

Araştırma makalesi

Research article

Associated Factors of Smartphone Addiction in the
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ABSTRACT

Aim: This study aimed to investigate associated factors of smartphone addiction in the students of a faculty of health sciences.

Material and Methods: This is a cross-sectional study. A total of 839 health sciences students participated in our study. The data was collected by Personal Information Form, the *Smartphone Addiction Scale-Short Form*, the *Pittsburg Sleep Quality Index*, and the *Piper Fatigue Scale*.

Results: As the smartphone addiction score increases by 0.59 units, the sleep quality total score increases by one unit. The smartphone addiction score decreases by 0.12 units when the fatigue score increases by one unit. It was determined that female students' smartphone addiction scale scores were higher than male students.

Conclusion: The female students' Smartphone Addiction Scale scores average were higher than males. In addition, fatigue and sleep problems were more significant in individuals with smartphone addiction. Appropriate Technology Use courses should be added to the curriculum to prevent telephone addiction.

Keywords: Addiction, fatigue, smartphone, students, sleeplessness

ÖZ

Sağlık Bilimleri Fakültesi Öğrencilerinde Akıllı Telefon Bağımlılığı ile İlişkili Faktörler

Amaç: Bu çalışmanın amacı, Sağlık Bilimleri Fakültesi'nde öğrenim gören öğrencilerde, akıllı telefon bağımlılığı düzeyinin ve ilişkili bazı faktörlerin belirlenmesidir.

Gereç ve Yöntem: Araştırma, kesitsel tipte epidemiyolojik bir araştırma olarak planlanmıştır. Çalışmamıza, toplam 839 Sağlık Bilimleri öğrencisi katılmıştır. Veriler Personal Information Form, Akıllı Telefon Bağımlılığı Ölçeği-Kısa Form, Pittsburg Uyku Kalitesi Endeksi ve Piper Yorgunluk Ölçeği ile toplanmıştır.

Bulgular: Uyku kalitesi toplam puanı bir birim arttığında akıllı telefon bağımlılığı puanı 0.59 birim artmıştır. Yorgunluk puanları bir birim arttığında akıllı telefon bağımlılığı puanı 0.12 birim azalmıştır. Kız öğrencilerin, akıllı telefon bağımlılığı ölçek puanlarının erkek öğrencilere göre daha yüksek olduğu belirlenmiştir.

Sonuç: Kız öğrencilerin akıllı telefon bağımlılığı ölçeği puan ortalamaları daha yüksektir. Ayrıca, akıllı telefon bağımlılığı olan bireylerde yorgunluk ve uyku problemleri seviyesi artmaktadır. Telefon bağımlılığını önlemeye yönelik Uygun Teknoloji Kullanımı dersleri müfredata eklenmelidir.

Anahtar kelimeler: Akıllı telefon, bağımlılık, öğrenciler, uykusuzluk, yorgunluk

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INTRODUCTION

Mobile phones have been replaced with smartphones that offer many technological features including internet, camera, video-sound recorder, navigation, music player as well as communication^{1,2}. Given smartphones offer many technological features making people's life easier, the usage areas of smartphones in daily life are gradually increasing. According to the Pew Research Center, 96% of adults in the USA have a mobile phone³. According to the Turkey Statistical Institute (TUIK, 2019) data, the rate of internet use was 75.3% among individuals in the 16-74 age group in 2019. This rate was determined to be 72.9% in the previous year. According to the report of The Household Use of Information Technology, 88.3% of households have access to the internet from home. This rate was determined as 83.8% in the previous year. The rate of households with broadband internet access was 82.5% in 2018 and 87.9% in 2019. Accordingly, 49.1% of households had access to a stable broadband internet connection (ADSL, wired Internet, fiber, etc.), while 86.9% had mobile broadband internet access⁴. Although smartphones are designed to increase individuals functioning in their daily life, some individuals overuse or are addicted to smartphones, decreasing their quality of life, especially in the dimensions of physical and mental health⁵⁻⁷. Smartphone addiction was defined as "the overuse of smartphones to the extent that it disturbs the users' daily lives"¹. According to the literature, smartphone addiction begins or is seen especially during adolescence⁸⁻¹⁰.

Like any substance and behavioral addictions, smartphone addiction is associated with psychological and physical health problems, including depression, family dysfunction, anxiety, sleep problems, and fatigue^{7,11-13}. Besides, smartphone addiction may reduce healthy behaviors such as physical activity and social gatherings¹⁴. Among college students, smartphone addiction was found to be correlated with increased academic stress, interpersonal relationship stress, family stress, and emotional stress¹⁵, which may negatively affect college life and the well-being of college students. Previous research has demonstrated that smartphone addiction is associated with lower levels of sleep quality and higher levels of fatigue, which increases the risk of academic problems in college students^{7,16,17}.

Literature reveals that smartphone addiction is associated with negative health and academic outcomes^{18,19}. It is important for researchers to examine the risk factors posing a danger to the university students' quality of life. Because the professionals of the future should not experience sleep problems, fatigue, and attention problems while performing their jobs. This issue, which is important for every occupational group, is much more important for health professionals interested in human health. The healthcare process does not accept faulty practices⁵. However, there is no study conducted in Turkey examining the relationship between smartphone addiction and sociodemographic variables and variables such as sleep and fatigue in health sciences students. Therefore, this study aimed to examine

associated factors of smartphone addiction in the students of a faculty of health sciences.

Research Questions

1. Is there a statistically significant difference between smartphone addiction levels of faculty of health sciences students according to some sociodemographic variables?
2. Is there a significant relationship between smartphone addiction and fatigue?
3. Is there a significant relationship between smartphone addiction and sleep quality?

Study Aim

This study aimed to investigate associated factors of smartphone addiction in the students of a faculty of health sciences.

MATERIAL and METHODS

Study Design

This study has a cross-sectional design.

Study Sample

While collecting this research data, there were two departments that were active in the relevant faculty and that were accepting students. For this reason, the title and content of this study include the expression of faculty of health sciences. The study was carried out with students who continued their education in a faculty of health sciences of a university (nursing and emergency aid and disaster management students). In the research, no extra sample determination was done, and it was aimed to reach all students in mentioned faculty of health sciences (N=1108). We were able to reach a total of 839 participants, which meant a return rate of 75.72%.

Place and Time of Research

This research was carried out with nursing and emergency aid and disaster management students studying at the health sciences faculty of a university. The research data were collected between January 15 and June 15, 2017.

Data Collection Tools

Questionnaires were distributed to students before the courses, and written consent was obtained by explaining the purpose of the research. After the data collection tools were distributed to the participants, they were expected to fill out the tools. Filling out the form by participants took about 20-25 minutes.

Personal Information Form: The form was prepared by the researchers using the literature and consisted of 32 questions regarding sociodemographic characteristics such as age, sex, marital status, family type, working and educational status, condition of having a chronic disease, duration of mobile phone use in years, the mean number of messages sent in a day, monthly mobile phone bill.^{20,21}

Smartphone Addiction Scale-Short Form (SPAS-SF): Smartphone addiction was measured with the Smartphone Addiction Scale-Short Form (SPAS-SF)²². The scale consists of 10 items and has a 6-point Likert type scoring system. The scale items are scored from 1 to 6, and scale scores range between 10 to 60. As the score obtained from the scale increases, the risk for addiction increases. The internal consistency and concurrent validity Cronbach's alpha coefficient of the original form is 0.91²². The Turkish validity

and reliability testing of the scale was performed by Noyan et al.(2015), and the Cronbach's Alpha coefficient for the scale was found to be 0.86².

Pittsburg Sleep Quality Index (PSQI): Pittsburgh Seleep Quality Index (PSQI) was developed by Buysse et al. (1989) and adapted into Turkish by Ağargün et al. (1996)^{23,24}. Sleep quality was measured with the PSQI²⁴. It consists of a total of 24 questions. Nineteen questions are answered by the individual, and five questions are answered by a roommate. Questions answered by the individual are taken into consideration; however, questions answered by the roommate are not. Each item on the scale scored from 0 (no problem) to 3 (serious problem) points. The sum of the scores taken from seven subscales gives the total PSQI score. The total PSQI score ranges between 0 and 21 points. Those with a total score of five or less are considered to have a "good" sleep quality. The 19 items are grouped into seven components, including (1) sleep duration, (2) sleep disturbance, (3) sleep latency, (4) daytime dysfunction due to sleepiness, (5) sleep efficiency, (6) overall sleep quality, and (7) sleep medication use. Each sleep component yields a score ranging from 0 to 3, with 3 indicating the greatest dysfunction. The sleep component scores are summed to yield a total score ranging from 0 to 21, with the higher total score (referred to as the global score) indicating worse sleep quality²⁴. The Cronbach's Alpha coefficient for the scale was found to be 0.80²⁴.

Piper Fatigue Scale (PFS): Fatigue was measured with a 22-item Piper Fatigue Scale (PFS)²⁵. Each scale item is rated as weak and strong, from 1 (weak) to 10 (strong). The total scale score ranges between 0 and 10 points, with higher scores indicating greater fatigue. The Turkish validity and reliability study of the scale was conducted by Can (2001)²⁶, and the Cronbach's Alpha coefficient for the scale was found to be 0.94 for the total scale²⁶.

Data Analysis

The research data were analyzed in the SPSS package program. An independent sample t-test was used to compare two groups, and one-way analysis of variance was used to compare three groups. The correlation between scale scores was determined by correlation analysis, and regression analysis was performed to interpret the Smartphone Addiction Scale. The significance level was taken as $p < 0.05$ for all statistical analyses.

Ethical Consideration

Before the participant filled out the questionnaires, the principle of voluntarism was explained, and the participants who volunteered to participate in the study were asked to fill in the consent form. Ethics committee approval was obtained from the Non-Interventional Clinical Research Ethics Committee of Burdur Mehmet Akif Ersoy University on 5 April 2017 with GO 2017/88 number.

Limitations

The limitations of the study are that the results cannot be generalized because the study was conducted in a single center

RESULTS

Of the participants, 57.8% were female, 52.9% stayed in a dormitory, 43.6% studied in second grade, 54.2% frequently met their friends, and 17.8% were still employed in an income-generating work (Table 1).

Table 1. Distribution of Students According to Some

Some Characteristics of Students (n=839)		n	%
Sex	Female	485	57.8
	Male	354	42.2
Type of Residence	With family	97	11.6
	Alone at home	36	4.3
	With friends at home	174	20.7
	Dormitory	444	52.9
	Hotel and guesthouse	88	10.5
Department	Nursing	455	54.2
	Emergency and Disaster Management	384	45.8
Grade	First grade	137	16.3
	Second grade	366	43.6
	Third grade	183	21.8
	Fourth grade	153	18.2
Perceived Monthly Income	Very low	12	1.4
	Low	69	8.2
	Moderate	501	59.7
	High	257	30.6
Frequency of meeting friends	Rarely	20	2,4
	Sometimes	41	4,9
	Often	173	20,6
	Frequently	455	54,2
	Very frequently	150	17,9
Status of still being employed in an income-generating work	Yes	149	17,8
	No	690	82,2
Educational status of the mother	Illiterate	55	6,6
	Literate	43	5,1
	Primary school graduate	408	48,6
	Secondary school graduate	106	12,6
	High school graduate	140	16,7
	University and higher degree	87	10,4
Educational status of the father	Illiterate	12	1,4
	Literate	20	2,4
	Primary school graduate	261	31,1
	Secondary school graduate	229	27,3
	High school graduate	167	19,9
	University and higher degree	150	17,9

Characteristics

It was found that the mean age of the students participating in the research was 20.64 ± 1.60 (range=18-25), that the mean number of siblings was 2.85 ± 1.26 (range=1-7), that the mean monthly family income was $2,763.46 \pm 1,485.92$ (minimum=800.00 TL, maximum=10,000.00 TL), and that the mean monthly expenditure was 655.60 ± 476.07 (minimum=100.00 TL, maximum=5,000.00 TL).

Among those who participated in the study, the mean smartphone addiction score was higher among female students compared to male students ($p < 0.001$), among those who felt fatigued during the class compared to those who did not feel ($p < 0.001$), and among those who felt sleepiness during the class compared to those who did not feel ($p < 0.001$). The mean smartphone addiction score was higher among those who stayed alone at home ($p = 0.009$) and those who stayed at the dormitory ($p < 0.001$) compared to those who stayed with friends at home and among those who stayed alone at home compared to those who stayed at a hotel or guesthouse ($p = 0.043$) (Table 2).

Among those who participated in the research, the mean Smartphone Addiction Scale score was lower among those who rarely met with friends compared to those who met with friends often ($p < 0.001$) and frequently ($p < 0.001$) and among those who met with friends very frequently compared to those who met often ($p = 0.034$) and frequently ($p < 0.001$). Among those who participated in the study, the mean Smartphone Addiction Scale score was lower among those using a mobile phone just for talking compared to those using a mobile phone for social media access, sending messages, and internet use ($p < 0.001$) (Table 2).

It was found that there was a positive, moderate, and statistically significant correlation between the total Smartphone Addiction Scale score and the total Pittsburg Sleep Quality Index score ($r = 0.65$; $p < 0.001$). There was a positive, moderate and statistically significant correlation between the total Smartphone Addiction Scale score and the Piper Fatigue Scale Behavior, Affection, Sensory, Cognition subscale scores and total score ($r = 0.47$, $p < 0.001$; $r = 0.41$, $p < 0.001$; $r = 0.43$, $p < 0.001$; $r = 0.41$, $p < 0.001$; $r = 0.47$, $p < 0.001$, respectively) (Table 3).

We found a statistically significant correlation between age and the total smartphone addition score. When other variables were controlled and the age variable increased by one unit, the smartphone addiction score increased by 0.12 units (Table 4). There was a statistically significant correlation between the duration of mobile phone use, the mean number of messages sent in a day, monthly mobile phone bill, and the total Smartphone Addiction Scale score. When other variables were controlled and the duration of mobile phone use variable increased by one unit, the smartphone addition score decreased by 0.14 units; the number of messages sent during a day increased by one unit, the Smartphone Addiction Scale score increased by 0.17 units; the monthly mobile phone bill variable during a

day increased by one unit, the Smartphone Addiction Scale score increased by 0.17 units (Table 4). There was a statistically significant correlation between the total Pittsburg Sleep Quality Index score and the total Smartphone Addiction Scale score. When the other variables were controlled, and the total Pittsburg Sleep Quality Index score increased by one unit, the Smartphone Addiction Scale score increased by 0.59 units (Table 4). There was a statistically significant correlation between the Piper Fatigue Scale Affection subscale, the Piper Fatigue Scale Sensory subscale, and the total Smartphone Addiction Scale score. When the other variables were controlled and the Piper Fatigue Scale Affection subscale score increased by one unit, the Smartphone Addiction Scale score decreased by 0.12 units; Piper Fatigue Scale Sensory subscale score increased by one unit, the Smartphone Addiction Scale score increased by 0.11 units (Table 4).

DISCUSSION

Today, smartphone addiction, which causes severe physical and psychological health problems, is a serious problem that can lead to attention problems in daily life activities and deterioration of functionality in work life. It is especially important that health professionals working in the health sector do not make mistakes in their professional lives^{1,2,8,14,15}. The aim of this study was to investigate associated factors of Smartphone Addiction in a Faculty of Health Sciences Students. Our findings revealed that females had significantly higher smartphone addiction scores compared to males. Previous findings are controversial regarding sex differences in smartphone addiction. A study conducted in India found that male adolescents had significantly higher smartphone addiction scores than female adolescents¹⁷. Mok et al. (2014) reported that male college students were found to be more addicted to a smartphone compared to female college students in Korea²⁷. Alosaimi et al. (2016) found no significant differences in smartphone addiction scores in males and females in Saudi Arabia²⁸. In a study conducted in Turkey by Demirci et al. (2015), the authors reported that female college students had significantly higher smartphone addiction scores than males, which is consistent with our findings¹. In the lens of previous research and our findings, smartphone usage and addiction may significantly differ in geographical locations where studies are conducted¹.

Our results revealed that university students living alone had significantly higher smartphone addiction scores than others. University students staying with friends had the lowest smartphone addiction scores. Matar Boumosleh and Jaalouk (2017) reported in their study that there was no significant difference in the smartphone addiction scores of the students' according to their place of residence, which is not consistent with our findings⁷.

Interestingly, students meeting with friends regularly were found to have higher smartphone addiction scores. In the

literature, it was shown that those with extrovert personality traits had a higher risk of smartphone addiction⁸. Because one purpose of using smartphones is socialization. Extrovert individuals can often experience smartphone addiction⁵.

Those spending less time with friends had the lowest smartphone addiction scores. Although we did not measure our participants' loneliness, living alone as a college student may be an important factor in having higher smartphone addiction scores compared to those who live with others. This could be partially explained by being alone at home. Previous research showed that loneliness was linked to mobile phone addiction scores in college students^{29,30}. We believe that future research should focus on the interaction between college students' study patterns and residence status in smartphone addiction scores.

The relationship between sleep quality and smartphone addiction has been examined in the literature. Demirci et al. (2015) reported that college students with high smartphone use scores had worse sleep quality compared to those with low smartphone use scores in Turkey¹. Similarly, other studies conducted in different geographical locations have found a correlation between high smartphone use and worse sleep quality in college students^{7,17,28}.

Our results also showed that college students with higher smartphone addiction scores were found to have worse sleep quality. Besides, students who feel sleepy in the class had significantly higher smartphone addiction scores compared to students who did not feel sleepy in class. Health and education literature have shown the link between sleep quality and positive health and education outcomes in college students^{30,31}. For example, low sleep quality was found to be associated with suicide ideation, physical aggression, smoking, alcohol and marijuana use, and physical inactivity in college students³². In addition, Soni et al. (2017) reported that low sleep quality is linked to lower academic performance in college students¹⁷.

Our results revealed a significant association between fatigue and smartphone addiction scores. Besides those who feel fatigued in class were found to have significantly higher smartphone addiction scores than those who do not feel fatigued in class. Previous findings demonstrated that smartphone overuse was related to fatigue and daytime sleepiness in college students^{33,34,35}. Besides et al. (2015) reported that high amount of smartphone use was associated with musculoskeletal symptoms in college students. They reported that college students who use smartphones while sitting and lying on their back reported a relatively high complaint rate¹⁶. Choi et al. (2016) reported that "maintaining the maximum bending posture while using a smartphone resulted in higher levels of fatigue [in college students] in the right splenius capitis, left splenius capitis, and left upper trapezius muscles compared with those for the middle bending posture" (p. 331)³⁶.

Overall, our findings indicated that smartphone addiction scores are significantly associated with adverse health and academic outcomes. University health and counseling centers should provide education for university students about how to use a smartphone in a healthier way. University students should be informed about the benefits and risks of smartphones. Given our study sample is faculty of health sciences students, our findings are unique and contribute to the literature in this dimension. Future health sciences students should be trained on smartphone addiction risks because they will be future health professionals who help individuals with health problems. In addition, faculty of health sciences students will work with individuals who may potentially have addiction disorders (e.g., smartphone addiction), therefore, these students should be aware that they may have similar problems and should seek help from university health and counseling centers³⁷. Additionally, faculty of health sciences students with smartphone addiction may have difficulty paying attention at work, which may cause harm to individuals with health problems. Overall, smartphone addictions may cause issues in future professional life, and it is essential to develop prevention strategies to reduce smartphone addiction among health sciences college students.

In this study, in which the factors predicting smartphone addiction in faculty of health sciences students were examined, age, duration of mobile phone use, the mean number of messages sent in a day, monthly mobile phone bill, sleep quality, and fatigue were found to be significant variables. As age increased, smartphone addiction decreased. This may be because the perception of loneliness increases especially in adolescence, and may decrease in older ages. The fact that loneliness is experienced more intensely during adolescence compared to other age levels has also been proven in the results of other studies^{12,29,38,39}. According to the results of multiple regression analysis, smartphone addiction increased as the phone bill increased. As in similar studies in the literature, this result shows that smartphone addiction can harm an individual economically besides causing physical problems such as sleep problems and fatigue⁴⁰. It is expected that the individual whose sleep quality is deteriorated will tend to use the smartphone. Addictive behaviors tend to increase in people who do not sleep at night⁴¹. In the research findings, as affect and sensory fatigue increased, smartphone addiction also increased. People may engage in ineffective coping behaviors to relieve non-physical fatigue. This finding suggests that students do not know effective methods to relieve their fatigue⁴².

Table 2. Distribution of Some Characteristics of Students and Their Mean Smartphone Addiction Scale Scores (n=839)

Characteristics	n	Smartphone Addiction Scale	
		Mean ± SD	t-F / p
Sex			
Female	485	31.98±11.45	-3.729/ ¹ <0.001
Male	354	28.86±12.32	
Type of Residence			
With family	97	29.74±13.56	5.628/ ² <0.001
Alone at home	36	34.47±10.19	
With friends at home	174	27.95±10.59	
Dormitory	444	32.04±12.04	
Hotel and guesthouse	88	28.53±11.23	
Frequency of meeting friends			
Rarely	20	25.25±3.44	7.601/ ² 0.001
Sometimes	41	27.19±12.44	
Often	173	30.72±10.45	
Frequently	455	32.34±12.43	
Very frequently	150	27.18±11.45	
Status of still being employed in an income-generating work			
Yes	149	26.67±10.39	-5.015/ ¹ <0.001
No	690	31.52±12.06	
Educational status of the mother			
Illiterate	55	24.18±8.28	6.374/ ² <0.001
Literate	43	33.25±10.82	
Primary school graduate	408	29.64±12.18	
Secondary school graduate	106	32.87±14.19	
High school graduate	140	32.86±9.93	
University and higher degree	87	32.05±11.20	
Educational status of the father			
Illiterate	12	34.50±13.05	3.530/ ² 0.004
Literate	20	34.20±11.67	
Primary school graduate	261	28.25±11.47	
Secondary school graduate	229	31.83±11.26	
High school graduate	167	31.71±13.57	
University and higher degree	150	31.13±11.12	
Reason for using mobile phone			
Just for talking	101	26.31±8.36	7.776/ ² <0.001
Just for social media access	23	31.56±16.59	
Talking, social media access, sending a message, using internet	715	31.25±12.06	
Status of feeling fatigue during class			
Yes	791	31.24±11.97	12.312/ ¹ <0.001
No	48	21.12±4.87	
Status of feeling sleepiness during class			
Yes	810	31.05±11.92	11.204/ ¹ <0.001
No	29	19.89±4.86	

¹Independent Sample t-test, ²One-way Analysis of Variance and Games Howell Multiple Comparison Test.

Table 3. Correlation Analysis Between the Smartphone Addiction Scale and the Pittsburg Sleep Quality Index and Piper Fatigue Scale

		Pittsburg Sleep Quality Index	Piper Fatigue Scale				
		Total score	Behavior subscale	Affection subscale	Sensory subscale	Cognition subscale	Total score
Smartphone Addiction Scale	r*	0.65	0.47	0.41	0.43	0.41	0.47
	p**	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Pittsburg Sleep Quality Index	r*		0.64	0.63	0.65	0.59	0.68
	p**		<0.001	<0.001	<0.001	<0.001	<0.001

*Pearson Correlation analysis, **Significance level.

Table 4. Multiple Regression Analysis Results Regarding the Interpretation of the Smartphone Addiction Scale.

Variables	Smartphone Addiction Scale Total Score	
	B (SH)	p
Age	0.12 (0.22)	<0.001
Duration of mobile phone use in years	-0.14 (0.12)	<0.001
Mean number of messages send in a day	0.17 (0.00)	<0.001
Monthly mobile phone bill	0.17 (0.00)	<0.001
Pittsburg Sleep Quality Index total score	0.59 (0.07)	<0.001
Piper Fatigue Scale Affection subscale	-0.12 (0.26)	<0.01
Piper Fatigue Scale Sensory subscale	0.11 (0.25)	0.01
R=0.70 R ² =0.49 F ₍₁₂₎ =67.89 p<0.01		

CONCLUSION

In this study, in which the factors associated with smartphone addiction in college students were examined, age, duration of mobile phone use, mean number of messages sent in a day, monthly mobile phone bill, sleep quality and fatigue were found to be statistically significant predictive factors of smartphone addiction. In addition, Appropriate Technology Use courses should be added to the curriculum to combat phone addiction and risk factors. In the content of these courses, subjects such as student groups at risk for smartphone addiction and the relationship of addiction with sleep quality and fatigue should be included in detail. Psychosocial support (such as directing those who use mobile phones to physical activity for a long time) should be provided in line with their needs, mainly by interviewing at-risk students. Future qualitative studies may provide further elaboration of the risk factors associated with students' mobile phone use.

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Author contributions

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REFERENCES

- Demirci K, Akgönül M, Akpınar A. Relationship of smartphone use severity with sleep quality, depression, and anxiety in university students. *J. Behav. Addict.* 2015;4(2):85-92.
- Noyan CO, Darçın A E, Nurmedov S, Yılmaz O, Dilbaz N. Validity and reliability of the Turkish version of the smartphone addiction scale-short version among university students. *Anadolu Psikiyatr De.* 2015;16:73-81.
- Smith A. More than half of us adults trust law enforcement to use facial recognition responsibly. 2019, Pew Research Center. (Erişim tarihi: 01.01.2020). Erişim adresi: https://www.pewresearch.org/internet/wpcontent/uploads/sites/9/2019/09/09.05.19.facial_recognition_FULLREPORT_update.pdf
- Türkiye İstatistik Kurumu. Hanehalkı Bilişim Teknolojileri Kullanım Araştırması. 2019, (Erişim tarihi: 01.01.2020). Erişim adresi: <http://tuik.gov.tr/PreHaberBultenleri.do?id=21779>
- Elhai JD, Dvorak RD, Levine JC, Hall BJ. Problematic smartphone use: A conceptual overview and systematic review of relations with anxiety and depression psychopathology. *J. Affect. Disord.* 2017;207:251-9.
- Ergun G, Guzel A. Determining the relationship of over-exercise to smartphone overuse and emotional intelligence levels in gym-goers: The example of Burdur, Turkey. *Int J Ment Health Ad.* 2019;17(4):1036-48.
- Matar Boumosleh J, Jaalouk D. Depression, anxiety, and smartphone addiction in university students-A cross sectional study. *PLoS one.* 2017;12(8): 1-14.
- Kuyucu M. Gençlerde akıllı telefon kullanımı ve akıllı telefon bağımlılığı sorunsalı: "Akıllı telefon (kolik)" üniversite gençliği. *Glob. Media J. TR Edition.* 2017;7(14):328-59.
- Randler C, Wolfgang L, Matt K, Demirhan E, Horzum MB, Beşoluk Ş. Smartphone addiction proneness in relation to sleep and morningness-eveningness in German adolescents. *J. Behav. Addict.* 2016;5(3):465-73.
- Yang SY, Lin CY, Huang, YC, Chang JH. Gender differences in the association of smartphone use with the vitality and mental health of adolescent students. *J. Am. Coll. Health.* 2018;66(7):693-701.
- Fu S, Chen X, Zheng H. Exploring an adverse impact of smartphone overuse on academic performance via

- health issues: A stimulus-organism-response perspective. *Behav Inform Technol.* 2020;1-13.
12. Kim JY. The relationship among loneliness, stress, and smartphone addiction of adolescents in the era of digitalization. *J. Digit. Converg.* 2017;15(9):335-43.
 13. Schweizer A, Berchtold A, Barrense-Dias Y, Akre C, Suris JC. Adolescents with a smartphone sleep less than their peers. *Eur. J. Pediatr.* 2017;176(1):131-6.
 14. Aktaş H, Yılmaz N. Smartphone addiction in terms of the elements of loneliness and shyness of university youth. *IJSSER.* 2017;3(1):85-100.
 15. Chiu SI. The relationship between life stress and smartphone addiction on Taiwanese university student: A mediation model of learning self-efficacy and social self-efficacy. *Comput Human Behav.* 2014;34:49-57.
 16. Kim HJ, Kim JS. The relationship between smartphone use and subjective musculoskeletal symptoms and university students. *J Phys Ther Sci.* 2015;27(3):575-9.
 17. Soni R, Upadhyay R, Jain M. Prevalence of smart phone addiction, sleep quality and associated behaviour problems in adolescents. *Int J Res Med Sci.* 2017;5(2):515-9.
 18. Kumcagiz H, Gunduz Y. Relationship between Psychological well-being and smartphone addiction of university students. *J. High. Educ.* 2016;5(4):144-56.
 19. Xie X, Dong Y, Wang J. Sleep quality as a mediator of problematic smartphone use and clinical health symptoms. *J. Behav. Addict.* 2018;7(2):466-472.
 20. Özkan M, Akın S. Evaluation of The Effect of Fatigue on Functional Quality of Life in Cancer Patients. *Florence Nightingale Hemşirelik Dergisi.* 2017;25(3):177-92.
 21. Sert H, Taskin Yılmaz F, Karakoc Kumsar A, Aygin D. Effect of technology addiction on academic success and fatigue among Turkish university students. *Fatigue.* 2019;7(1):41-51.
 22. Kwon M, Kim DJ, Cho H, Yang S. The smart phone addiction scale: Development and validation of a short version for adolescents. *PLoS. One.* 2013;8:e83558.
 23. Buysse DJ, Reynolds CF, Monk TH. The pittsburgh sleep quality index: A new instrument for psychiatric practice and research. *Psychiatry Res.* 1989;28:193-213.
 24. Ağargün MY, Kara H, Anlar Ö. Pittsburgh uyku kalitesi indeksi'nin geçerliliği ve güvenilirliği, *Türk Psikiyatri Dergisi.* 1996;7(2):107-15.
 25. Piper BF, Dibble SL, Dodd MJ, Weiss MC, Slaughter RE, Paul SM. The revised Piper Fatigue Scale: Psychometric evaluation in women with breast cancer. *Oncol. Nurs. Forum.* 1998;25:677-684.
 26. Can G. Meme kanserli hastalarda yorgunluğun ve bakım gereksinimlerinin değerlendirilmesi (Yüksek Lisans Tezi). İstanbul: İstanbul Üniversitesi; 2001.
 27. Mok JY, Choi SW, Kim DJ, Choi JS, Lee J, Ahn H et al. Latent class analysis on internet and smartphone addiction in college students. *Neuropsychiatr Dis Treat.* 2014;10:817.
 28. Alosaimi FD, Alyahya H, Alshahwan H, Al Mahyijari N, Shaik SA. Smartphone addiction among university students in Riyadh, Saudi Arabia *Saudi Med J.* 2016;37(6):675.
 29. Kirca, K., & Kutlutürkan, S Hemşirelik Öğrencilerinin Akıllı Telefon Bağımlılık Düzeylerinin İletişim Becerilerine Etkisi. *Kocaeli Üniversitesi Sağlık Bilimleri Dergisi,* 2019;5(2):81-5.
 30. Bian M, Leung L. Linking loneliness, shyness, smartphone addiction symptoms, and patterns of smartphone use to social capital. *Social Science Computer Review.* 2015;33(1):61-79.
 31. Enez Darcin A, Kose S, Noyan CO, Nurmedov S, Yılmaz O., Dilbaz N. Smartphone addiction and its relationship with social anxiety and loneliness. *Behav Inform Technol.* 2016;35(7):520-5.
 32. Baert S, Omey E, Verhaest D, Vermeir A. Mister Sandman, bring me good marks! On the relationship between sleep quality and academic achievement. *Soc. Sci. Med.* 2015;130:91-8.
 33. Rose D, Gelaye B, Sanchez S, Castañeda B, Sanchez E, Yanez ND et al. Morningness/eveningness chronotype, poor sleep quality, and daytime sleepiness in relation to common mental disorders among Peruvian college students. *Psychol Health Med.* 2015;20(3):345-52.
 34. Medic G, Wille M, &Hemels ME. Short-and long- term health consequences of sleep disruption. *Nat Sci Sleep.* 2017;9:151.
 35. Jun MS, Ju KO, Song MS, Suk Lee K. Effects of smartphone overuse on perceived cognitive function, fatigue, and daytime sleepiness among college students. *J Korean Acad Nurs.* 2016;29(3):245-55.
 36. Choi JH, Jung MH, Yoo KT. An analysis of the activity and muscle fatigue of the muscles around the neck under the three most frequent postures while using a smartphone. *J. Phys. Ther.* 2016;28(5),1660-4.
 37. Masters, K. Social networking addiction among health sciences students in Oman. *Sultan Qaboos Univ Med J.* 2015;15(3),e357.
 38. Mahapatra S. Smartphone addiction and associated consequences: role of loneliness and self-regulation. *Behav Inform Technol.* 2019;38(8):833-44.
 39. Mert A, Özdemir G. Yalnızlık duygusunun akıllı telefon bağımlılığına etkisi. *OPUS Uluslararası Toplum Araştırmaları Dergisi.* 2018;8(1):88-107.
 40. Al-Barashdi HS., Bouazza A, Jabur NH. Smartphone addiction among university undergraduates: A literature review. *J. Sci. Res.* 2015:210-25.
 41. Sano A, Taylo, S, McHill AW, Phillips AJ, Barger LK, Klerman E et al. Identifying objective physiological markers and modifiable behaviors for self-reported stress and mental health status using wearable sensors and mobile phones: observational study. *Journal of Medical Internet Research,* 2018;20(6):e9410.
 42. Júnior LJFS, Ribeiro CHT, de Sousa Fortes L, Barbosa BT, da Silva Neto LV. Smartphone addiction is associated with symptoms of anxiety, depression, stress, tension, confusion, and insomnia: A cross-sectional and comparative study with physically and non-physically active adults in self-isolation during the COVID-19 pandemic. *Salud Mental,* 2021;44(4):193-20.