İnönü Üniversitesi Sağlık Hizmetleri Meslek Yüksekokulu Dergisi
ISSN: 2147-7892, Cilt 13, Sayı 1 (2025) 89-101
doi: 10.33715/inonusaglik.1583915

Journal of Inonu University Health Services Vocational School
ISSN: 2147-7892, Volume 13, Issue 1 (2025) 89-101
doi: 10.33715/inonusaglik.1583915

Original Article / Araştırma Makalesi

THE IMPACT OF SMARTPHONE ADDICTION ON EMPATHY AMONG MEDICAL STUDENTS

Telefon Bağımlılığının Tıp Fakültesi Öğrencilerinde Empati Üzerindeki Etkisi

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Geliş Tarihi / Received: *21.11.2024* ***Kabul Tarihi / Accepted:*** *18.01.2025*

ABSTRACT

Smartphone addiction has become an increasing significant public health issue. This study has investigated the relationship between smartphone addiction, and empathy levels, and demographic variables among medical students. As a cross-sectional study, the research has been conducted with 261 medical students educating in İnönü University Medical Faculty between 21.03.2022-31.03.2022. Participants completed a survey delivered to them via Google Forms, including questions about demographic characteristics, reasons for phone use, as well as the Smartphone Addiction Scale (SAS) and the Toronto Empathy Questionnaire (TEQ). Analyses were performed by using IBM SPSS Statistics 26.0. The students' average SAS score was 90.39±23.39, and the mean TEQ score was 52.59 ± 6.66. Approximately 33.7% of participants scored above 50% on the SAS. Smartphones were used most often to listen to music (42.5%) and least often to play games (27%). Students with higher social media use and female students scores were higher on the SAS when compared to others ($p<0.05$). While there was no correlation between the average SAS score and the average TEQ score, it was observed that as the scores given to the negative questions in the TEQ scale increased, the SAS scores also increased ($p<0.05$). Phone addiction is an increasing problem, and identifying risk groups, especially among healthcare workers, and taking precautions will make important contributions in improving the quality of service provided.

Keywords: Addiction, Empathy, Medicine, Smartphone, Student.

ÖZ

Akıllı telefon bağımlılığı giderek artan bir halk sağlığı sorunu haline gelmiştir. Mevcut çalışma, tıp fakültesi öğrencileri arasında cep telefonu bağımlılığı ile empati düzeyleri ve demografik değişkenler arasındaki ilişkiyi araştırmıştır. Kesitsel nitelikteki bu çalışma, 21.03.2022-31.03.2022 tarihleri arasında İnönü Üniversitesi Tıp Fakültesi'nde eğitim gören 261 tıp fakültesi öğrencisi arasında gerçekleştirildi. Katılımcılar Google Forms üzerinden kendilerine gönderilen demografik özellikler, telefon kullanım nedenlerini araştıran sorular ile Akıllı Telefon Bağımlılık Ölçeği (ATBÖ) ve Toronto Empati Ölçeği 'ne (TEQ) ait sorulardan oluşan anketi cevapladı. Analizler IBM SPSS Statistics 26.0 ile yapıldı. Öğrencilerin ATBÖ ortalama puanı 90.39±23.39, TEQ ortalama puanı 52.59±6.66'idi. Katılımcıların %.33.7'si ATBÖ toplam puanın %50'sinin üzerinde puan almıştı. Akıllı telefon en çok müzik dinlemek için kullanılırken (%42.5), en az oyun oynamak için kullanılmıştı (%2.7). Sosyal medyayı fazla kullanan öğrencilerin ve kız öğrencilerin ATBÖ puanları diğerlerinden yüksekti ($p<0.05$). ATBÖ ortalama puanı ile TEQ ortalama puanları arasında korelasyon yokken, TEQ ölçeğindeki olumsuz sorulara verilen puanlar arttıkça, ATBÖ puanlarının da arttığı görüldü ($p<0.05$). Telefon bağımlılığı giderek artan bir sorun olup, özellikle sağlık çalışanlarında riskli grupların tespiti ve önlem alınması verilen hizmetin kalitesinin artırılmasında önemli katkılar sağlayacaktır.

Anahtar kelimeler: Akıllı telefon, Bağımlılık, Empati, Öğrenci, Tıp.

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Bu makaleye atıf yapmak için (How to cite this article): Cansel, N., Avci, E. B., Tutal, B., Alaca, F. Z., Ghaffari, M., Kumaşoğlu, G., Çitil, M. S., Küçükbiltekin, S., Nur Taner, F. N & Balikçi Çiçek, İ. (2025). The Impact of Smartphone Addiction on Empathy Among Medical Students. *İnönü Üniversitesi Sağlık Hizmetleri Meslek Yüksekokulu Dergisi*, 13(1), 89-101. doi: 10.33715/inonusaglik.1583915

INTRODUCTION

Rapid internet access, multitasking capabilities, and portability have led to the swift rise in smartphone use, which continues to grow. As of 2023, approximately 6.925 billion individuals worldwide, or 86% of the global population, own a smartphone. In Turkey, this number is reported to be 81.68 million (Mobisad, 2023)

Originally limited to calls before the year 2000, smartphones now serve multiple functions, including banking, social media access, streaming services, and gaming (Nakamura, 2015). One of the primary domains for smartphone usage is healthcare, where medical professionals use smartphones to communicate with patients, monitor treatment adherence, manage appointments, review test results, and access academic resources (Klasnja & Pratt, 2012). However, smartphone use can sometimes introduce negative consequences, such as headache, feeling of stiffness, backache and various mental health issues; addiction, depression and sleep disorder (Güzel et al., 2018; Hasan & Jaber, 2019; Özen & Topcu, 2018; Zhang et al., 2023). In particular, inappropriate smartphone use during patient care may distract healthcare professionals, impair response times, reduce performance, and jeopardize patient safety (Cho & Lee, 2016; Katz-Sidlow, Ludwig, Miller & Sidlow, 2012). Moreover, increased screen time can negatively impact face-to-face interactions between patients and care teams, potentially leading to communication deficiencies and thereby diminishing empathic engagement (Gutiérrez-Puertas, Márquez-Hernández, Gutiérrez-Puertas, Granados-Gámez & Aguilera-Manrique, 2020; Nakamura, 2015; Turkle, 2015).

Empathy, generally defined as the “emotional process of accurately understanding and reflecting another person’s feelings, thoughts, and emotions,” plays a central role in healthcare. In the clinical context, empathy is associated with greater patient satisfaction, improved clinical outcomes, effective wound healing, enhanced immune responses, and reduced stress levels (Barker, Crowfoot & King, 2022).

In recent years, the rising prevalence of smartphone use, and duration has raised concerns about smartphone addiction, prompting numerous studies to investigate its causes and effects (Jenaro, Flores, Gómez-Vela, González-Gil & Caballo, 2007; Salehan & Negahban, 2013). Studies including medical students have also shown that smartphones are addictive and that their prevalence is quite high, and they are associated with functional impairments in various areas, including a decline in academic performance, as well as the development of several mental health disorders (Baykan, Güneş & Seyfeli, 2021; İkışık et al., 2020; Ulutaş, Çilli, Aydın, Muratdağı & Ekerbiçer, 2020; Ünal M, 2015). However, to the best of our knowledge,

no studies have examined the relationship between smartphone addiction and empathy levels among medical students, who represent the future of healthcare delivery. Considering the critical importance of empathy in healthcare, it is essential to understand the degree to which smartphones may contribute to addiction among future physicians and the potential impact on empathy skills.

In this context, the objective of this study is to assess the levels of smartphone addiction among students enrolled in a medical faculty in Turkey, identify potential factors that may be associated with this addiction, and examine the relationship between addiction and levels of empathy. We hypothesized that smartphone addiction is common among medical students and would reduce their empathy levels.

MATERIAL AND METHOD

This cross-sectional study was conducted among students at the İnönü University Faculty of Medicine during the 2021-2022 academic year. The survey, administered between March 21 and March 31, 2022, collected demographic data (age, gender, relationship status, living situation, history of psychiatric or internal disease, alcohol and substance use), reasons for smartphone use, and responses to the Smartphone Addiction Scale (SAS) and Toronto Empathy Questionnaire (TEQ) via Google Forms.

The study received approval from the İnönü University Scientific Research and Publication Ethics Committee (2022/3167).

Sample Size

The sample size was calculated using G*Power 3.1 software, based on a Type I error (alpha) of 0.05, a power of 0.8, an effect size of 0.25 (medium effect), and six groups for comparison across medical school years (Years 1 through 6). A minimum of 216 participants was determined necessary to detect a significant difference using one-way ANOVA (Buchner, 2017).

Instruments

Smartphone Addiction Scale (SAS)

Developed by Kwon et al., this 33-item, six-point Likert scale assesses smartphone addiction, with responses ranging from 1 (strongly disagree) to 6 (strongly agree). Scores range from 33 to 198, with higher scores indicating greater addiction risk (Kwon et al., 2013). The

scale was validated for Turkish populations by Demirci et al. and has a Cronbach's alpha reliability of 0.947 (Demirci. et al., 2014).

Toronto Empathy Questionnaire (TEQ)

Developed by Spreng et al. in 2009 and validated in Turkish by Totan et al., this 13-item, five-point Likert scale measures empathy, with higher scores indicating greater empathy (Spreng et al., 2009; Totan et al., 2012).

Statistical Analysis

Qualitative variables were summarized using frequencies and percentages, while the normality of quantitative variables was assessed using the Kolmogorov-Smirnov and Shapiro-Wilk tests. Normally distributed quantitative data were summarized using mean ± standard deviation, and non-normally distributed data were summarized using median (minimum-maximum). The statistical methods used in the study were selected in accordance with the structure of the data and the analysis needs. In order to test whether there was a significant difference between two independent groups, the Mann-Whitney U test was used when the data did not show a normal distribution; the independent sample t-test was used when it showed a normal distribution. When three or more groups needed to be compared, the Kruskal-Wallis test was used when the data did not show a normal distribution, and One-way ANOVA was used when it showed a normal distribution. In order to examine the relationships between variables, the Spearman correlation coefficient was used for ordinal data or continuous data types that did not show a normal distribution. These methods were appropriately preferred in the statistical analyses of the study, considering the distribution characteristics of the data and the measurement scales. A p-value of <0.05 was considered statistically significant, and analyses were performed using IBM SPSS Statistics 26.0 for Windows (New York, USA).

RESULTS

Participant Demographics, Empathy, and Addiction Levels

The study included 261 students, with a mean age of 21.28±2.33; 157(60.2%) were female, and 104 (39.8%) were male. The majority (36.0%) were first-year students, while fifth-year students had the lowest participation. A total of 116 students (44.4%) lived with their families, 41(15.7%) reported smoking, and 6(2.3%) reported alcohol/substance use. Additionally, 197 students (75.5%) were in a romantic relationship.

The average TEQ score was 52.59±6.66, and the mean SAS score was 90.39±23.39. Given the maximum total SAS score of 198, 88 students (33.7%) scored above the midpoint of 99. Female students (93.32±24.04) and students living in dormitories (93.89 ± 24.95) scored higher on the SAS than other groups (p=0.012 and p=0.013, respectively).

The highest TEQ scores were observed among female students [55(36-65)], those without a history of alcohol/substance use [53 (34-65)], and non-smokers [54(37-65)] (p<0.001, p=0.003, p<0.001, respectively). A breakdown of demographic characteristics and scale scores is provided in Table 1.

Table 1. Demographic Characteristics of the Participants and Distribution of Scale Scores

Variables		n	%	SAS score	p	TEQ score	p
Gender	**Male**	104	39.8	85.95±21.75	**0.012***	50.5(30-64)	**<0.001****
	Female	157	60.2	93.32±24.04		55(36-65)	
Grade	**First-grade**	94	36.0	95(52-154)	0.339***	52.5(30-65)	0.420***
	Second- grade	39	14.9	82(45-149)		56(38-64)	
	Third grade	33	12.6	91(35-144)		52(36-64)	
	Fourth grade	29	11.1	92(62-151)		54(43-63)	
	Fifth grade	27	10.3	86(36-157)		54(39-63)	
	Sixth grade	39	14.9	90(41-132)		51(39-65)	
Relationship status	**Married**	4	1.5	80.5(70-92)	0.581***	51.5(47-56)	0.059***
	Has a boy/girl friend	56	21.5	89.5(41-135)		52(34-64)	
	Engaged	4	1.5	89.5(41-135)		45(37-54)	
	Alone	197	75.5	91(35-157)		54(30-65)	
Living environment	**Family home**	116	44.4	91.25±21.04	**0.013******	53(34-65)	0.225***
	Student home	35	13.4	79.46±24.33		51(36-64)	
	Alone	11	4.2	84.55±20.98		52(49-61)	
	Student dormitory	99	37.9	93.89±24.95		54(30-65)	
History of internal illness	**Yes**	14	5.4	93.71±24.86	0.585*	54(36-63)	0.697**
	No	247	94.6	90.20±23.35		53(30-65)	
History of psychiatric illness	**Yes**	16	6.1	91.88±27.77	0.793*	50(36-63)	0.466**
	No	245	93.9	90.29±23.14		53(30-65)	
Alcohol/Substance use	**Yes**	6	2.3	92(67-122)	0.776**	41.5(30-56)	**0.003****
	No	255	97.7	90(35-157)		53(34-65)	
Smoking	**Yes**	41	15.7	86.02±24.87	0.194*	48(30-63)	**<0.001****
	No	220	84.3	91.20±23.08		54(37-65)	

*: Variables are summarized as 'median (min.-max.)'. **: Kruskal Wallis test; ***: a: different from the small group, b: different from the medium group, c: different from the large group, d: different from the very large group.

Most Common Reasons for Smartphone Use and Distribution of Empathy and Addiction Scores

When analyzing the primary reasons students use smartphones, the most commonly reported activity was listening to music (42.5%). This was followed by social media use (17.6%), communication (12.6%), watching series/films (9.2%), taking photos/videos (8.0%), educational and research purposes (6.1%), and gaming (2.7%). These findings highlight the

diverse range of activities for which students frequently utilize their smartphones. Regarding the SAS, students who frequently used their smartphones for social media scored significantly higher [107.5(49–157)], indicating a stronger tendency toward smartphone addiction ($p<0.001$). This result suggests a potential link between extensive social media use and increased risk of smartphone dependency. Conversely, students who primarily used smartphones for educational and research purposes had significantly lower SAS scores [82 (45–135)] ($p=0.041$). This finding implies that more academic and constructive usage might reduce the likelihood of smartphone addiction. In terms of empathy levels measured by the Toronto Empathy Questionnaire (TEQ), students who frequently used their smartphones for photography and video had higher empathy scores [55(34–65)] ($p=0.011$). This result may indicate that creative and visual activities could positively influence empathetic abilities. On the other hand, students who frequently used their smartphones for gaming scored significantly lower on the TEQ [44(39–58)] ($p=0.028$). This finding suggests that gaming may be associated with reduced empathy, especially in contexts requiring interpersonal understanding and emotional awareness. Comparisons of usage frequency, addiction, and empathy scores are provided in Table 2.

Table 2. Reasons for Smartphone Use and Distribution of Empathy and Addiction Scores

Variables *		n	%	SAS score	p**	TEQ score	p**
Communication	**Seldom**	28	10.7	97(35-141)	0.760	51(42-65)	0.348
	Sometimes	106	40.6	86.5(48-154)		54(30-65)	
	Frequently	94	36.0	91.5(36-144)		54(36-64)	
	Always	33	12.6	85(41-157)		53(38-65)	
Social media (Facebook, Twitter, Instagram)	**Never**	9	3.4	64[b,c,d](35-98)	**<0.001**	53(45-60)	0.217
	Seldom	33	12.6	77[c,d](48-135)		55(39-65)	
	Sometimes	74	28.4	82[c,d](36-132)		51.5(34-65)	
	Frequently	99	37.9	93[d](48-154)		55(30-64)	
	Always	46	17.6	107.5(49-157)		53.5(36-63)	
Viewing series/movies	**Never**	9	3.4	87(45-107)	0.723	55(45-62)	0.566
	Seldom	65	24.9	91(35-157)		52(34-65)	
	Sometimes	100	38.3	88(36-151)		53.5(30-65)	
	Frequently	63	24.1	89(46-146)		52(36-63)	
	Always	24	9.2	97(49-149)		55.5(36-64)	
Gaming	**Never**	84	32.2	87(35-154)	0.679	54[b,d](38-63)	**0.028**
	Seldom	113	43.3	90(36-157)		53[d](34-65)	
	Sometimes	44	16.9	98(41-146)		51(30-64)	
	Frequently	13	5.0	85(52-125)		48(39-63)	
	Always	7	2.7	92(49-135)		44(39-58)	
Educational/Research purposes	**Never**	3	1.1	113[c,d](99-146)	**0.041**	37(30-62)	0.134
	Seldom	45	17.2	93[c](41-149)		52(38-61)	
	Sometimes	125	47.9	92[c](35-157)		54(34-65)	
	Frequently	72	27.6	86(36-125)		53.5(39-65)	
	Always	16	6.1	82(45-135)		51.5(36-65)	
Photography/Video Recording	**Never**	4	1.5	71(46-120)	0.140	56.5(39-62)	**0.011**

	Seldom	79	30.3	93(35-149)		51[b,c](30-63)	
	Sometimes	104	39.8	93.5(36-157)		53.5(39-65)	
	Frequently	53	20.3	83(48-146)		55(34-65)	
	Always	21	8.0	79(41-154)		53(36-64)	
Listening to music	**Never**	2	0.8	75(70-80)	0.181	51.5(47-56)	0.056
	Seldom	19	7.3	86(46-129)		54(39-64)	
	Sometimes	43	16.5	98(35-144)		51(39-63)	
	Frequently	86	33.0	91(36-157)		52.5(30-65)	
	Always	111	42.5	90(45-154)		55(34-65)	

*: Variables are summarized as 'median (min.-max.)'. **: Kruskal Wallis test; ***: a: different from the small group, b: different from the medium group, c: different from the large group, d: different from the very large group.

Correlation Between Reasons for Smartphone Use and Empathy and Addiction Scores

Correlation analyses showed a positive correlation between social media use frequency and SAS scores (r=0.455, p<0.001) and a negative correlation between frequency of educational/research use and SAS scores (r=-0.165, p=0.008). Gaming was negatively correlated with TEQ scores (r=-0.179, p=0.040), while educational/research use, photography, and music listening were positively correlated with TEQ scores (r=0.127, p=0.040; r=0.173, p=0.005; and r=0.157, p=0.011, respectively). Correlation data between smartphone use and empathy/addiction scores are shown in Table 4.

Table 4. Correlation Between Reasons for Phone Use and Scale Scores

		SAS score	**Communication**	**Social media**	**Watching series/ films**	**Gaming**	**Educational/ research purposes**	**Taking photos/ videos**	**Listening the music**
TEQ score	**r**	-0.117	0.048	0.039	0.069	-0.179**	0.127*	0.173**	0.157*
	p	0.059	0.442	0.533	0.267	**0.004**	**0.040**	**0.005**	**0.011**
SAS score	**r**	1.000	-0.022	0.455**	0.046	0.075	-0.165**	-0.104	0.012
	p	-	0.718	**<0.001**	0.458	0.229	**0.008**	0.094	0.851

*p<0.05,**p<0.01; r: Spearman's rho correlation coefficient

Relationship Between Smartphone Addiction Scores and Toronto Empathy Subscale Scores

Correlation analysis revealed no significant relationship between total SAS and TEQ scores. However, there was a positive correlation between SAS scores and responses to negative TEQ items, including items 3, 5, 8, and 11 (p<0.001, r=0.117; p=0.001, r=0.198; p=0.012, r=0.155; p=0.004, r=0.178, respectively). TEQ item 4 showed a negative correlation with SAS scores (p=0.009). Further details of the correlation between empathy items and SAS scores are provided in Table 5.

Table 5. Correlation Between Empathy Questions and SAS

		TEQ 1	TEQ 2	TEQ 3	TEQ 4	TEQ 5	TEQ 6	TEQ 7	TEQ 8	TEQ 9	TEQ 10	TEQ 11	TEQ 12	TEQ 13
SAS score	**r**	0.117	0.013	0.232**	-0.162**	0.198**	-0.089	-0.098	0.155*	-0.089	-0.077	0.178**	0.050	0.105
	p	0.058	0.839	**<0.001**	**0.009**	**0.001**	0.151	0.113	**0.012**	0.151	0.215	**0.004**	0.417	0.091

*p<0.05,**p<0.01; r: Spearman's rho correlation coefficient
Question 3: I am not affected when someone close to me is happy
Question 4: I am happy to make people feel better
Question 5: When a friend starts talking about their problems, I try to change the subject
Question 8: I get angry when someone cries.
Question 11: When I see someone being treated unfairly, I do not feel sorry for them.

DISCUSSION

The primary aim of this study was to examine the relationship between smartphone addiction, empathy levels, and demographic variables among medical students. In this study, although there was no cutoff score on the scale, 33.7% of participants scored above the average on the SAS. Studies from different countries reported smartphone addiction prevalence rates ranging from 5.57% to 39.6% (Choudhury, S. et al., 2019). Among medical students, the rate has been found to be 23.5% in a study by Oflu et al. (Oflu & Bükülmez, 2022) and 48.6% in a study by Yalçın et al. (Yalçın et al, 2023). Given that smartphone addiction can impact healthcare professionals by reducing focus and communication, potentially leading to errors in patient care (Piscotty et al., 2013), these results are noteworthy.

In this study, nearly all participants used social networking sites, with frequent users scoring higher on the SAS. The literature indicates that social networking is the most common reason for smartphone use, with approximately 72% of young people accessing multiple online sites (Lenhart, Duggan, Perrin, Stepler, Rainie & Parker, 2015). Similarly, a meta-analysis revealed that 75% of medical students use social networking sites, although only 20% use them for educational purposes (Guraya, 2016). Studies on social media usage indicate that it can yield both positive and negative effects, including enhancing emotional security and life satisfaction by fostering interpersonal connections (Park & Sung-Hui, 2015), but may also be associated with distraction, sleep disorders, musculoskeletal and neurological problems, academic performance issues, and social isolation (Beranuy, Oberst, Carbonell & Chamarro, 2009). The negative impact of social media suggests that programs for early detection and intervention could be beneficial for at-risk students.

The relationship between sociodemographic characteristics and smartphone addiction remains inconclusive in existing studies. In our study, gender was the only demographic factor that significantly correlated with smartphone addiction, with females scoring higher on both

SAS and TEQ. In contrast to our finding, Choudhury et al. reported higher addiction rates among males (Choudhury et al., 2019), while Rupani et al. found no significant association with age or gender (Rupani et al., 2016). Internet addiction and digital gaming are generally considered more prevalent among adolescent males, while smartphone addiction is higher among females (Ektiricioğlu, Arslantaş & Yüksel, 2020). The discrepancy in our study may stem from gendered social constraints, leading women to seek more secure social interactions through social media, despite higher empathy levels. Additionally, students living in dormitories had higher addiction scores, possibly due to increased feelings of loneliness or anxiety, prompting them to use smartphones more frequently. Encouraging face-to-face communication in dorm settings could foster social and emotional development.

Research indicates that alcohol and substance users have higher internet and smartphone addiction rates. Similarly, in this study, students who reported smoking or alcohol/substance use had higher SAS scores and lower empathy scores. This finding aligns with the common physiological predisposition that one addiction can increase susceptibility to other addictions (Alaçam, Çulha, Şengül & Tümkaya, 2015).

A notable aspect of this study was the investigation of the effects of smartphone addiction on empathy skills. While no significant relationship was observed between overall TEQ and SAS scores, higher scores on specific negative TEQ items correlated positively with SAS scores. Given that physicians' core duty is to help others, factors diminishing this motivation could potentially contribute to future challenges in patient care, such as burnout, depression, and anxiety (Hartanto, Quek, Tng & Yong, 2021).

Finally, students who used their phones for gaming had lower empathy scores. This finding supports previous studies suggesting that digital games, often played alone in virtual settings, may reduce empathy by limiting social interactions (Çankaya & Ergin, 2015). Excessive gaming weakens social skills and may contribute to a less empathetic society. Thus, promoting responsible gaming and encouraging social interactions are essential for strengthening empathy.

This study has several limitations. First, it was conducted among students from a single university in one geographic region of Turkey, limiting generalizability to all medical students in the country. Second, addiction levels were self-reported through a survey, which may not accurately reflect true addiction levels. Future research involving larger samples and one-to-one interviews could validate or refute these findings. Despite these limitations, this study is

the first to examine the relationship between smartphone addiction and empathy in Turkey and offers preliminary data for future research.

CONCLUSION

No direct relationship was found between smartphone addiction and empathy. However, female gender and high social media usage emerged as risk factors for addiction. Given the increasing prevalence of smartphone addiction, identifying and addressing at-risk groups, particularly among healthcare professionals, may contribute to improving service quality.

Note

The study was presented as an oral presentation at the 23rd International Eastern Mediterranean Family Medicine Congress on 09-12 May 2024.

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