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ORIGINAL ARTICLE

Smartphone Addiction and Sleep Status in Adolescents During COVID-19 Pandemic

COVID-19 Pandemisi Sırasında Adölesanların Akıllı Telefon Bağımlılığı ve Uyku Durumları

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ABSTRACT

Aim: This descriptive study investigated smartphone addiction and daytime sleepiness in adolescents during the COVID-19 pandemic.
Methods: The sample consisted of 1001 adolescents living in the Central Anatolia Region of Türkiye. Data were collected using a sociodemographic characteristics questionnaire, the Cleveland Adolescent Sleepiness Questionnaire (CASQ), and the Smartphone Addiction Scale-Short Version (for Adolescents) (SAS-SV). The data were analyzed using descriptive, comparative, and correlational statistics.
Results: Most participants stated that they had spent much more time on their smartphones since the pandemic (87.2%). More than half of the participants noted that they had been on their smartphones for more than 90 minutes daily (63.1%). Less than half of the participants said they spent most of their time on Instagram (44.8%). More than half of the participants reported daytime sleepiness (55.7%). Less than half of the participants had a moderate-level sleep status (44.8%). There was a positive correlation between CASQ "sleep in school" and "sleep in the evening" subscale scores.
Conclusion: During the COVID-19 pandemic, adolescents were at high risk of smartphone addiction, affecting daytime sleepiness. Therefore, we need interventions to reduce the risk of psychological problems and daytime sleepiness in adolescents.

Keywords: Adolescents, COVID-19, daytime sleepiness, smartphone addiction

ÖZ

Amaç: Bu tanımlayıcı araştırmada, COVID-19 pandemisi sırasında adölesanların akıllı telefon bağımlılığı ve gündüz uykululuğu araştırılmıştır.
Yöntem: Örneklem, Türkiye'nin İç Anadolu Bölgesi'nde yaşayan 1001 adölesandan oluşmaktadır. Veriler, sosyodemografik özellikler anketi, Cleveland Ergen Uykululuk Anketi (CASQ) ve Akıllı Telefon Bağımlılığı Ölçeği-Kısa Versiyonu (Ergenler için) (SAS-SV) kullanılarak toplanmıştır. Veriler tanımlayıcı, karşılaştırmalı ve korelasyonel istatistikler kullanılarak analiz edilmiştir.
Bulgular: Katılımcıların çoğu, pandemiden bu yana akıllı telefonlarında çok daha fazla zaman geçirdiklerini belirtmiştir (%87,2). Katılımcıların yarısından fazlası, akıllı telefonlarında günde 90 dakikadan fazla kaldıklarını belirtmiştir (%63.1). Katılımcıların yarısından azı zamanlarının çoğunu (%44,8) Instagram'da geçirdiklerini söylemiştir. Katılımcıların yarısından fazlası (%55,7) gündüz uykulu olduğunu bildirmiştir. Katılımcıların yarısından azı orta düzeyde uyku durumuna sahipti (%44,8). CASQ "okulda uyku" ile "akşam uyku" alt ölçek puanları arasında pozitif bir ilişki vardı.
Sonuç: COVID-19 pandemisi sırasında adölesanlar, gündüz uykululuğunu etkileyen akıllı telefon bağımlılığı açısından yüksek risk altındadır. Bu nedenle adölesanlarda psikolojik sorunlar ve gündüz uykululuk riskini azaltacak müdahalelere ihtiyacımız vardır.

Anahtar Kelimeler: Adölesanlar, COVID-19, gündüz uykululuğu, akıllı telefon bağımlılığı

Introduction

Everybody uses the Internet for communication, information, and entertainment. Nowadays, most people use their smartphones to access the Internet. Adolescents exhibit high online engagement. They access online connectivity through various devices regardless of time, place, and circumstance. Therefore, the Internet has been an integral part of their lives (1). Research over the last decade has shown that adolescents use the Internet at higher rates than any other age group. Most American (90%), Japanese (90%), and Chinese (72%) adolescents use the Internet every day. One in five Indian and Iranian high school students also use the Internet daily (2). Tsitsika et al. (2014) conducted a cross-sectional study and reported two findings (3). First, most adolescents aged 14-17 have at least one social network account (92%). Second, two in five adolescents aged 14-17 spend more than two hours on social media. Adolescents have been using the Internet more since the COVID-19 pandemic began (4). Moreover, they have been spending much more time on their smartphones to access the Internet for various purposes (information, communication, education, entertainment, etc.) since the pandemic (5). However, this drastic lifestyle change has affected their physical and mental health and interpersonal relationships. It has also taken a toll on their sleep patterns. Bates et al. (2020) found that adolescents had suffered sleep problems since the pandemic began (6). Sleep problems lead to physiological and mental problems. Therefore, it is crucial to identify the behaviors that affect sleep (7).

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The problematic use of the Internet and smartphones has become a significant issue concerning behavioral problems. Adolescents who use the Internet and smartphones excessively are more likely to suffer from nighttime and daytime sleep problems. Daytime sleepiness is difficulty staying awake and alert during regular waking hours, resulting in unintended lapses into drowsiness or sleep (8). Research shows that adolescents who use electronic media in the evening go to bed late and sleep for a shorter period of time than those who do not (9-10). Choi, Son, and Park (2009) reported a correlation between Internet overuse and excessive daytime sleepiness in adolescents (11). Johnson, Cohen, and Kasen (2004) and Van den Bulck et al. (2007) also detected an association between electronic media use and sleep (12-13). Research shows a correlation between smartphone use and daytime sleepiness. Nathan and JM Zeitzer (2013) reported an association between mobile phone use and daytime sleepiness in California high school students (14). Söderquist, Carlberg, and Hardell (2008) determined that regular users of wireless phones suffered from tiredness, stress, headache, anxiety, concentration difficulties, and sleep disturbances more often than less frequent users (15). Nasirudeen et al. (2017) reported that tertiary students who used mobile devices before bedtime were more likely to experience daytime sleepiness (16). Hu et al. (2021) conducted a study during the COVID-19 pandemic and reported three results. First, adolescents experience more mental and behavioral problems during lockdowns. Second, they spend much more time on their smartphones. Third, they are at higher risk of daytime sleepiness and mental problems (4). Moreover, almost all countries shut down their schools and switched to online learning, causing students to spend much more time online (17). Sohn et al. (2019) conducted a systematic review and meta-analysis before the pandemic and found that the prevalence of problematic smartphone use (including smartphone addiction) among children and adolescents ranged from 10% to 30% (18). Although people have started using their smartphones more and more, there is limited research on the impact of smartphone use on sleep and daytime sleep among adolescents (4,19). We need to find out about adolescents' sleep patterns to ensure their physiological and mental development and academic performance. Adolescents have been spending much more time on smartphones since the pandemic began. We think that this excessive use of smartphones turns into an addiction. We assume that smartphone use harms adolescents' sleep behaviors. Therefore, this study aimed to determine the relationship between smartphone use and daytime sleepiness. The following are research questions:

1.Do adolescents using smartphones during the COVID-19 pandemic suffer from daytime sleepiness?

2.Does smartphone use during the COVID-19 pandemic increase the risk of addiction among adolescents?

Methods

Design: This was a cross-sectional study.

Research Setting and Time: This study was conducted in a high school in a district in the Central Anatolia Region of Turkey in the spring semester of the 2021-2022 academic year. Data were collected using a survey between February 10, 2022, and May 10, 2022. Turkiye shut down all schools and switched to online learning during this period. Therefore, preventive measures were taken during data collection.

Population and Sample: The study population consisted of 1602 students (aged 14-17 years) from three high schools in a district in the Central Anatolia Region of Turkey. Sample selection was based on simple random sampling. The population consists of 1602 students studying in ninth, 10th, 11th and 12th grades in three high schools selected by simple random sampling from 12 general high schools in the district center. Although the sample size was determined as 311 students by power analysis (95% confidence interval, 95% representativeness of the universe and 0.5% alpha level) to adequately represent the universe, the number of participants was 1001. The inclusion criteria were (1) being a high school student, (2) having a smartphone, and (3) being volunteer. Six hundred and one students were excluded because they either declined to participate for various reasons (not wanting to allocate time, etc.) (n=100), had no smartphones (n=300), or failed to fill out the survey (n=201). Therefore, the sample consisted of 1001 participants. The participation rate was 62.4%.

Data Collection Tools: The data were collected using a sociodemographic characteristics questionnaire, the Cleveland Adolescent Sleepiness Questionnaire (CASQ), and the Smartphone Addiction Scale-Short Version (for Adolescents) (SAS-SV).

Sociodemographic Characteristics Questionnaire

The socio-demographic characteristics questionnaire was based on a literature review conducted by the researcher (4,19). The questionnaire consisted of 20 items on sociodemographic characteristics (age, gender, grade level, family type, income, number of siblings, place of residence, parent's education and occupation).

Cleveland Adolescent Sleepiness Questionnaire (CASQ)

The Cleveland Adolescent Sleepiness Questionnaire (CASQ) was developed by Spilsbury et al. (2007) and adapted into Turkish by Çağlar and Tokur Kesgin (2020) (20-21) The instrument consists of 16 items rated on a five-point Likert-type scale. The total score ranges from 16 to 80, with higher scores indicating high levels of daytime sleepiness. The scale has four subscales: sleep in school, alert in school, sleep in the evening, and sleep during transport. The Turkish version has a Cronbach's alpha of 0.87 (21), which was .769 in this study.

Smartphone Addiction Scale-Short Version (for Adolescents) (SAS-SV)

The Smartphone Addiction Scale-Short Version (for Adolescents) (SAS-SV) was developed by Kwon, Kim, Cho, and Yang (2013) and adapted into Turkish by Şata and Karip (2017) (22-23). The instrument consists of ten items rated on a six-point Likert-type scale ("1 = strongly disagree" to "6 = strongly agree"). The total score ranges from 10 to 60. The scale has a Cronbach's alpha of 0.91. The Turkish version has a Cronbach's alpha of .90, which was .913 in this study.

Research Method: The data were collected to determine the relationship between smartphone addiction and daytime sleepiness in adolescents. Participation was voluntary. We contacted the principals and teachers at the high schools. The data were collected in the classrooms. Parents were briefed on the research purpose and procedure. Informed consent was obtained from those who agreed to have their children participate in the study. The surveys were collected by the teachers. It took each participant about 15 minutes to fill out the survey.

Data Analysis

The data were analyzed using the Statistical Package for Social Sciences (IBM SPSS Corp; Armonk, NY, USA, v. 24.0) at a significance level of 0.05 and 0.001. The Kolmogorov-Smirnov and Shapiro-Wilk tests were used for normality testing. The results showed that the data were nonnormally distributed. Therefore, the data were analyzed using the Kruskal-Wallis and Mann-Whitney U tests. The Kruskal-Wallis test and Bonferroni correction were used for within-group comparisons. Spearman's correlation test was used to determine the relationship between scale scores.

Ethical Considerations:

The study was approved by the Scientific Research Platform of the XXX Ministry of Health (2021-11-25T13_31_12) and the local ethics committee of the faculty of medicine of Selcuk University (28.12.2021-E.200071). Permission was obtained from the Directorate of National Education (10.01.2022-E-83688308-605.99-40942302). Informed consent was obtained from students and parents who agreed to participate in the study. Authorization was obtained from the developers of the scales.

Results

More than half of the participants were girls (58.2%). Most participants had nuclear families (77%). More than half of the participants had a neutral income (income = expense) (58.9%). Most participants lived in districts (86.3%) (data not shown in the Table).

Most participants stated that they had spent much more time on their smartphones since the pandemic (87.2%). More than half of the participants noted that they spent more than 1.5 hours on their smartphones daily (63.1%). Less than half of the participants used Instagram the most (44.8%). More than half of the participants remarked that they experienced daytime sleepiness (55.7%). Less than half of the participants had a moderate-level sleep status during the pandemic (44.8%). Table 1 shows the participants' sociodemographic characteristics in detail.

Participants had a median CASQ and SAS-SV score of 44 and 30, respectively (Table 2).

Table 1. Sociodemographic characteristics

Variables	n	Frequency (%)
Using smartphones more during COVID-19		
Yes	873	(87.2)
No	128	(12.8)
Daily smartphone usage during COVID-19 (minutes)		
1-30	80	(8.0)
31-60	105	(10.5)
61-90	184	(18.4)
≥90	632	(63.1)
The most used social media site during COVID-19		
Blogs	27	(2.6)
Gmail	40	(4.0)
Instagram	448	(44.8)
Facebook	8	(0.8)
Twitter	43	(4.3)
YouTube	237	(23.7)
WhatsApp, Telegram	110	(11.0)
TikTok	88	(8.8)
The reason for using social media during COVID-19		
Doing homework	140	(14.0)
Streaming and uploading videos	275	(27.5)
Sharing photos	41	(4.0)
Meeting new people	47	(4.7)
Listening to music or playing games	335	(33.5)
Shopping	56	(5.6)
Communicating with friends and family	107	(10.7)
Your level of academic performance during COVID-19		
Good	159	(15.9)
Neither good nor bad	589	(58.8)
Bad	253	(25.3)
Daytime sleepiness during COVID-19		
Yes	558	(55.7)
No	443	(44.3)
Presence of any COVID-19 symptoms		
Yes	125	(12.5)
No	876	(87.5)
Having been diagnosed with COVID-19 by a healthcare professional		
Yes	361	(36.1)
No	640	(63.9)
Living with a COVID-19 positive person		
Yes	483	(48.3)
No	518	(51.7)
General sleep status during COVID-19		
Good	188	(18.7)
Neither good nor bad	448	(44.8)
Bad	365	(36.5)
Total	1001	(100.0)

n=indicates the number of people who participated in the research.

Table 2. CASQ and SAS-SV scores

	Min.-Max.	Median [IQR]	Std. Error
CASQ Subscales			
Sleep in school	5.00-25.00	10.00(8.00)	.13
Alert in school	5.00-25.00	18.00(6.00)	.14
Sleep in the evening	3.00-15.00	8.00(4.00)	.103
Sleep during transport	3.00-15.00	6.00(5.00)	.09
CASQ Total	16.00-67.00	44.00(13.00)	.31
SAS-SV Total	10.00-60.00	30.00(20.00)	.41

IQR: 25 percentile-75 percentile

Participants who spent more time on their smartphones had higher CASQ subscale scores (sleep in school, alert in school, and sleep in the evening) ($p<.05$). Their total CASQ scores also differed depending on how much time they spent on their smartphones during

Table 3. Smartphone usage characteristics and scale comparisons during COVID-19

	CASQ					
	Sleep in school	Alert in school	Sleep in the evening	Sleep during transport	Total CASQ Score	Total SAS-SV Score
	Median [IQR]	Median [IQR]	Median [IQR]	Median [IQR]	Median [IQR]	Median [IQR]
Using smartphones more during COVID-19						
Yes	11.0(6.0)	18.0(5.0)	8.0(4.0)	6.0(5.0)	44.0(13.0)	31.0(17.0)
No	9.0(7.0)	17.0(9.0)	8.0(4.7)	6.0(6.0)	40.5(15.0)	27.0(23.8)
p-value**	.005	.004	.020	.247	.001	.011
Daily smartphone usage during COVID-19 (minutes)						
1-30[1]	12.0(5.8)	19.0(9.0)	9.0(7.8)	5.0(5.0)	45.5(18.0)	17.5(23.0)
31-60[2]	10.0(6.0)	18.0(6.5)	8.0(4.0)	7.0(4.0)	42.0(11.0)	31.0(18.5)
61-90[3]	9.0(5.7)	18.0(5.0)	8.0(3.0)	6.0(5.0)	42.0(15.0)	30.0(20.0)
≤90[4]	11.0(6.0)	18.0(5.0)	8.0(4.0)	6.0(4.0)	44.0(14.0)	31.0(17.0)
p-value*	.003	.121	<.001	.149	.001	<.001
Difference	1=4>2=3		4>3=2>1		4>2>1	3=4>1
The most used social media site during COVID-19						
Blogs[1]	8.0(8.0)	19.0(6.0)	8.0(4.0)	7.0(3.0)	42.0(7.0)	29.0(17.0)
Gmail[2]	12.0(7.5)	19.0(8.8)	8.5(7.0)	6.5(6.0)	46.5(20.3)	38.5(20.0)
Instagram[3]	10.5(6.0)	18.0(6.0)	8.0(4.0)	6.0(4.8)	44.0(13.0)	31.0(19.0)
Facebook[4]	9.5(7.0)	19.5(6.3)	7.0(3.5)	3.5(6.3)	41.5(14.5)	32.5(30.5)
Twitter[5]	10.0(4.0)	18.0(5.0)	8.0(2.0)	5.0(3.0)	42.0(11.0)	30.0(20.0)
YouTube[6]	10.0(7.0)	18.0(6.0)	8.0(5.0)	6.0(4.0)	44.0(17.5)	28.0(20.0)
WhatsApp, Telegram[7]	11.0(6.0)	18.0(5.0)	8.0(4.0)	7.0(5.0)	44.0(13.2)	29.0(23.3)
TikTok[8]	10.0(5.0)	18.0(7.0)	8.0(3.0)	7.0(6.0)	43.0(15.0)	32.0(12.0)
p-value*	.759	.606	.595	.304	.588	.001
Difference						6>2=3
The reason for using social media during COVID-19						
Doing homework[1]	10.0(7.7)	19.0(6.0)	8.0(4.0)	5.0(4.0)	42.0(15.0)	31.5(23.5)
Streaming and uploading videos[2]	11.0(6.0)	18.0(6.0)	9.0(6.0)	6.0(5.0)	44.0(15.0)	31.0(23.0)
Sharing photos[3]	12.0(9.5)	18.0(9.0)	9.0(6.5)	5.0(5.0)	44.0(25.0)	35.0(25.0)
Meeting new people[4]	10.0(5.0)	18.0(6.0)	8.0(3.0)	6.0(5.0)	43.0(13.0)	33.0(20.0)
Listening to music or playing games[5]	10.0(6.0)	18.0(4.0)	9.0(4.0)	6.0(5.0)	44.0(12.0)	30.0(19.0)
Shopping[6]	9.0(4.0)	18.0(2.7)	8.0(1.7)	7.0(5.7)	42.5(8.0)	30.0(9.2)
Communicating with friends and family[7]	11.0(7.0)	18.0(8.0)	8.0(4.0)	7.0(4.0)	42.0(16.0)	30.0(25.0)
p-value*	.202	.483	.162	.014	.480	.059
Difference				7=6>1		
Your level of academic performance during COVID-19						
Good[1]	17.0(8.0)	9.0(7.0)	8.0(5.0)	7.0(5.0)	42.0(15.0)	25.0(20.0)
Neither good nor bad[2]	18.0(5.0)	10.0(6.0)	8.0(4.0)	6.0(5.0)	44.0(12.0)	30.0(20.0)
Bad[3]	18.0(5.0)	11.0(6.0)	9.0(4.5)	6.0(4.0)	44.0(16.0)	32.0(20.0)
p-value*	<.001	.012	.001	.931	.001	<.001
Difference	2=3>1	2=3>1	3>1=2		2=3>1	3>2>1
Daytime sleepiness during COVID-19						
Yes	19.0(5.0)	11.5(6.0)	8.0(3.0)	6.0(5.0)	45.0(12.3)	31.0(18.2)
No	18.0(5.0)	10.0(7.0)	8.0(4.0)	6.0(4.0)	42.0(15.0)	30.0(19.0)
p-value**	<.001	<.001	.006	.003	<.001	.020
Presence of any COVID-19 symptoms						
Yes	18.0(4.5)	12.0(5.0)	9.0(3.0)	5.0(3.0)	44.0(13.0)	30.0(26.0)
No	18.0(6.0)	10.0(6.0)	8.0(4.0)	6.0(5.0)	44.0(12.8)	30.0(19.0)
p-value**	.003	.248	.008	.017	.061	.590
Having been diagnosed with COVID-19 by a healthcare professional						
Yes	19.0(5.0)	12.0(6.0)	8.0(5.0)	6.0(4.5)	45.0(14.0)	30.0(19.0)
No	18.0(6.0)	10.0(6.0)	8.0(4.0)	6.0(5.0)	43.0(13.0)	30.0(20.0)
p-value**	.085	.088	.013	.554	.014	.485
Living with a COVID-19 positive person						
Yes	18.0(6.0)	11.0(6.0)	8.0(4.0)	6.0(4.0)	44.0(13.0)	32.0(22.0)
No	18.0(5.0)	10.0(6.0)	8.0(4.0)	6.0(5.0)	44.0(13.0)	30.0(20.0)
p-value**	.644	.389	.154	.992	.838	.007
General sleep status during COVID-19						
Good [1]	18.0(8.7)	11.0(7.0)	8.0(4.0)	7.0(6.0)	44.0(13.0)	27.0(12.0)
Moderate[2]	18.0(5.0)	10.0(6.8)	8.0(3.0)	6.0(4.0)	42.0(12.7)	30.0(15.0)
Bad[3]	19.0(6.0)	12.0(6.0)	9.0(4.0)	6.0(5.0)	45.0(16.0)	33.0(22.0)
p-value*	.001	<.001	<.001	.952	<.001	<.001
Difference	3>1=2	3>1=2	3>1=2		3>1=2	3>2>1

* Kruskal-Wallis Test, **Mann-Whitney U Test *** Kruskal Wallis test for intergroup comparison.

Table 4. Correlation between CASQ and SAS-SV

		Sleep in school	Alert in school	Sleep in the evening	Sleep during transport	Total SAS-SV Score
Sleep in school	r	1	.170**	.508**	.386**	.123**
	p		<.001	<.001	<.001	<.001
Alert in school	r	.170**	1	.268**	-.076*	.316**
	p	<.001		<.001	.016	<.001
Sleep in the evening	r	.508**	.268**	1	.325**	.280**
	p	<.001	<.001		<.001	<.001
Sleep during transport	r	.386**	-.076*	.325**	1	.223**
	p	<.001	.016	<.001		<.001
CASQ Total	r	.779**	.589**	.762**	.525**	.352**
	p	<.001	<.001	<.001	<.001	<.001

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

the pandemic (p<.05). The source of the significant difference was the group who spent more than 90 minutes on their smartphones. Their total SAS-SV scores also differed depending on how much time they spent on their smartphones during the pandemic (p<.05). The sources of the significant difference were the groups who spent 61-90 minutes and more than 90 minutes on their smartphones. All in all, the higher the risk for smartphone addiction, the higher the daytime sleepiness during the pandemic (Table 3.)

Participants' CASQ and SAS-SV scores also differed depending on their general sleep status during the pandemic (p<.001). The source of the difference was due to bad sleep status. This result showed that participants at higher risk for smartphone addiction were more likely to suffer from bad sleep status (Table 3.).

There was a positive correlation between CASQ "sleep in school" and "sleep in the evening" subscale scores (r=0.508; p<0.001), indicating that the higher the "sleep in school" score, the higher the "sleep in the evening" score. There was a positive correlation between CASQ "sleep during transport" and "sleep in the evening" subscale scores (r=0.325; p<0.001), suggesting that the higher the sleep during transport score, the higher the sleep in the evening score (r=0.325; p<0.001). There was a positive correlation between total CASQ and "sleepiness in school" scores (r=0.779; p<0.001). The higher the total CASQ score, the higher the "sleepiness in school" score. There was a positive correlation between total CASQ and "sleep during transport" scores (r=0.525; p<0.001). There was a positive correlation between total CASQ and SAS-SV scores (r=0.352; p<0.001), suggesting that the higher the CASQ score, the higher the SAS-SV score (Table 4.).

Discussion

Almost all countries introduced preventive measures as a response to the COVID-19 pandemic. Adults worked from home while children and adolescents attended lessons online. During this period, everybody used their smartphones more often for various reasons (shopping, communication, socialization, etc.) (24). However, excessive use of smartphones may lead to physical and mental issues, such as sleep problems (25). Most of our participants stated that they had spent much more time on their smartphones since the pandemic (87.2%). More than half of the participants noted that they had been on their smartphones for more than 90 minutes (63.1%). Research also showed that one in two adolescents spent the whole day on their smartphones during the COVID-19 pandemic (26-28). Social isolation due to lockdowns took a toll on all aspects of life. Children and adolescents spent much more time on their smartphones because they attended online lessons without extracurricular activities and communicated with their peers through social media during the pandemic.

Our participants had a median SAS-SV score of 30, suggesting that they were at risk for smartphone addiction (Table 2.). Research also shows that the COVID-19 pandemic has put adolescents at an increased risk for smartphone addiction (29-30).

More than half of our participants stated that they suffered from daytime sleepiness during the pandemic (55.7%). There was a significant difference between daytime sleepiness during COVID-19 and sleep in school, alertness in school, and total sleepiness scores (p<0.001) (Table 3). The more at-risk adolescents are for smartphone addiction, the more they experience daytime sleepiness, which is consistent with the literature (4, 27). These results suggest that smartphone addiction puts adolescents at risk for daytime sleepiness.

Less than half of the participants had neither good nor bad general sleep status (44.8%). Overall sleep status affected their "alert in school," "sleep in the evening," total sleepiness," and smartphone addiction scores (p<0.001) (Table 3). These findings are noteworthy given the important effects of overall sleep status on health. These results suggest that adolescents at a higher risk for smartphone addiction are likely to have worse overall sleep status. Consequently, the risk of smartphone addiction has a significant impact on overall sleep status.

Living with a COVID-19-positive person affected participants' SAS-SV scores (p<0.005). However, no research has investigated the effect of living with a COVID-19-positive person on adolescents' smartphone use and daytime sleepiness. Research also shows that adolescents who spend much time on smartphones are more likely to suffer from smartphone addiction and daytime sleepiness (27). It is challenging for family members to live with COVID-positive people because the same quarantine rule also applies to them. Therefore, they end up using their smartphones more often to meet their needs, resulting in disturbances in their sleep patterns.

Our results showed a positive correlation between smartphone addiction and daytime sleepiness. Bates et al. (2020) reported that adolescents experienced sleep problems during the pandemic (6). Research also shows that more and more adolescents have been developing smartphone addiction since the pandemic began (4, 6, 27). We can conclude that adolescents who spend much time on their smartphones are more likely to suffer from sleep problems.

Limitations

This study had two limitations. The first limitation is that the results are sample-specific and therefore cannot be generalized to all adolescents. The second limitation is that the study data were collected by questionnaire method. The study is one of the first studies in Türkiye to examine the relationship between daytime sleepiness and smartphone addiction and makes an important contribution to the literature.

Conclusions and Recommendations

There was a positive correlation between smartphone addiction and daytime sleepiness during the

COVID-19 pandemic. Further research is warranted to better understand the factors affecting smartphone addiction and daytime sleepiness among adolescents. We should provide education for adolescents about the risks of smartphone addiction.

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