, The Cronbach's alpha value of the scale was found to be 0.942.

### Compliance With Ethical Standards

Approval of the authors who developed the scales used in this study was obtained by e-mail. At the outset, Ethics Committee approval was obtained from the Dokuz Eylül University Non-Interventional Research Ethics Committee (protocol no: 4293-GOA, date: 01.11.2018, issue: 2018/28-17). Following approval by the Ethics Committee, permission for the research was granted by the Provincial Directorate of National Education of the Istanbul Governorship. Before the study, the parents were informed about the study content in a meeting at the school. Information forms about the study aim and content were mailed to those parents who did not attend the meeting. Only those students whose parents gave written consent were included in this study.

### Evaluation of data

The research data were analyzed using the IBM SPSS Statistics version 24 (IBM Corp, Armonk, NY, USA). Numbers, percentages, and mean values were used to evaluate the descriptive information of the adolescents. The Shapiro–Wilk test was used to confirm that the scale data fit the normal distribution. The relationship between problematic internet use and smartphone addiction, and the relationship between social-appearance anxiety and smartphone addiction were evaluated using a Pearson's correlation analysis. The effect of problematic internet use and social-appearance anxiety on smartphone addiction was evaluated with multiple regression analysis. The multi-collinearity test was employed to determine whether variables would be included in the model. In multi-collinearity tests, the VIF value should be less than 10, the tolerance value should be greater than 0.2, and the condition index value should be less than 15. The variables in this study were included in the model as they were found to meet the desired criteria. The significance level was accepted as  $p<0.001$ .

## RESULTS

Table 1 reports the sample characteristics. As a result of the correlation analysis conducted in this study, a significant, strong, and positive correlation was determined between the mean of the total PIUS-A scores of adolescents and the mean of the total smartphone addiction scores ( $r=0.651$ ,  $p<0.001$ ). Additionally, there was a moderately significant positive correlation between the mean of the total SAAS-A scores of the adolescents and the mean of the total smartphone addiction scores ( $r=0.454$ ,  $p<0.001$ ) (Table 2).

Three models were established considering the relationship between the study variables and smartphone addiction. Multiple regression analysis was used to evaluate the models.

In Model 1, the PIUS-A was identified as explaining 45% of smartphone addiction ( $p<0.001$ ). A strong positive relationship was found between

**Table 1. Adolescent characteristics**

	Mean	SD
Mean age	15.67	1.02
	n	%
<b>Adolescents' age</b>		
14	68	9.7
15	282	40.3
16	188	26.9
17	145	20.7
18	17	2.4
<b>Gender</b>		
Female	302	43.1
Male	398	56.9
<b>Student's class</b>		
9 <sup>th</sup> class	338	48.3
10 <sup>th</sup> class	193	27.6
11 <sup>th</sup> class	169	24.1
<b>Mother's education level</b>		
Primary	193	27.6
Middle	156	22.3
High school	211	30.1
University	140	20.0
<b>Father's education level</b>		
Primary	111	15.9
Middle	169	24.1
High school	233	33.3
University	187	26.7
<b>Perception of income</b>		
Low	68	9.7
Middle	562	80.3
High	70	10.0
<b>Weekly internet usage</b>		
<5 hours per week	445	63.6
5–14 hours per week	224	32.0
15–39 hours per week	10	1.4
>40 hours per week	21	3.0
<b>Internet usage purposes</b>		
Studying	130	18.6
Watching movies	137	19.6
Chatting	109	15.6
Using social media sites	211	30.1
Online games	113	16.1

SD: standard deviation, n: number.

problematic internet use and smartphone addiction ( $\beta=0.669$ ,  $p<0.001$ ).

In Model 2, the mean total scores obtained from the SAAS-A were determined to explain 21% of smartphone addiction ( $p<0.001$ ). A moderate positive relationship was identified between social-appearance anxiety and smartphone addiction ( $\beta=0.454$ ,  $p<0.001$ ).

In Model 3, the mean total scores obtained from the scales relating to PIUS-A and SAAS-A were included in the model. Taken together, these variables explained 48% of smartphone addiction. According to this model, the variables that affected the smartphone addiction of the adolescents mostly were determined to be the problematic internet use of adolescents ( $\beta=0.581$ ) and social-appearance anxiety ( $\beta=0.204$ ), respectively ( $p<0.001$ ) (Table 3).

### DISCUSSION

The findings of this study indicated the effects of adolescents' problematic internet use and social-appearance anxiety on smartphone addiction. Three models were created to explore the relationships between the study variables and smartphone addiction.

Model 1 showed that problematic internet use in adolescents explained 47% of smartphone addiction. The use of smartphones is highly preferred among adolescents, as it provides easy access to the internet at any time and in any place via a portable device.<sup>23-25</sup> The fact that internet and smartphone use allow for social interaction also encourages adolescents to use it frequently.<sup>26</sup> Similar to our study, there are studies in the literature showing a significant relationship between problematic internet use and smartphone addiction.<sup>10,27,28</sup> In a study conducted in Japan (Ministry of Internal Affairs and Communications) on the internet use of 38,630 adolescents, 59.7% of adolescents were found to access the internet via their smartphones and that they also preferred smartphones especially as they allowed internet access whenever and

wherever they wanted.<sup>29</sup> Studies in the literature supported the findings determined in Model 1 in our study that adolescents with a high level of problematic internet use report their smartphone addiction to be at a high level.<sup>18,27,29</sup>

Model 2 indicated that the increase in the mean SAAS-A score of adolescents led to an increase in smartphone addiction by 0.454 times and that the mean of the total SAAS-A scores explained 21% of the total smartphone addiction. Similar to our study, Doğan and Tosun<sup>11</sup> determined that as the level of social anxiety increased in high school students, smartphone addiction increased as well. In the study of Wang et al.<sup>30</sup>, individuals who were concerned about establishing a face-to-face relationship were determined to use smartphones as an avoidance behavior. In a study on 443 adolescents aged between 14 and 18, Emirtekin et al.<sup>31</sup> found that 19% of adolescents' smartphone addiction was explained by social-appearance anxiety.

In Model 3, on the other hand, both problematic internet use and social-appearance anxiety in adolescents were determined to affect smartphone addiction. Various studies show that adolescents are highly prone to smartphone and internet use, particularly because smartphones provide easy access to the internet and anonymity among adolescents with social-appearance concerns.<sup>17</sup> Adolescents with pronounced social-appearance anxiety feel more confident and more comfortable on the internet, and can interact with other individuals more easily, compared to face-to-face interaction.<sup>17,32</sup> In their meta-analysis study, Prizant-Passal et al.<sup>17</sup> found that individuals with high social-appearance anxiety had higher problematic internet use and smartphone addiction. In particular, adolescents with high social-appearance anxiety prefer to socialize on the internet, especially with smartphones, because they can mask their identities and photographs on the internet, and they are highly unlikely to receive criticism of their images, which is what they worry about. Adolescents with high social-appearance anxiety have more online communication than face-to-face communication.<sup>11</sup> In their study with 319 university students, Demirci et al.<sup>33</sup> found that adolescents with high social-appearance anxiety had higher levels of smartphone addiction and that these two variables were mutually influential. In other words, adolescents who were smartphone addicts were identified as those who experience high social-appearance anxiety. In their study with 381 university students, Hawi and Samaha<sup>34</sup> found that students with a high level of smartphone addiction had higher levels of social-appearance anxiety compared to those students without smartphone addiction.

In the literature, there was no study investigating the effect of both PIUS and social-appearance anxiety of adolescents together with regards to smartphone addiction. The strength of our study was that it had a large sample size ( $n=700$ ) and that the sample was made up of the most delicate age group in terms of smartphone use. Also, addressing social-appearance anxiety in adolescents in our study was very important in terms of preventing problems that may adversely affect the future health of adolescents, such as eating behavior disorders, anxiety, depression and addiction.<sup>35</sup>

Schools are the most appropriate places for health education and screening programs to promote and maintain health. Adolescents are open to the information provided at school and are more willing to participate in existing programs and activities with their peers. The duties and responsibilities of school nurses in Turkey involve the provision of accurate health information to students and the organization of training

**Table 2. The relation of adolescents' smartphone addiction levels with their problematic internet use and social appearance anxiety levels**

	1	2	3
1. Smartphone addiction	1.0		
2. Problematic internet use	0.669*	1.0	
3. Social-appearance anxiety	0.454*	0.431*	1.0

\* $p<0.001$ .

**Table 3. The predictive status of problematic internet use and social-appearance anxiety levels of the adolescent on their smartphone addiction levels**

	Model 1	Model 2	Model 3
	$\beta$	$\beta$	$\beta$
PIUS-A	0.669*		0.581*
SAAS-A		0.454*	0.204*
R	0.669	0.454	0.694
R <sup>2</sup>	0.448	0.207	0.481
F	565.540	181.671	323.467
p-value	<0.001	<0.001	<0.001
DW	1.766	1.829	1.796

\* $p<0.001$ , DW: Durbin-Watson, PIUS-A: Problematic Internet Use Scale-Adolescent, SAAS-A: Social-Appearance Anxiety Scale-Adolescent Form.

programs in order for adolescents to acquire positive attitudes towards health education. Accordingly, the school nurse should plan training programs on the conscious use of technology for students. In addition, with these awareness training interventions, the school nurse should draw attention to the effects of technological devices on adolescents resulting from their inappropriate use. Early recognition and treatment of adolescent's smartphone addictions is crucial given the negative consequences of untreated addiction on adolescent development.

In this study, the high social-appearance anxiety of adolescents was found to significantly affect smartphone addiction. Social-appearance anxiety is another important issue that the school nurse should pay attention to. Enhancing the self-confidence of adolescents who particularly have high social-appearance anxiety and helping them to be aware of their strengths is among the important responsibilities of the school nurse. The school nurse should also follow the times when adolescents are online and when they quit, encourage them to spend more time with their family and friends, and direct them towards social activities (e.g. sports, cinema, etc.) which they are/may be interested in instead of online games.

### Limitations and Suggestions for Future Research

This study has several limitations. The primary limitation of our study is the cross-sectional nature of the work, which prevents the establishment of causal relationships. The present study was limited in that we did not collect data on all the variables that could be related to PIUS-A and SAS, such as prior family or individual mental health history. This study determined that adolescents with high problematic internet use and high social-appearance anxiety were more likely to have a smartphone addiction. This study found that 48% of smartphone addiction was explained by problematic internet use and social-appearance anxiety.

### CONCLUSION

In future studies, we recommend that some of the sociodemographic characteristics of adolescents, such as their past mental health history and familial features, should be taken into consideration and the effects of these variables on smartphone addiction should be investigated. In addition, issues such as internet addiction and smartphone addiction should be addressed in detail in schools, and adolescents should be provided with counseling services on these issues.

### MAIN POINTS

- This study found that 48% of smartphone addiction was explained by problematic internet use and social-appearance anxiety.
- This study determined that adolescents with high problematic internet use and high social-appearance anxiety were more likely to have a smartphone addiction.
- The early recognition and treatment of adolescent's smartphone addiction are crucial given the negative consequences of untreated addictions on adolescent development.

### ETHICS

**Ethics Committee Approval:** The Ethics Committee approval was obtained from the Dokuz Eylül University Non-Interventional Research Ethics Committee (protocol no: 4293-GOA, date: 01.11.2018, issue: 2018/28-17). Following approval by the Ethics Committee, permission

for the research was granted by the Provincial Directorate of National Education of Istanbul Governorship.

**Informed Consent:** Informed consent was obtained.

**Peer-review:** Externally peer-reviewed.

### Authorship Contributions

Concept: Ö.Ş., D.A., Design: Ö.Ş., D.A., Data Collection and/or Processing: Ö.Ş., D.A., Analysis and/or Interpretation: Ö.Ş., D.A., Literature Search: Ö.Ş., D.A., Writing: Ö.Ş., D.A., Critical Review: D.A.

### DISCLOSURES

**Conflict of Interest:** No conflict of interest was declared by the authors.

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