An Investigation of Smartphone Addiction Among Adolescents Presenting to a Child and Adolescent Psychiatry Clinic

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Abstract: The widespread use of smartphones may raise the importance of investigating the impacts of smartphone addiction on adolescents. And yet, it seems critical to explore the current situations of adolescents who apply to psychiatry clinics for excessive smartphone use. Therefore, it was aimed to investigate smartphone use habits among adolescents who applied to a training and research hospital. The sample included adolescents diagnosed with Attention Deficit and Hyperactivity Disorder or Anxiety Disorder. The data were collected using a demographic information form and the "Test of Mobile Phone Dependence" (TMD). The data were analyzed through appropriate statistical techniques, and a p-value < 0.05 was accepted as statistically significant. The findings revealed no significant differences between the participants' scores on the TMD and its subscales by age and gender. Yet, it was found that those using a smartphone for more than three hours a day got higher scores on the TMD. When it comes to the purposes of smartphone use, the participants reported using their smartphones for texting, phone calls, movie-video watching, and social media the most. Using a smartphone for more than three hours a day was considered a risk factor for smartphone addiction. Moreover, using a smartphone mainly for entertainment and gaming was also accepted as a risk factor for dependence. The research on this subject is evidently appreciated to prevent smartphone addiction

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and its problematic use; however, further research is needed to reveal the case among adolescents with a psychiatric diagnosis.

Keywords: Adolescence, anxiety disorders, attention problems, developmental psychopathology, technology, psychosocial development

Çocuk ve Ergen Psikiyatri Polikliniğine Başvuran Ergenlerde Akıllı Telefon Bağımlılığının İncelenmesi

Öz: Cep telefonunun günümüzdeki yaygın kullanımı göz önüne alındığında ergenler üzerindeki cep telefonu bağımlılık düzeylerinin araştırılmasının önemi ortaya çıkmaktadır. Bununla beraber özellikle psikiyatri kliniğine başvuran ergenlerin cep telefonu kullanımı açısından mevcut durumlarının araştırılması oldukça önemli görülmektedir. Bu kapsamda mevcut çalışmada bir eğitim ve araştırma hastanesine başvuran ergenlerin akıllı telefon kullanım alışkanlıklarını incelemek amaçlanmıştır. Çalışma grubu olarak Dikkat Eksikliği ve Hiperaktivite Bozukluğu veya Anksiyete Bozukluğu tanısı almış ergenler alınmıştır. "Ergen-Ebeveyn Demografik Bilgi Formu" ve "Cep Telefonu Bağımlılığı Testi" uygulanmıştır. Verileri analiz etmek için uygun istatistiksel yöntemler kullanılmış ve $p<0.05$ anlamlı olarak kabul edilmiştir. Cep Telefonu Bağımlılık Ölçeği (CBÖ)'nin alt ölçeklerinden alınan puanlar arasında yaş grubu ve cinsiyete göre anlamlı bir fark bulunamamıştır. Cep Telefonu Bağımlılığı Ölçeği puanı günde üç saatten fazla akıllı telefon kullanan grupta daha yüksek bulunmuştur. Akıllı telefon kullanım amaçlarına bakıldığında ise vakalar arasında en sık mesajlaşma, telefon görüşmeleri, film-video izleme ve sosyal medya kullanma olduğu tespit edilmiştir. Günde üç saatten fazla akıllı telefon kullanmak, akıllı telefon bağımlılığı için bir risk faktörü olarak kabul edilmiştir. Ayrıca akıllı telefonu ağırlıklı olarak eğlence ve oyun amaçlı kullanmak da bağımlılık için bir risk faktörü olarak değerlendirilmiştir. Bu alandaki çalışmalar akıllı telefon bağımlılığı ve problematik kullanımın önlenmesi açısından önemlidir ve psikiyatrik tanılı ergenlerde durumun belirlenmesi için daha detaylı çalışmalara ihtiyaç vardır.

Anahtar Kelimeler: Ergenler, anksiyete bozukluğu, dikkat problemleri, gelişimsel psikopatoloji, teknoloji, psikososyal gelişim

Introduction

The increase in the frequency of smartphone use provokes concerns about potential adverse effects of their excessive use, especially in terms of physical and mental health, and exacerbates the related problems (Horvath et al., 2020; Tateno et al., 2019). Smartphones are now an inevitable part of daily life; yet, individuals may attach themselves to their devices and experience anxiety (or separation anxiety) when leaving them for a short time (Cheever, Rosen, Carrier, & Chavez, 2014; Panova & Lleras, 2016). Today, both DSM-5 (The Diagnostic and Statistical Manual of Mental Disorders) and ICD-10 (International Statistical Classification of Diseases and Related Health Problems) do not cover the diagnosis of smartphone addiction (SA). Nevertheless, recent years have witnessed increased research interest in SA (Derevensky, Hayman, & Lynette Gilbeau, 2019; Panova & Carbonell, 2018). Considering the components of "addiction," problematic smartphone use can be included in the behavioral addiction category. The addiction components can be addressed in five evident behaviors: (1) one is occupied with specific behavior; (2) the behavior is used to escape reality or create a sense of pleasure; (3) maintaining the behavior leads to tolerance; (4) withdrawal symptoms occur when the behavior is avoided or intervened; (5) as a result of the ongoing behavior, the individual may experience interpersonal problems and relapses their will (Griffiths, 2005; Mok et al., 2014). In fact, the concept of SA is also referred to as problematic mobile phone use (Augner & Hacker, 2012), excessive mobile phone use (Ha, Chin, Park, Ryu, & Yu, 2008), or mobile phone dependency (Toda et al., 2008); all these terms describe uncontrolled or excessive smartphone use. SA includes physiological symptoms associated with frequent checking of the phone, inability to stay away from it, and overuse of the phone (Kuyucu, 2017). However, excessive smartphone use may cause maladaptive behavioral difficulties, generally seen in impulse-control disorder, and have projections on school or professional life (Kuss & Griffiths, 2011; Mok et al., 2014). The possible indicators of SA are one's occupation with a smartphone, conflicts with family members, mood changes, and feelings of discomfort when staying away from the phone (Csibi, Griffiths, Cook, Demetrovics, & Szabo, 2018).

An integrative model defines four pathways proposed for problematic smartphone use: impulsive, relationship maintenance, extraversion, and cyber-addiction. While the first three pathways describe the relationship between problematic smartphone use and personal traits, the fourth is related to inappropriate internet use. In the addiction process, a smartphone user switches from "liking" to "desiring." Such a transition is conceived of as a turning point. The "desiring" situation is also the motive behind the behavior (Billieux, 2012).

Because adolescence triggers rapid development and shapes personality, uncontrolled and excessive smartphone use can be somewhat risky in this period that is susceptive to developing SA (Pamuk & Kutlu, 2020; Sahu, Gandhi, & Sharma, 2019; Shek & Yu, 2016; Xu et al., 2012). Adolescents' SA is known to be positively associated with loneliness and uneasiness (Çakır & Oğuz, 2017; Huan, Ang, & Chye, 2014; Mert & Özdemir, 2018) and negatively with self-control skills (Gültekin & Mazılı, 2020).

A Korea-based study with college students to determine the relationship between psychiatric symptoms and SA concluded a significant relationship between addiction and psychiatric symptoms (Im, Hwang, Choi, Seo, & Byun, 2013). Also, it is stated that psychiatric disorders, such as ADHD, can also be important risk factors for developing SA (S. G. Kim et al., 2019; Weiss, Baer, Allan, Saran, & Schibuk, 2011). SA of adolescents who presented to a psychiatry clinic was accompanied by depression and anxiety disorder (AD) in girls and ADHD in boys (Akaltun & Ayaydın, 2019). Considering that adolescents applying to psychiatry clinics may be suspected to be those demonstrating risk behaviors, smartphone addiction may such risk behaviors and bring substantial psychosocial influences on adolescence. This is the case particularly among adolescents admitted to child and adolescent psychiatry clinics. Ultimately, we believe that smartphone addiction among adolescents applying to such clinics needs to be explored to prevent possible adverse developmental conditions or to intervene in existing situations.

Considering such a background of the subject, we aimed to investigate smartphone use habits among adolescents who applied to a training and research hospital

and were diagnosed with ADHD or AD, to discuss the findings in light of the relevant literature, and to contribute to research on this subject.

Method

Design

We designed the present study as prospective research employing a cross-sectional survey model.

Sample

We used the criterion sampling technique to select the study sample. We included a total of 49 voluntary adolescents aged 13-17 years and one of their parents in the study. The participants were those who applied to the Child and Adolescent Psychiatry Outpatient Clinic of xxx Training and Research Hospital between April 2020 and October 2020 and were diagnosed with AD or ADHD according to DSM-5 criteria. We determined the exclusion criteria as the diagnosis of Autism Spectrum Disorder (ASD) and the presence of mental retardation (IQ < 70) based on a clinical evaluation. Some demographic and clinical characteristics of the cases and their family members are shown in Table 1.

Informed Consent Statement: We reserved all participants' rights and informed each adolescent and their parents about the study. Finally, we obtained the verbal and written consent of all adolescents and their parents/legal guardians in line with the Helsinki Declaration before initiating the procedures.

Table 1. Demographic and clinical characteristics of the cases and their family members

Variables	n	%	Variables	n	%
Diagnosis			**Treatment status**		
AD	32	65.3	In remission	10	20.4
ADHD	17	34.7	Not in remission	39	79.6
Diagnoses and treatment statuses of the cases					
AD (In remission)	5	10.2	ADHD (In remission)	5	10.2
AD (Not in remission)	27	55.1	ADHD (Not in remission)	12	24.5

Table 2 continuation. Demographic and clinical characteristics of the cases and their family members

Variables	n	%	Variables	n	%
Age group			**Grade level**		
13-15 years	23	46.9	Middle school	12	24.5
16-17 years	26	53.1	High school	37	75.5
Gender			**Sibling**		
Female	34	69.4	Yes	43	87.8
Male	15	30.6	No	6	12.2
Total number of children in the family			**Birth order**		
Single child	6	12.2	First-born child	24	49.0
Two children	21	42.9	Middle-born child	4	8.2
Three and more children	22	44.9	Last-born child	21	42.9
Mother's age			**Father's age**		
30-39 years	18	36.7	30-39 years	6	12.2
40 years and over	31	63.3	40 years and over	43	87.8
Mother's education			**Father's education**		
Illiterate	1	2.0	Illiterate	3	6.1
Primary or middle school	33	67.3	Primary or middle school	26	53.1
High school and university	15	30.6	High school and university	20	40.8
Mother's employment			**Father's employment**		
Unemployment	38	77.6	Unemployment	2	4.1
Employed	11	22.4	Employed	47	95.9
Total	**49**	**100.0**	**Total**	**49**	**100.0**

Data Collection Tools

Demographic Information Form: We prepared it in two separate forms for adolescents and parents. The "Demographic Information Form-Adolescent" aimed to gather information related to the participating adolescents' smartphone use habits and their daily, social, and academic activities. In the "Demographic Information Form-Parent," there were questions inquiring about common demographic characteristics of the parents.

Test of Mobile Phone Dependence (TMD): It was developed by Chóliz (2012) to assess the mobile phone addiction levels of adolescents. The first ten items are scored on a 5-point Likert-type scale ranging from 0 (Never) to 4 = (Frequently), while items 11-22 are scored on a scale ranging from 0 (Strongly Disagree) to 4 (Strongly Agree). The scale

has no cut-off value, and higher scores mean an increased risk of mobile phone addiction (Fırat & Çelik, 2017). Fırat and Çelik (2017) conducted its validity and reliability study in Turkey (Fırat & Çelik, 2017).

The scale consists of three subscales: "Abstinence, Lack of Control/Problems, and Tolerance/Interference." The first factor, "Abstinence," addresses what the main criterion in the definition of addiction is. The items in this factor measure the degree of discomfort caused by the abstinence of mobile phones and whether phones are used to solve emotional problems that may or may not be associated with mobile phone abuse. That is, the addictive behavior is negatively reinforced. The second, "Lack of Control/Problems," includes two fundamental features of addiction. On the one hand, one may experience difficulties in controlling their behaviors when favorable environmental conditions emerge. On the other hand, difficulty in controlling impulses is common for all forms of drug addiction, and pathological gambling is now included in this category. The third factor, "Tolerance/Interference," covers two basic aspects of addiction, which seem to be related and have common conceptual foundations. The first is increasingly more usage to achieve tolerance or desired effects. Tolerance can also occur with any addiction, not just chemical variables. Secondly, when consumption reaches an excessively high or dysfunctional level, addictions begin to interfere with other activities because one may spend excessive time on the addictive activity and has less time for other activities. Both criteria were within the same factor on the scale (Chóliz, 2012).

Procedure

First, we requested permission to use TMD from the responsible authors who conducted its Turkish validity and reliability study. Then, XXX Training and Research Hospital granted ethical approval to our study (No: E19-199 dated 04.21.2020).

The adolescents filled out the "Demographic Information Form-Adolescent" and the TMD themselves, while the parents handled the "Demographic Information Form-Parent" under the supervision of the researchers. We obtained the data on the psychiatric diagnosis of the cases through their anamnesis and their parents, the psychiatric examination by a

clinician (researcher), and the electronic medical file registry of the hospital. Those receiving psychiatric treatment for at least three months, having improved psychiatric symptoms, and engaging in recovery were coded as "In remission." The patients who did not receive any psychiatric treatment, whose psychiatric symptoms did not improve, or who were not in recovery were coded as "Not in remission."

Data Analysis

We used a "Statistics Package Program" for all statistical analyses and presented descriptive statistics of the data as mean±standard deviation, median, quartile values (Q1-Q3), frequency distribution, and percentage. In evaluating categorical variables, we utilized Yates Continuity Correction and Fisher's Exact Test where appropriate. We checked the normality of distribution using the Shapiro-Wilk Test. We used the t-test and Mann-Whitney U test to compare data between two independent groups and evaluated the homogeneity of variances with Levene's test. The groups were compared using one-way analysis of variance (ANOVA) for the variables with normal distribution and Kruskal-Wallis analysis for those without normal distribution. We used Bonferroni Test and Dunnett's Test as multiple comparison tests (posthoc). Finally, we ran a Spearman's test to uncover the relationship between the variables. A p-value < 0.05 was considered statistically significant.

Limitations

The limitations of the study can be considered a small sample size and a higher number of female participants within the sample. Including only those with AD and ADHD diagnoses in the study may have brought some contextual limitations. Ultimately, the too low number of cases to make further analysis by psychiatric diagnosis and treatment status can be other limitations of the present research.

Findings

In the study, we investigated the differences between smartphone use and daily life habits of the cases and how their scores on the TMD differed by their demographic characteristics and some variables pertinent to smartphone use, respectively. We

descriptively present some characteristics related to their smartphone use and daily life habits in Table 2.

Table 2. Participants' characteristics of smartphone use and daily habits

Variables	n	%	Variables	n	%
Owning a smartphone (n=49)			**Perceiving the self as a smartphone addict (n=49)**		
Yes	43	87.8	Yes	17	34.7
No	6	12.2	No	32	65.3
How did the case own his/her smartphone? (n=43)			**How long has the case owned his/her smartphone? (n=43)**		
My mother/father bought it for me.	34	79.1	Less than 1 year	8	18.6
I bought it with my own pocket money.	2	4.6	1-3 years	16	37.2
A relative of mine bought it for me.	7	16.3	More than 3 years	19	44.2
Duration of smartphone use on school days (n=49)			**Duration of smartphone use on holidays (n=49)**		
Less than 1 hour	8	16.3	1-3 hours	17	34.7
1-3 hours	25	51.0	More than 3 hours	32	65.3
More than 3 hours	16	32.7			
Owning a personal computer (n=49)			**Meeting with friends out of school (n=49)**		
Yes	31	63.3	Yes	37	75.5
No	18	36.7	No	12	24.5
Frequency of meeting with friends out of school (n=49)			**Academic achievement**		
Every day	5	10.2	Good	14	28.6
3-4 times a week	3	6.1	Moderate	24	49.0
1-2 times a week	12	24.5	Poor	11	22.4
1-2 times a month	17	34.7			
Never	12	24.5			
Regular sports/hobby (n=49)			**Regular academic activity (n=49)**		
Yes	10	20.4	Yes	14	28.6
No	39	79.6	No	35	71.4

We evaluated the scores on the TMD and its subscales (Abstinence, Lack of Control/Problems, and Tolerance/Interference) by diagnosis, but there was no significant difference between the groups (not in remission) ADHD and AD ($p = 0.708$ (t-test), $p = 0.802$ (t-test), $p = 0.831$ (Mann-Whitney U Test), and $p = 0.886$ (t-test), respectively; $p > 0.05$ for the total score and each subscale; not shown in the table).

Then, we ran the t-test and Mann-Whitney U test to examine whether the scores on the TMD and its subscales differed by age (13-15 years and 16-17 years) and gender. Overall,

we found that the groups did obtain similar scores on the scale ($p > 0.05$ for the total score and each subscale; not shown in the table).

When grouping the participants by number of children in the family, we found that 44.9% of the participants lived in a family with three or more children, while the families of 55.1% had less than three children. The results of the relevant analyses showed that the groups had similar scores on the TMD and its subscales and did not differ significantly ($p > 0.05$ for the total score and each subscale; not shown in the table).

The results of the ANOVA and Kruskal-Wallis test revealed no significant difference between the participants by academic achievement ($p > 0.05$ for the total score and each subscale; not shown in the table).

We compared the participants' scores by duration of owning a smartphone through ANOVA and the Kruskal-Wallis test but found no statistical difference between the groups ($p > 0.05$ for the total score and each subscale; not shown in the table).

The results revealed that the participants' scores did not significantly differ by owning a computer/tablet ($p = 0.993$ (T-test), $p = 0.932$ (t-test), $p = 0.708$ (Mann-Whitney U Test), and $p = 0.779$ (t-test), $p > 0.05$ for the total score and each subscale; not shown in the table).

We determined that 40.8% of the cases met with their friends weekly. When comparing the participants' scores by frequency of meeting with friends, we could not reach a significant difference between the groups ($p > 0.05$ for the total score and each subscale; not shown in the table). Moreover, we divided the cases into two groups: those using a smartphone for more than 3 hours a day and those who do not. Eventually, we did not find a significant difference between the groups by frequency of meeting with friends ($p > 0.05$, $p = 0.066$, Yates Continuity Correction).

Table 3. Scores on TMD and its subscales by some variables

Variables		n	Abstinence (M ± SD)	p	Lack of Control/ Problems Median (Q₁-Q₃)	p	Tolerance/ Interference (M ± SD)	p	TMD*	p
School	High school	37	19.4 ±8.79	0.086ᵃ	6 (4-11)	0.225ᵇ	14.2 ±5.55	0.003ᵃ	41.7 ±17.6	0.028ᵃ
	Middle school	12	14.3 ±8.18		5.5 (2-11)		8.17 ±6.63		28.4 ±17.8	
Duration of smartphone use on school days	<1 hour	8	17±9.58	0.00ᶜ	4.5 (2.75-11)	0.69ᶜ	10.8±7.81	0.06ᵈ	35.00±23.7	0.03ᵈ
	1-3 hours	25	14.8±8.31		6 (4-11)		11.4±5.82		33.3±16.3	
	>3 hours	16	23.9±6.44		6 (4.75-10.3)		15.8±5.51		48.3±15.8	
Duration of smartphone use on holidays	1-3 hours	17	13.5±8.02	0.006ᵃ	5 (3-10)	0.114ᵇ	10±6.66	0,028ᵃ	25 (18-44)	0.015ᵇ
	>3 hours	32	20.6±8.35		6 (4-11)		14.1±5.73		40 (29.5-50.8)	
Perceiving the self as an addict	Yes	17	24.6±8.24	<0,001ᵃ	9 (6-14)	0.009ᵇ	16.9±6.07	<0.001ᵃ	51.7±17.2	<0.001ᵃ
	No	32	14.7±7.10		5 (3.75-9.25)		10.5±5.30		31.4±15	

M: Mean, SD: Standard Deviation, Q₁: First Quartile, Q₃: Third Quartile

ᵃ: T-Test, ᵇ: Mann-Whitney U Test ᶜ: Kruskal Wallis ᵈ: ANOVA

*Mean ± standard deviation (M ± SD) values were given for normally distributed data, while Median (Q₁-Q₃) values were presented for non-normally distributed data.

Regarding school type, we found that the high school students had obtained higher scores on the TMD and its "Tolerance/Interference" subscale than the middle school students, and the difference was statistically significant (p < 0.05; see Table 3). However, the scores on the other subscales did not differ significantly (p > 0.05; see Table 3).

The results showed that the scores on the TMD and the "Abstinence" subscale differed significantly by duration of smartphone use on school days (p < 0.05; see Table 3). We explored the source of the difference by performing a posthoc test and discovered that those using their smartphones for less than 1 hour and 1-3 hours on school days had similar scores on the TMD. These groups got lower scores when compared to those using them 3 hours and more a day. We obtained the same results when performing a non-parametric posthoc test to determine the source of the difference after the Kruskal-Wallis test. However, as in Table 3, we could not reach a significant difference between the scores on the "Lack of Control/Problems" and "Tolerance/Interference" subscales by the mentioned variable (p > 0.05; see Table 3).

The cases using their smartphones for 3 hours and more on holidays obtained higher scores on the TMD and the "Abstinence" and "Tolerance/Interference" subscales when

compared to those using them for 1-3 hours on holidays. The difference between the groups was also statistically significant ($p < 0.05$; see Table 3). Nevertheless, there was no significant difference when the scores on the other subscales were compared by the mentioned variable ($p = 0.114$; $p > 0.05$ for each subscale; see Table 3).

We determined that 32.7% of the cases use their smartphones for more than 3 hours a day both on school days and holidays. These cases got significantly higher scores on the TMD and the "Abstinence" and "Tolerance/Interference" subscales than the others ($p < 0.05$, $p = 0.008$, $p < 0.001$, $p = 0.017$ (t-test), respectively; not shown in the table). We also analyzed these cases with their counterparts by purpose of smartphone use. Therefore, we found a significant relationship between using a smartphone for more than 3 hours a day and entertainment and gaming purposes ($p < 0.05$; $p = 0.039$ and $p = 0.033$, respectively (Yates Continuity Correction); not shown in the table). Yet, other purposes (texting, social media, mailing, shopping, movie-video watching, information seeking, phone calls) did not show any significant relationship with using a smartphone for more than 3 hours a day ($p > 0.05$ for each variable (Yates Continuity Correction and Fisher's Exact Test); not shown in the table). There was also no significant difference between those using a smartphone for more than 3 hours a day and those who do not by meeting friends outside of school, regular hobbies, and regular academic activities ($p > 0.05$ for each variable (Fisher's Exact Test); not shown in the table).

The cases perceiving themselves as addicted to their smartphones had significantly higher scores on the TMD and its subscales than those not ($p < 0.05$; see Table 3). We analyzed the variable "perceiving oneself addicted to a smartphone" by purpose of smartphone use and reached a significant relationship between the mentioned variable and only using a smartphone for gaming purposes ($p < 0.001$ (Yates Continuity Correction)

We found the most frequent purposes of using a smarthope among the participants were texting (85.7% (n = 42)), phone calls (83.7% (n = 41)), movie-video watching (79.6% (n = 39)), and social media (75.5% (n = 37)), while the least frequent ones were mailing (20.4% (n = 10)) and shopping (22.4% (n = 11)). Other purposes were gaming (63.3% (n = 31)), entertainment (57.1% (n = 28)), and information seeking (53.1% (n = 26)), respectively.

Table 4. The purpose of using a smartphone by gender

Variable		Gender		*p*	School		*p*
		Female	Male		Middle School	High School	
Texting	No	3 (6.1%)	4 (8.2%)	0.179[a]	4 (33.3%)	3 (8.1%)	**0.051[a]**
	Yes	31 (63.3%)	11 (22.4%)		8 (66.7%)	34 (91.9%)	
Social media	No	7 (14.3%)	5 (10.2%)	0.473[a]	5 (41.7%)	7 (18.9%)	0.136[a]
	Yes	27 (55.1%)	10 (20.4%)		7 (58.3%)	30 (81.1%)	
Mailing	No	28 (57.1%)	11 (22.4%)	0.47[a]	11 (91.7%)	28 (75.7%)	0.414[a]
	Yes	6 (12.2%)	4 (8.2%)		1 (8.3%)	9 (24.3%)	
Shopping	No	26 (53.1%)	12 (24.5%)	1[a]	11 (91.7%)	27 (73%)	0.252[a]
	Yes	8 (16.3%)	3 (6.1%)		1 (8.3%)	10 (27%)	
Movie-video	No	6 (12.2%)	4 (8.2%)	0.470[a]	5 (41.7%)	5 (13.5%)	**0.05[a]**
	Yes	28 (57.1%)	11 (22.4%)		7 (58.3%)	32 (86.5%)	
Information seeking	No	15 (30.6%)	8 (16.3%)	0.775[b]	7 (58.3%)	16 (43.2%)	0.564[b]
	Yes	19 (38.8%)	7 (14.3%)		5 (41.7%)	21 (56.8%)	
Entertainment	No	16 (32.7%)	5 (10.2%)	0.561[b]	6 (50%)	15 (40.5%)	0.811[b]
	Yes	18 (36.7%)	10 (20.4%)		6 (50%)	22 (59.5%)	
Gaming	No	15 (30.6%)	3 (6.1%)	0.196[b]	4 (33.3%)	14 (37.8%)	1[a]
	Yes	19 (38.8%)	12 (24.5%)		8 (66.7%)	23 (62.2%)	
Phone calls	No	3 (6.1%)	5 (10.2%)	**0.047[a]**	4 (33.3%)	4 (10.8%)	0.088[a]
	Yes	31 (63.3%)	10 (20.4%)		8 (66.7%)	33 (89.2%)	

[a:] Fisher's Exact Test
[b:] Yates Continuity Correction

Purposes of smartphone use by gender are given in Table 4. Accordingly we found that the girls used their smartphones primarily for texting and phone calls (n = 31, 91.2%), while the boys mostly played games on their phones (n = 12, 80%). On the other hand, the boys used their phones least often for shopping (n = 3, 20%), and it was mailing among the girls (n = 6, 17.6%). We evaluated each purpose separately by gender and reached a significant association only between phone calls and gender (*p* = 0.047 (Fisher's Exact Test); see Table 4).

Table 5. Scores on TMD and its subscales by purpose of smartphone use

Variable		n	Abstinence (*M ± SD*)	*p*	Lack of Control/ Problems Median (Q₁-Q₃)	*p*	Tolerance/ Interference (*M ± SD*)	*p*	TMD*	*p*
Texting	No	7	8.86 ±6.23	0.002[a]	3 (1-4)	0.001[b]	4.43 ±4.35	<0.001[a]	15.9 ±10.9	<0.001[b]
	Yes	42	19.7 ±8.28		6.5 (4.25-11.0)		14.1 ±5.51		42.2 ±16.7	
Social media	No	12	12.3±7.68	0.006[a]	3.50 (1.75-7.25)	0.012[b]	9.17±5.41	0.025[a]	25.8±14.1	0.005[a]
	Yes	37	20.1±8.41		6 (4-12)		13.8±6.23		42.6±17.9	

Table 5 continuation. Scores on TMD and its subscales by purpose of smartphone use

Variable		n	Abstinence (M ± SD)	p	Lack of Control/ Problems Median (Q$_1$-Q$_3$)	p	Tolerance/ Interference (M ± SD)	p	TMD*	p
Mailing	No	39	17.4±9.08	0.256[a]	6 (4-11)	0.681[b]	12.3±6.68	0.344[a]	37.33±19.7	0.400[a]
	Yes	10	21±7.53		6 (4.50-9.75)		14.4±4.58		42.9±12	
Shopping	No	38	18±9.11	0.836[a]	6 (4-11)	0.373[b]	12.5±6.44	0.655[a]	37.8±19.3	0.662[a]
	Yes	11	18.6±8.20		8 (5-10.5)		13.5±6.14		40.6±15.5	
Movie-video	No	10	15±10.2	0.211[a]	4 (2.25-13.3)	0.485[b]	10.8±8.52	0.293[a]	34±26.6	0.536[a]
	Yes	39	18.9±8.42		6 (4-10.5)		13.2±5.67		39.6±16	
Information seeking	No	23	17.9±10.8	0.845[a]	6 (3.50-11)	0.732[b]	11.4±7.67	0.207[a]	37.1±22.9	0.637[a]
	Yes	26	18.4±6.91		6 (4-10.8)		13.8±4.71		39.7±13.6	
Entertainment	No	21	14.1±8.44	0.004[a]	5 (3-10)	0.096[b]	10.2±6.01	0.017[a]	30.7±18	0.009[a]
	Yes	28	21.2±7.99		6 (4.75-11)		14.5±6.01		44.3±16.8	
Gaming	No	18	13.2±7.73	0.002[a]	4 (2.25-9.50)	0.026[b]	10.6±5.38	0.079[a]	30±17.2	0.013[a]
	Yes	31	21±8.22		6 (5-11)		13.9±6.59		43.4±17.5	
Phone calls	No	8	19±12.3	0.485[a]	4 (2.25-7.25)	0.115[b]	10.3±8.48	0.768[a]	34.3±24.6	0.236[a]
	Yes	41	18±8.18		6 (4-11)		13.2±5.83		39.3±17.2	

M: Mean, SD: Standard Deviation, Q$_1$: First Quartile, Q$_3$: Third Quartile

[a]: T-Test, [b]: Mann-Whitney U Test

*Mean ± standard deviation (M ± SD) values were given for normally distributed data, while Median (Q$_1$-Q$_3$) values were presented for non-normally distributed data.

Table 5 shows the results of the analysis to examine whether the scores on the TMD and its subscales differed by purpose of smartphone use. Accordingly, we found that the cases using their smartphones for texting, social media, gaming, and entertainment had significantly higher scores on the scale than those not ($p < 0.05$; see Table 5). Moreover, those using their phones for texting and social media obtained significantly higher scores on the scale and its subscales than those not ($p < 0.05$; see Table 5). However, using a phone for mailing, shopping, movie-video watching, information seeking, and phone calls did not create a significant difference between the participants' scores ($p > 0.05$; see Table 5). Those using their phones for entertainment had significantly higher scores on the TMD and the "Abstinence" and "Tolerance/Interference" subscales than those not ($p < 0.05$; see Table 5). Finally, those using their phones for gaming had significantly higher scores on the TMD and the "Abstinence" and "Tolerance/Interference" subscales than those not ($p < 0.05$; see Table 5).

We investigated the TMD scores of the participants using their phones for the above-specified purposes by gender through the t-test and Mann-Whitney U test. As a result, there was no statistical difference between the groups (*p* > 0.05 for each variable; not shown in the table).

Table 6. Scores on TMD and its subscales by duration of smartphone use

		School days	Holidays
Abstinence	*r**	**0.404**	**0.386**
	p	**0.004**	**0.006**
Lack of Control/Problems	*r**	0.123	0.230
	p	0.398	0.112
Tolerance/Interference	*r**	**0.311**	0.255
	p	**0.030**	0.077
TMD	*r**	**0.373**	**0.352**
	p	**0.008**	**0.013**

*r: Spearman rho

As in Table 6, the duration of smartphone use on school days showed a moderate positive correlation with the scores on the "Abstinence" subscale and a weak positive correlation with the scores on the "Tolerance/Interference" subscale and the TMD. On the other hand, there was a weak positive correlation between the duration of smartphone use on holidays and the scores on the "Abstinence" subscale and the TMD.

Discussion and Conclusion

The present study explored smartphone use among adolescents who applied to a child psychiatry outpatient clinic of a training and research hospital. Although both national and international literature hosts many studies on SA, there are limited studies investigating SA among children and adolescents with a psychiatric diagnosis. Considering the functional enhancement of smartphones over time, we believe that it may be needed to consider the years of publications while interpreting their results. In addition, these studies used varied terms for the phenomenon, such as addiction, overuse, and problematic use (Zou et al., 2017).

Previous studies focused on the association between a psychiatric diagnosis and internet addiction, SA, and game addiction (Akaltun & Ayaydın, 2019; Im et al., 2013; S. G. Kim et al., 2019; Weiss et al., 2011). It is evident that the unstoppable desire to check the phone frequently can lead to concentration disturbances (Minaz & Bozkurt, 2017), and there is a strong relationship between hyperactivity and problematic phone use (Roser, Schoeni, Foerster, & Röösli, 2016). In our study, to ensure homogeneity, we compared the scores of cases with ADHD and AD (not in remission) on the TMD and its subscales but could not find significant differences. Inevitably, we need to consider the effect of the small sample size on the results. The small sample size also discouraged us from performing more detailed analyses by psychiatric diagnosis and treatment status.

The participants' scores on the TMD and its subscales did not differ by gender and age. The relevant literature touched upon different frequencies and purposes of smartphone use among males and females by their varied attitudes and approaches (Sağıroğlu & Akkanat, 2019). Besides, the literature suggests mixed results regarding the effects of gender on SA. While some studies showed that the mean SA scores were higher in girls (Dikeç et al., 2020; Dou et al., 2020; Durak & Seferoğlu, 2018; Göymen & Ayas, 2019; R. Kim, Lee, & Choi, 2015; Roser et al., 2016; Sağıroğlu & Akkanat, 2019), some others revealed that SA was more common among male participants (Nikhita, Jadhav, & Ajinkya, 2015). Even the participants did not differ regarding SA by gender in some studies (Gültekin & Mazılı, 2020). All such results are thought to be influenced by factors such as the research design and the sample. When it comes to our study, it should be noted that we evaluated only cases with psychiatric disorders.

In our study, there was no significant difference in SA among the cases by age. Although some studies (Dikeç et al., 2020) pointed out similar results, a review study reminded certain age-related risk factors (Fischer-Grote, Kothgassner, & Felnhofer, 2019). Therefore, it is prudent to state that the effects of age have not been elucidated yet.

Addiction often begins as a benign behavior (Roberts, Yaya, & Manolis, 2014). In our study, the rate of cases who perceived themselves as smartphone addicts was 34.7%, and these cases had significantly higher scores on the TMD and its subscales. This result might

imply that the participants had a well-established insight about themselves. In a study with college students, 12.2% of the participants perceived themselves as smartphone addicts. The considerable difference between the studies (34.7% vs. 12.2%) might be because university students use their phones for their daily needs more than high school and middle school students, and they do not consider this situation an addiction. Regarding gaming, the refusal to accept excessive gaming was previously envisaged as a risk factor for SA (Fischer-Grote et al., 2019). In another study, the group that rejected extreme gaming was found to have more SA risk (Cha & Seo, 2018). Although these studies emphasized only gaming, refusal of excessive smartphone use can be considered a risk factor for addiction.

Among our participants, 87.8% have their own smartphones. Similarly, while a study revealed that 87.7% of middle school students had their own phones, it was 77.4% in another study (Gürarslan Baş & Karatay, 2020; Roser et al., 2016). Gürarslan Baş and Karatay found that 62% of the participants had their own tablets, and the rate of those who had their own computers was 63.2% (Gürarslan Baş & Karatay, 2020). In our study, the rate of the cases with their own computers or tablets was 63.3%. The higher rates of owning a smartphone may be related to the widespread use of smartphones over time.

The rates of those using their phones for 1-3 hours on school days and more than 3 hours on holidays constituted the highest rates in our study (51% and 65.3%, respectively). In a study conducted in our country, 46.3% of adolescents had smartphone use for 4 hours or more a day (Çakır & Oğuz, 2017). In another study, it was found that the mean smartphone use time of 4-6 hours was the highest with 36.4%, followed by 2-4 hours with 24.9% (Minaz & Bozkurt, 2017). One of the findings was that the mean smartphone use time among adolescents appeared as 4.24±3.08 hours a day (Dikeç et al., 2020). Another study revealed that 57.5% of adolescents used their phones for 1-5 hours a day (Sağıroğlu & Akkanat, 2019). In another study with adolescents, the majority of the participants (68.4%) used their phones between 1-4 hours a day (Gültekin & Mazılı, 2020). In our study, we determined that 32.7% of the cases use their phones for more than 3 hours a day on school days, while it was the case for 65.3% on holidays. Decreasing smartphone use on school days implies that smartphone use is under more control when the participants are occupied with their

academic tasks. Although there is no standard classification system, it is noteworthy that many studies suggest "prolonged" smartphone use within a day among adolescents. Consequently, prolonged and frequent use of technology and excess data traffic may pose an addiction risk (Fischer-Grote et al., 2019; Gürarslan Baş & Karatay, 2020). However, as mentioned before, different classification systems in the studies make it difficult to predict a specific cut-off value for smartphone use.

We found that those using their smartphones for more than 3 hours a day on school days or holidays had higher scores on the TMD, which is supported by previous findings (Dikeç et al., 2020; Gültekin & Mazılı, 2020; Nikhita et al., 2015; Roser et al., 2016). As a result of the discriminant analysis among students with and without smartphone addiction, the discriminant variables were found to be "the duration of daily smartphone use, the frequency of checking the smartphone, the frequency of accessing/checking social media through smartphones" (Durak & Seferoğlu, 2018). Yet, there may have been probable effects of the self-report data on the results. One may think that smartphone use starts as a benign behavior; however, prolonged usage is likely to increase the risk of addiction over time. Or being occupied with smartphones for longer hours may be related to abstinence and losing self-control. In addition, some scholars emphasized that excessive smartphone use may not necessarily lead to highly problematic use and, quite the opposite, that highly problematic smartphone use can also be seen in users spending a short time with their smartphones than others (Roser et al., 2016). It was proposed that SA should be considered among behavioral addiction types, and the increasing time with smartphones in SA was associated with "tolerance," which is a concept related to addiction (Dikeç et al., 2020). Bal and Balcı reached a moderate positive relationship between the duration of daily smartphone use and SA. Despite weak, we also found positive correlations between SA and duration of smartphone use on school days and holidays, respectively.

While the most common purpose of smartphone use among the male cases was gaming (80%), it was texting and phone calls among the female cases (91.2%). In the analysis performed to determine the relationship between gender and the purpose of smartphone use, we found a relationship only between "phone calls" and gender. In the literature, Çakır

and Oğuz found male high school students experienced more loneliness than female students (Çakır & Oğuz, 2017). We did not explore the link between loneliness and smartphone use, but one may consider that using a smartphone for gaming, texting, and phone calls may be related to loneliness. Yet, the studies did not propose a framework where the purposes of smartphone use can be investigated, making it challenging to interpret the results. Previous research reported the common purposes of using a smartphone among university students to be social media (34%) and phone calls (28.3%); however, gaming was the least common purpose with 1% in the same study (Minaz & Bozkurt, 2017). In another study investigating SA among college students, the participants reported using a smartphone mostly for phone calls, social media, information seeking, and listening to music, while gaming and entertainment appeared to be insignificant purposes of using a smartphone (Bal & Balcı, 2020). In our study, we found that 63.3% of the cases use their phones for gaming. Such a finding may be because the majority of cases are in their young adulthood and spend less time playing games due to being less attractive. Also, their intense daily responsibilities may give them no chance to spare some time for gaming. The young may leave problem behaviors in adulthood, which can be a natural recovery process or may occur as a result of psychological support (Derevensky et al., 2019). Today's young generation is known to be born in the digital age; however, today's adults used to have limited access to technological devices in their childhood and adolescence. Therefore, the age of meeting technology can also be considered influential on the recovery process.

Previous studies revealed controversial results regarding the relationship between SA and gender; however, they suggested some common findings regarding the purpose of using a smartphone by gender. A study discovered that female college students use their smartphones mostly for phone calls, taking photo-video, and social media, while male students use them mostly for gaming and entertainment (Bal & Balcı, 2020). Another study investigated social media addiction among adolescents and found that girls had higher mean addiction scores than boys (Güney & Taştepe, 2020). We concluded that the female cases used their phones more for social media than males; nevertheless, the difference was statistically significant. In a study, more than half of the secondary school students indicated

the purpose of using a phone as "A phone enables me to communicate with my friends easily" (56.4%) (Durak & Seferoğlu, 2018).

We could not reach any significant difference between middle and high school students by smartphone use for social media. Similarly, a previous study reported no difference among adolescents regarding social media addiction by grade level (Güney & Taştepe, 2020). Social media may be a mediating factor for the friendship relations among adolescents, which may lead to social media addiction. In a review study, Fischer-Grote et al. discovered that using a smartphone for social media and time spent on social media might be factors predicting SA (Fischer-Grote et al., 2019). However, another study did not conclude any significant association between instant messaging and social media use and SA (Bae, 2017). In our study, 75.5% of the cases used their smartphones for social media. In addition, we found these cases were more prone to SA than others. Face-to-face communication is getting lost due to social media and messaging (Minaz & Bozkurt, 2017), and SA may be inevitable for individuals who use only their phones for socializing (Sağıroğlu & Akkanat, 2019).

We found that using a smartphone for more than three hours a day was a risk factor for SA. It is also noteworthy that these cases spent time with their phones mainly for entertainment and gaming. In our study, the rates of those using their phones for games and entertainment were 63.3% and 57.1%, respectively. The TMD scores of these cases were significantly higher than those who do not. Considering the relevant literature, the link between smartphone use and gaming may need to be uncovered in further studies.

Many studies point out a robust link between owning a smartphone, even SA, and video game addiction (Göldağ, 2018; Göymen & Ayas, 2019; Gürarslan Baş & Karatay, 2020; Talan Tarık & Kalınkara, 2020). However, gaming should not be interpreted as a harmful activity in itself (Derevensky et al., 2019). Video games can meet users' specific psychological needs, including identity expression, sense of accomplishment, and desire to escape reality. Moreover, it is frequently stated that playing games to meet social needs will be less problematic than a psychological escape (Derevensky et al., 2019). Besides, when it comes to smartphones, using a smartphone for social media and gaming both predict SA, but the

latter is the stronger predictor (Jeong, Kim, Yum, & Hwang, 2016). Addiction is a condition that is acquired over time to relieve stress (Derevensky et al., 2019). It seems more reasonable to be addicted to applications rather than the device itself (Fischer-Grote et al., 2019). Future research may switch its focus to the specific types of activities and practices to which one is attached (Derevensky et al., 2019).

The cases using their phones for entertainment had significantly higher scores on the TMD and its subscales (except for Lack of Control/Problems). Similarly, a review study evaluated "entertainment" as one of the factors predicting addiction. Also, it was previously stated that seeking entertainment and enjoyment, such as watching videos, listening to music, or reading e-books, from smartphones is associated with problematic phone use. A study reported that more than half of the participants used technological devices for other free-time activities rather than doing homework. As indicated above, the scores of those using their phones for entertainment did not differ on the "Lack of Control/Problems" subscale. This result may be attributed to the unsettled self-control mechanism, which continues developing in adolescence. Overall, in this study, given that using a smartphone for more than 3 hours a day was a risk factor for SA and that this risk factor was associated with entertainment and gaming, entertainment should inevitably predict SA.

Among our cases, 53.1% reported using their phones for information seeking (e.g., news, product/service, traffic status, and location). Some studies found a relationship between using a phone for information seeking and SA (Bae, 2017), but such a relationship was not significant (Jeong et al., 2016). Even smartphone use for learning is thought to be a protective factor (Lee, Kim, & Choi, 2017). Concerning "learning," we could not find a relationship between academic achievement and SA. At this point, it should be noted that we did not measure the academic achievement of our cases but considered the "perceived" achievement among both the cases and their parents. Similar to our study, there are studies showing no relationship between academic achievement and SA (Dikeç et al., 2020); on the contrary, better school grades are positively correlated with less problematic phone use (Gallimberti et al., 2016). In this respect, further studies are still needed to uncover the relationship between academic achievement and smartphone use. On the other hand, in our

study, 22.4% of the cases use their phones to check their e-mails. Similarly, Durak and Seferoğlu found in their study that "checking e-mails" was among the rarest transactions on smartphones (21.2%) (Durak & Seferoğlu, 2018).

In our study, 20.4% of the cases were engaged in regular sports/hobbies, but we could not further analyze this variable due to the small sample size. In a similar study, 55.1% of the adolescents were doing regular exercise, but there was no relationship between SA and doing sports (Dikeç et al., 2020). Nevertheless, it was reported that prolonged mobile phone use might prevent individuals from participating in sports activities (Ikeda & Nakamura, 2014). It is suggested that adolescents need to be encouraged to engage in sports activities and hobbies to reduce their smartphone use time (Gültekin & Mazılı, 2020). The literature proposes that many factors should be considered together for uncovering SA; therefore, more comprehensive studies are needed on the relationship between regular sports activities/hobbies and SA.

We found the SA levels of the participants to be similar by meeting with friends. One may anticipate that encouraging adolescents for social relationships and creating opportunities for them to meet with their friends may reduce their time with their smartphones and may allow them to feel less need for virtual friendship relations. However, a study in the literature found an association between problematic phone use and a large number of friends and interpreted this result as that such users may reflect more extroverted personality traits (Gallimberti et al., 2016). Lissak proposed that some types of social support can reduce screen addiction.

To sum up, the findings of our study revealed that the duration of smartphone use might become a risk factor for SA. We discovered that the girls used their phones mostly for texting and phone calls, while the boys used them commonly for gaming. Besides, we found that using the phone for texting, social media, gaming, and entertainment may carry more risk for SA. Finally, we believe that a comprehensive investigation of gaming and SA would contribute to the literature.

Recommendations

Given the results of the present study, to prevent smartphones from causing addictive behaviors and problematic use among individuals, further research may:

consider addressing personality traits and including different assessment methods along with self-report scales.

be designed as longitudinal studies as well. In addition, researchers are encouraged to perform studies with a mixed-method design supported by qualitative interviews.

be engaged in interventions for individuals and/or parents.

consider establishing a common terminology and classification system to suggest a better understanding of SA.

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