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Evaluation of Burnout Syndrome and Smartphone Addiction Among Healthcare Workers Engaged in Active Duty Throughout the COVID-19 Pandemic

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Abstract

Burnout syndrome frequently affects healthcare workers, who are prone to spending excessive, unhealthy amounts of time on their smartphones. While these devices offer numerous life conveniences, their overuse can evolve into addictive behavior. This study set out to explore the relationship between burnout syndrome and smartphone addiction among various healthcare staff—including doctors, nurses, medical secretaries, security guards, and cleaning personnel—actively working since the start of the COVID-19 crisis. From a pool of 1,190 healthcare employees, 183 individuals qualified and consented to take part in the research. The study employed a sociodemographic questionnaire alongside the Maslach Burnout Inventory and the Smartphone Addiction Scale-Short Version for data collection. Analysis showed notable differences in burnout syndrome levels predominantly among doctors and nurses. Findings also highlighted links between emotional burnout (EB), desensitization, and smartphone addiction, in addition to correlations involving higher education, professional roles (doctors and nurses), and smartphone addiction tendencies. Linear regression results suggested that age accounted for 17% of the variance in smartphone addiction scores, while education level contributed 16%. The highest incidences of both burnout syndrome and smartphone addiction were observed in doctors and nurses. Moreover, healthcare workers experiencing EB and desensitization were more prone to developing smartphone addiction. The data suggest a potential association between elevated education levels in healthcare professionals and increased occurrences of EB, desensitization, and smartphone addiction, with age serving as a significant factor influencing addiction severity.

Keywords: Smartphone addiction, Burnout syndrome, Healthcare workers, COVID-19

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Introduction

The outbreak of the COVID-19 pandemic, which originated in China and quickly spread worldwide, prompted governments and health authorities to implement various preventive strategies such as quarantine, mandatory isolation, and temporary lockdowns. Although these interventions were crucial to curb the virus's transmission and alleviate pressure on healthcare systems, they also contributed to heightened anxiety related to the pandemic [1, 2]. Frontline healthcare professionals, in particular, faced numerous challenges that adversely affected their ability to cope and led to burnout. These challenges encompass uncertainties about the pandemic's duration and symptomatology, the virus's rapid spread and rising death toll, concerns about infecting family members, especially children, the ongoing waves of infection, extended work hours, physical and mental fatigue, societal stigma labeling healthcare workers as sources of infection, continuous demands despite societal attempts to return to normalcy, and persistent feelings of isolation, abandonment, and socioeconomic hardships [3–7].
Originally, burnout was defined as a condition of exhaustion stemming from failure, fatigue, loss of strength, or unmet aspirations [8]. More recent research characterizes burnout by symptoms such as emotional exhaustion, desensitization, and

a diminished sense of personal accomplishment across physical, professional, and psychological domains, driven by prolonged stress and anxiety [3, 9, 10]. The physical manifestations linked to burnout include cardiovascular, respiratory, and gastrointestinal disorders, musculoskeletal pain, and increased mortality under the age of 45; professionally, it is associated with job dissatisfaction, absenteeism, reduced productivity, disability claims, and job turnover; psychologically, burnout is connected to social withdrawal, feelings of inadequacy, fatigue, sleep disturbances, depression, and substance abuse [3, 5, 6, 10].

Burnout syndrome tends to be more prevalent among healthcare professionals than other occupational groups [3, 8]. Certain demographics exhibit higher burnout levels, including females, individuals aged 35-44, singles, those with advanced education, and those with longer tenure in their profession [8, 10]. Evidence also suggests that individuals struggling with anxiety, chronic stressors, and burnout often engage in excessive and unhealthy usage of the internet and smartphones, alongside substance use like alcohol and tobacco [6, 7, 11–14]. In the current century, smartphones and internet access have become integral to daily life, facilitating work, social interaction, and personal activities through features like communication tools, games, social media, videos, multimedia, and navigation systems [11, 15].

However, beyond their communicative benefits, smartphones may impair everyday functioning through compulsive urges prior to use, loss of behavioral control, and repetitive engagement [16]. The portability and constant connectivity of smartphones, compared to other devices, contribute significantly to the development of addiction [12, 16]. Research on smartphone addiction has predominantly focused on children and adolescents, revealing that addiction can lead to burnout later in their educational journey [11]. Studies exploring internet addiction prevalence among adults remain limited [14, 17]. Notably, there is a lack of data examining the connection between smartphone addiction and ongoing stress and anxiety contexts such as the COVID-19 pandemic. Although extensive research has addressed the relationships between smartphone addiction and variables like stress, depression, academic outcomes, loneliness, social support, and personal traits [12], limited investigations have focused on its association with burnout [15].

To address this gap, the present study aims to analyze the interplay between smartphone addiction and burnout among healthcare workers actively engaged since the start of the COVID-19 pandemic. Operating under the hypothesis that healthcare professionals experiencing burnout syndrome may be more susceptible to smartphone addiction, this research explores both variables in this population and examines how sociodemographic factors influence their relationship. As the first study of its kind, these findings are expected to provide a foundational reference for future research in this area.

Materials and Methods

Participants and procedure

This study involved direct, in-person interviews conducted with healthcare personnel employed at Recep Tayyip Erdogan University Research and Training Hospital as of November 3, 2020. Out of 1190 healthcare workers approached, 183 agreed to take part in the research aimed at evaluating their levels of burnout and patterns of smartphone use during the COVID-19 crisis. Each session with participants lasted between half an hour and 45 minutes. Researchers collected data through a sociodemographic questionnaire, the Maslach Burnout Inventory, and the Smartphone Addiction Scale-Short Version, with subsequent analysis correlating these findings with demographic variables.

Inclusion criteria

1. Participants had to be over 18 years old.
2. Must be employed in a healthcare role.
3. Should not have any diagnosed systemic or psychiatric conditions.
4. Should not be using psychotropic drugs.
5. No history of alcohol or substance abuse was allowed.

Measurement instruments

The Sociodemographic Questionnaire was designed by the researchers to capture key participant information, including age, gender, marital status, employment status, educational background, and presence or absence of insomnia.

Maslach Burnout Inventory (MBI), developed by Maslach and Jackson [18] and validated in Turkish by Ergin (1992), comprises 22 items measured on a 5-point Likert scale (0 = never to 4 = always). The MBI includes three dimensions: emotional exhaustion (9 items), depersonalization (5 items), and reduced personal accomplishment (8 items) [18].

Smartphone Addiction Scale-Short Form (SAS-SF), created by Kwon *et al*., is a unidimensional scale with items scored on a 6-point Likert scale, yielding scores between 10 and 60. Higher total scores indicate greater addiction risk. The original instrument demonstrated excellent internal consistency, with a Cronbach's alpha of 0.91 [19].

Statistical methods

Continuous variables are presented as mean values ± standard deviations. Normality checks were performed using Shapiro-Wilk and Kolmogorov-Smirnov tests. Relationships between variables were analyzed via Mann-Whitney U and Kruskal-Wallis tests for group comparisons, while Pearson correlation was applied to explore associations between continuous measures. Statistical significance was determined at a threshold of $p < 0.05$.

The study protocol was approved by the Non-invasive Clinical Research Ethics Committee of Recep Tayyip Erdogan University, Faculty of Medicine. All procedures complied with institutional and national ethical standards, including adherence to the Declaration of Helsinki (1964) and its subsequent revisions.

Results and Discussion

An analysis of the participants' sociodemographic data showed that females comprised 65.6% of the group, while 61.2% were married. Profession-wise, 32.2 percent were nurses, 20.2 percent doctors, 27.9% cleaning staff, 13.7% medical secretaries, and 6 percent security guards, as depicted in **Figure 1**. The mean age of participants was 33.07±6.92 years.

Table 1. Sociodemographic characteristics of the participants

	Number	Percentage
Gender		
Male	63	34.4
Female	120	65.6
Marital status		
Single	71	38.8
Married	112	61.2
Education level		
Literate	1	0.5
Primary school	23	12.6
High school	39	21.3
Bachelor's degree	100	54.6
Master's degree	20	10.9
Profession		
Doctor	37	20.2
Nurse	59	32.2
Medical secretary	25	13.7
Security guard	11	6.0
Cleaning staff	51	27.9
Insomnia		
Yes	34	18.6
No	149	81.4

Their average emotional burnout rate stood at 24.15±7.79%, and smartphone addiction was present in 23.22±11.52% of the participants **(Table 2)**.

Table 2. Means and standard deviations of the scale scores

Scale	Mean	Standard deviation	Minimum	Maximum
Emotional burnout	24.15	7.79	9	44
Desensitization	10.89	4.25	5	23
Personal success	27.72	6.92	6	44
Smartphone addiction	23.22	11.52	10	58

A strong association was identified between emotional burnout and desensitization experienced by participants and their levels of smartphone addiction ($p<0.001$, $p<0.001$) **(Table 3)**. **Figure 1** illustrates the correlation between smartphone addiction scores and depersonalization scores, while **Figure 2** depicts the relationship involving emotional exhaustion scores.

Table 3. Comparison of smartphone addiction and emotional burnout

	Smartphone addiction	
	r	**p**
Emotional burnout	0.360	<0.001
Desensitization	0.378	0.001
Personal success	0.029	0.712

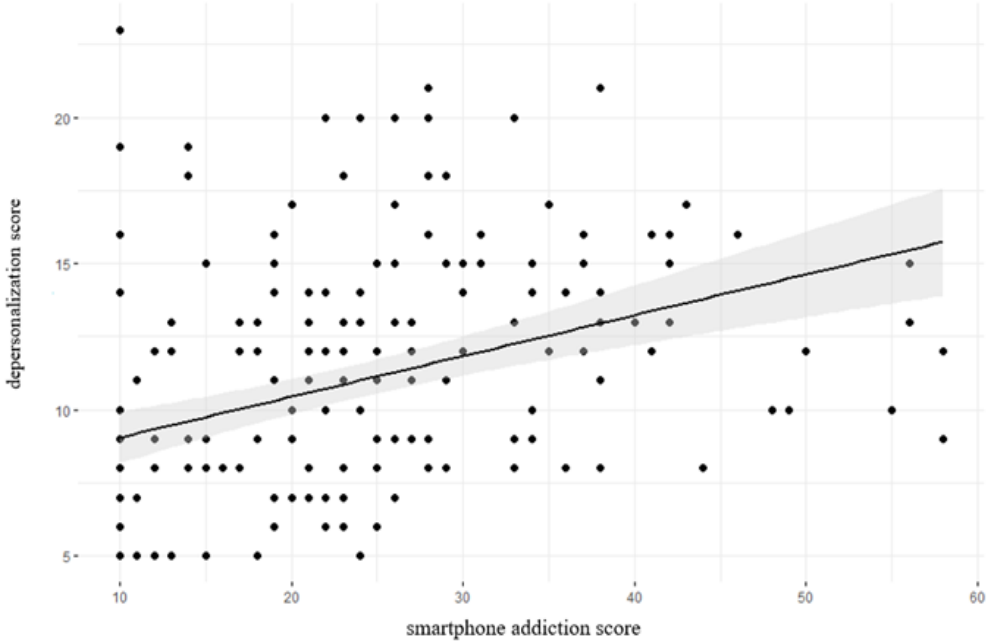

Figure 1. Correlation distribution of smartphone addiction score and depersonalization score

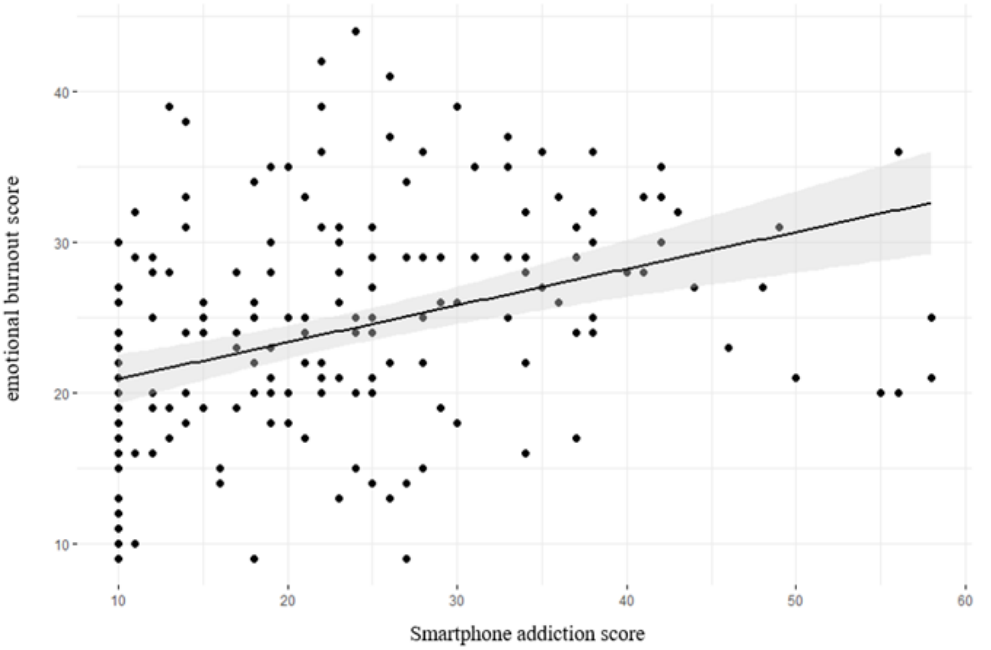

Figure 2. Correlation distribution of smartphone addiction score and emotional burnout score

Age demonstrated a negative correlation with both emotional burnout and personal success ($r = -0.320$, $p < 0.001$; $r = -0.274$, $p < 0.001$). Additionally, emotional burnout was significantly associated with factors such as being female, unmarried, possessing higher education, working as a doctor or nurse, and experiencing insomnia ($p = 0.001$, $p = 0.002$, $p = 0.000$, $p = 0.000$, $p = 0.050$) **(Table 4)**.

Table 4. Comparison of the scale scores and other variables

	Emotional burnout		Desensitization		Personal success		Smartphone addiction	
	Mean±SD	**p**	**Mean±SD**	**p**	**Mean±SD**	**p**	**Mean±SD**	**p**
Gender		0.001		0.039		0.075		0.78
Male	21.56±8.02		10±4.09		26.46±8.16		22.89±12.27	
Female	25.51±7.34		11.36±4.27		28.38±6.12		23.39±11.15	
Marital status		0.002		0.110		0.048		0.098
Single	26.35±7.73		11.52±4.05		28.99±6.2		24.99±10.75	
Married	22.75±7.53		10.49±4.34		26.91±7.26		22.1±11.89	
Education level		0.000		0.043		0.000		0.019
Literate	9±19.3		5±9.04		28±22.43		10±17.57	
Primary school	19.3±8.85		9.04±4.12		22.43±8.91		17.57±9.05	
High school	21.72±8.43		10.46±4.31		26.03±8.29		21.46±11.97	
Bachelor's degree	25.5±6.4		11.25±4.15		29.14±5.46		24.51±11.31	
Master's degree	28.45±7.29		12.35±4.11		29.95±4.39		27.35±11.88	
Profession		0.000		0.001		0.002		0.000
Secretary	24.2±7.48		11.4±4.34		27.28±6.12		24.8±11.76	
Security guard	19.82±7.41		9.64±3.67		25.55±7.85		21.27±9.87	
Cleaning staff	19.55±8.03		8.92±4.18		24.92±9.21		16.22±9.73	
Nurse	27.08±6.09		11.97±3.78		29.56±5.08		26.68±11.02	
Doctor	27.05±6.81		11.92±4.29		29.57±4.36		26.86±10.89	
Insomnia		0.050		0.032		0.757		0.144
Yes	26.5±7.54		12.29±4.27		27.38±8.14		25.82±12.58	
No	23.61±7.77		10.57±4.19		27.79±6.65		22.62±11.22	

The Mann-Whitney-U test and the Kruskal-Wallis test were used for this table.

A negative association was identified between age and emotional burnout ($r = -0.320$, $p < 0.001$). Among those exhibiting smartphone addiction, 22.8% were male, 23.3% female, 24.9% unmarried, 22.1% married, 27.3% held a master's degree, 26.8% were doctors, and 25.8% reported insomnia **(Table 4)**. A statistically significant link was found between smartphone addiction and both higher education levels and profession ($p = 0.019$, $p = 0.000$) **(Table 4)**. However, when analyzed through linear regression, the influence of profession on addiction lost significance, with 17% of the variance in addiction scores explained by age and 16% by educational level **(Table 5)**.

Table 5. Linear regression analysis of the variables affecting smartphone addiction

	Unstandardized B	Std. Error	Standardized Beta	t	p	95.0% CI
(Constant)	24.2	6.69		3.62	<0,001	11,00-37.39
Age	-0.28	0.13	-0.17	-2.25	0.025	-0.53--0.04
Education level	2.18	1.07	0.16	2.04	0.043	0.07-4.29
Profession	0.33	0.7	0.04	0.47	0.637	-1.06-1.72

This study revealed that burnout levels were elevated among participants who were frontline nurses or doctors, female, unmarried, possessed higher educational qualifications, or suffered from insomnia. A significant association was identified between emotional burnout, desensitization, and smartphone addiction, along with a link between smartphone addiction and both higher education levels and membership in healthcare professions (doctors and nurses). Additionally, emotional burnout and smartphone addiction tended to decrease with advancing age, with educational attainment accounting for 16% and age for 17% of the variance in addiction scores.

Previous research has consistently indicated that burnout is more prevalent in occupations involving direct interpersonal interaction, such as healthcare workers [3, 6, 8, 10, 20, 21]. More recent investigations have renewed focus on burnout among these frontline professionals during the COVID-19 pandemic [22, 23]. These studies emphasize that the pandemic may amplify burnout incidences due to increased responsibilities needed to maintain functionality in both personal and social spheres, evolving job roles, uncertainties about the virus, challenges in managing the disease, and the ongoing chronic stressors involved [8, 10].

Although earlier studies suggested that females and single individuals are more susceptible to burnout compared to males and married individuals [3, 10, 24, 25], more recent analyses report no significant association between burnout and gender or

marital status [25, 26]. Some literature reports an increase in emotional burnout with age [14, 24], whereas other studies and meta-analyses argue that burnout diminishes as experience accumulates and decision-making skills improve with age [27, 28]. Furthermore, several studies have linked burnout syndrome among frontline healthcare workers during the COVID-19 crisis to longer working hours, extended years of service, and higher academic achievement [23, 25, 29, 30].

In Turkey, one investigation attributed elevated emotional burnout in healthcare workers to daily work hours exceeding 17, advanced academic qualifications, and prolonged professional tenure [3, 24].

Despite some inconsistent findings, the current study aligns with much of the existing literature, indicating that burnout syndrome is more prevalent among females, unmarried individuals, frontline healthcare professionals (doctors and nurses), and those with higher education, while it tends to decrease with increasing age.

The relatively lower burnout rates observed in health personnel working on the frontlines in our country may be influenced by their extensive professional experience, which equips them to make critical decisions during patient care, thus helping to sustain their roles throughout the COVID-19 pandemic. Both this study and previous research suggest that frontline healthcare workers who perceive greater control over the virus, have timely access to updated information, and can make key clinical decisions while witnessing their outcomes tend to report higher personal success. In these challenging times, where social support is crucial, healthcare workers living with family and receiving adequate emotional backing are less likely to develop burnout compared to those living alone.

The gender disparity in burnout may also be rooted in sociocultural expectations within Turkish society and elsewhere, where women often bear the dual burden of domestic responsibilities, including childcare and household duties, alongside their professional obligations, contrasting with their male colleagues. Additionally, all frontline healthcare staff face heightened vulnerability to burnout due to factors such as mandatory overtime outside their specialties, uneven task allocation, increased workload stemming from shifting healthcare delivery policies, difficulties adapting to new procedures, prolonged patient recovery periods or failure to recover, rising mortality rates, and the risk of transmitting infections to colleagues, family members, or other patients with comorbid conditions.

Extensive research has linked chronic stress factors in physicians with both sleep disturbances and burnout symptoms. Studies reveal that over half of doctors exhibit signs of burnout when sleep disorders like insomnia, obstructive sleep apnea syndrome, or restless leg syndrome remain undiagnosed or untreated, often due to shift work schedules[31, 32]. In an earlier investigation, Karatas *et al*. [32] discovered insomnia to be the most frequently occurring sleep disorder among healthcare workers actively serving during the pandemic who did not have any psychiatric conditions. Similarly, Tıraş and Öztemel [33] described a reciprocal link between insomnia and burnout syndrome, where each condition might predispose the development of the other. Another study from China also confirmed an association between insomnia and burnout in healthcare professionals [34]. In line with these findings, our current study highlights that healthcare workers experiencing insomnia and smoking were at greater risk of developing burnout syndrome. Thus, diagnosing and managing sleep disorders, particularly insomnia, is essential for addressing burnout effectively.

Early recognition and treatment of burnout syndrome can help avoid serious health consequences such as cardiovascular, respiratory, and gastrointestinal illnesses, which may lead to premature death. Additionally, burnout contributes to decreased work efficiency, increased absenteeism, and mental health challenges, including fatigue, loss of energy, insomnia, and substance misuse. Timely intervention enhances individuals' ability to perform in social, private, and professional environments, which is especially critical during the ongoing COVID-19 crisis. It is therefore vital that healthcare institutions, hospitals, and public health authorities, with psychiatrists at the helm, develop structured programs that clearly define burnout syndrome and its symptoms to implement preventative strategies.

Research also points to behavioral addictions like smartphone addiction, alongside substance use such as tobacco and alcohol, as factors that can diminish the impact of anxiety and prolonged stress on burnout syndrome [10, 11, 35]. Smartphones offer various features beyond basic communication — internet access, social media, messaging, video, and multimedia functions — which provide coping support under chronic stress, combined with their portability. However, excessive use may disrupt daily life and reduce overall functionality [11, 12, 36, 37]. A meta-analysis categorized smartphone addiction within compulsive-impulsive spectrum disorders [14]. The majority of prior studies have focused on adolescents and university students [11–13, 15, 16, 38, 39]. Evidence suggests that smartphone addiction is more common in younger adults, while internet use tends to increase with age [14, 38, 40]. Older adults also appear to employ more mature defense mechanisms and effective stress coping strategies [12].

Findings on gender differences in smartphone addiction are mixed; most report no significant difference [41, 42], while some suggest higher rates in females [23, 43, 44] and others find it more prevalent in males [45]. In this study, smartphone addiction was more frequent in adults (mean age 33.07±6.92), decreasing as age increased, with no significant gender disparity. Because most research on behavioral addictions like smartphone addiction targets younger populations, the adult focus here represents a notable strength. Few studies have addressed smartphone addiction among healthcare workers, and none have examined it

during the COVID-19 pandemic. Our analysis of healthcare professionals working during this period revealed a higher risk of smartphone addiction among frontline doctors and nurses, marking another key contribution of this study.
Key determinants of smartphone addiction identified in literature include anxiety, chronic stress, and poor sleep quality across genders [13–15, 41, 42, 46]. Chronic stress and emotional desensitization are also known to heighten burnout risk, which aligns with our observation that smartphone addiction worsened as these factors deteriorated. This research is the first to explore the relationship between burnout syndrome and smartphone addiction, notably in individuals with insomnia but without chronic stress or other medical/psychiatric conditions.
Our findings offer a foundation for further investigations into how smartphone functionalities — internet access, social media, messaging, video, and multimedia — influence burnout syndrome.

Conclusion

1. Frontline healthcare professionals, especially doctors and nurses actively combating the COVID-19 pandemic—a significant chronic stressor—demonstrated the highest likelihood of experiencing burnout syndrome alongside smartphone addiction.
2. Among healthcare workers, those who were female, single, and suffering from insomnia were more prone to burnout syndrome, particularly in later stages of life.
3. Exploring smartphone addiction specifically within adult populations remains a crucial area for further research.
4. Elevated educational attainment appears to correlate with greater emotional burnout, increased desensitization, and a higher incidence of smartphone addiction.
5. Emotional burnout and desensitization in healthcare professionals were significantly associated with a greater risk of smartphone addiction.

Limitations

1. This study did not include examination of other sleep-related issues such as shift work and circadian rhythm disorders.
2. Insomnia was not assessed using a dedicated, standardized scale but was instead inferred from responses on the sociodemographic questionnaire.
3. The study did not dissect specific smartphone functionalities—like internet and social media access, messaging, video, or multimedia use—or their individual usage frequencies in relation to smartphone addiction.

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