



Original Article

# The Degree of Dependence on Mobile Phones and Its Relationship with Sleep Quality in Students of Bam University of Medical Sciences in 2020

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## Abstract

**Background:** Due to the ease of access, the use of mobile phones is increasing. Sleep is a basic necessity that constitutes almost a third of the human lifetime. This research was conducted to investigate the degree of dependence on mobile phone and its relationship with sleep quality among students of Bam University of Medical Sciences.

**Methods:** This was an analytical study conducted cross-sectionally in 2020 on 280 students of Bam University of Medical Sciences using a stratified sampling method. In this research, Jenaro et al's Excessive Use of Cell Phone Questionnaire was used to measure degree of dependence on mobile phones, and the Pittsburg Sleep Quality Questionnaire was used to measure sleep quality.

**Results:** Of the 280 subjects in this research, 59.3% were female, and 95% were single. Regarding the field of study, the highest percentage belonged to medicine (9.28%) and the lowest to emergency medicine (1.02%). The average score for dependence on mobile phones was  $2.07 \pm 1.34$ , and the average sleep quality score was  $1.34 \pm 0.47$ . The average dependence on mobile phones was  $2.11 \pm 0.346$  among male students and  $2.04 \pm 0.255$  among female students ( $P=0.04$ ). A statistically significant correlation was found between dependence on mobile phones and sleep quality ( $r=0.152$ ) ( $P<0.05$ ).

**Conclusion:** The increase in the use of mobile phones leads to poor sleep quality. This relationship causes adverse effects on health, academic performance, energy, etc. Therefore, more attention from officials and policymakers is required for interventions such as increasing scientific, cultural, educational, recreational, and research programs.

**Keywords:** Mobile phone, Students, Sleep quality

**Citation:** Mirzaei S, Akbarian MJ, Damiyar S, Tajik R. The degree of dependence on mobile phones and its relationship with sleep quality in students of Bam university of medical sciences in 2020. *Health Dev J.* 2022;11(3):123-128. doi:10.34172/jhad.92346

**Received:** May 15, 2023, **Accepted:** October 25, 2023, **ePublished:** November 2, 2023

## Introduction

Like a computer, a mobile phone is an essential device that helps people adapt to modern life (1). Mobile phones are popular devices that are capable of processing information. They include many features such as games, access to the Internet and social networks, messaging, movies, multimedia, and communication (2). The use of mobile phones is expanding daily due to their ease of access, and they play a crucial role in social communication, so they attract the attention of different social groups, including students (3).

As people have widespread access to the Internet, we are witnessing a kind of dependency among young people; also, as people, especially teenagers and young people, increase their relationships in the virtual world, their relationships in the real world decrease (4). Research shows that excessive use of mobile phones causes a kind of dependence, and in extreme cases, this dependence gradually leads to a kind of addiction in users (5).

Smartphone addiction is classified as a behavioral addiction. Similar to any other type of addiction, its definition includes uncontrollable use of mobile phones that causes adverse consequences for the individual. Previously, addiction to mobile phones and the Internet were considered separate from each other. As mobile phones have the characteristics of computers, the possibility of addiction to them is very high (6).

The Internet emerged in Iran in 1994; since then, the number of Internet users has increased day by day; as per the report of the Ministry of Health, the number of Internet users has increased by a factor of 25 in recent years (7). Currently, the penetration rate of mobile phone subscribers in Iran is 91.2%, which, considering the population of 75.1 million, means that there are currently more than 67 million mobile phone users in Iran (8). Even if a person does not use the device for calls and messages, there is still a possibility of dependence on mobile phones and the occurrence of its associated complications, and



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this risk will increase continuously. Sleep disorder can be mentioned as one of these complications (9). Long-term use of smartphones can cause physical, mental, and behavioral problems, such as eye problems, unhealthy eating habits, reduced academic performance, reduced attention and concentration, communication and adaptation difficulties, addictive behavior, reduced self-esteem, and suicide. In addition, excessive use of smartphones has been associated with sleep problems such as reduced sleep quality, daytime fatigue, delayed onset of sleep, and shorter sleep duration (10).

Sleep is a basic necessity that constitutes almost a third of a human's lifespan. During this unconscious and reversible state, the body and mind repair and develop (11). Sleep is well documented as one of the main components of cognition and physical performance, critical to various aspects of life, especially for teenagers and young people (12).

In students who have left the structure of high school and entered the free lifestyle of university, the patterns, duration, and quality of sleep usually change. Research shows reduced sleep duration and quality may affect cognitive performance, general health, and good feelings (13). Also, from a physical point of view, sleep deprivation can disrupt the body's daily rhythm, leading to deep sleep patterns and metabolic, endocrine, and immune response disorders (14). Considering that the issue of the development of new technologies, especially smartphones, is increasing day by day and access to them has expanded dramatically, and also considering the undeniable importance of university students in society, this research was conducted among the students of Bam University of Medical Sciences to determine the degree of dependence on mobile phones and its effects on their quality of sleep, which is one of the essential factors in the efficiency and productivity of students.

## Methods

This descriptive and analytical study was conducted cross-sectionally using stratified random sampling in 2020. The research population included all the students of Bam University of Medical Sciences students, which was divided into subgroups that were similar in terms of intra-group characteristics. Students were randomly included from these subgroups. The target research population was 1000 people. Using Cochran's formula, and taking into account an error rate of 0.05, the sample size was calculated as 280 people.

In this research, the Excessive Use of Cell Phone Questionnaire by Jenaro et al. was used to collect information. It comprises 23 questions measuring the excessive use of mobile phones (15). This questionnaire is based on ten psychological indicators from the 4th edition of the *Manual of Diagnosis and Classification of Mental Disorders*. The 23 items are measured on a 6-point Likert

scale (1-never, 2-almost never, 3-sometimes, 4-often, 5-almost always, and 6-always). High scores reflect excessive use, with subjects scoring above 75 defined as heavy users and subjects scoring below 25 defined as light users. Regarding the validity of this questionnaire in Iran, Golmohammadian and Yaseminejad reported the validity of this questionnaire using Cronbach's alpha method as 0.90 in their standardization of this scale on 782 students (16).

In order to measure sleep quality, the Pittsburgh Sleep Quality Questionnaire, prepared by Buysse et al (17), was used. This questionnaire differentiates between bad and good sleep quality. Regarding the validity of this questionnaire in Iran, Cronbach's alpha of 0.79 was obtained, and the content validity of the questionnaire has also been confirmed (18). Using the internal consistency coefficient through Cronbach's alpha, Sadoughi and Mohammad-Salehi reported the reliability coefficient of this questionnaire as 0.80 (3). The scoring method of this questionnaire is such that the score for each component is in the range of 0 (no problem) to 3 (severe problems). A high score in each component or the overall score indicates poor sleep quality. On each scale, score 0 indicates normal conditions, and scores 1, 2, and 3 indicate mild, moderate, and severe problems, respectively. The sum of the seven scale scores forms the total score, which ranges from 0 to 21. Regarding sleep quality, a total score greater than 6 indicates that the subject has poor sleep quality. The higher the sleep quality score, the poorer the sleep quality.

The data were analyzed by SPSS 22 software using descriptive and analytical statistical tests, including frequency, mean, independent t, analysis of variance (ANOVA), and correlation. The independent t-test was used to examine the relationship between the variables of mobile phone usage and sleep quality and the variables of gender and material status. ANOVA was used to examine the relationship between the total score of sleep and mobile phone use and the variable of age groups and study field. Pearson's correlation test was used to examine the relationship between the variables of mobile phone usage and sleep quality. Levene's test was used to measure the equality of variances. Analysis was done at a significance level of less than 0.05 ( $P < 0.05$ ).

## Results

Of the 280 subjects in this research, 40.7% were male, 59.3% were female, and 95% were single. In terms of study field, the highest percentage belonged to medicine (28.9%) and the lowest to emergency medicine (2.1%) (Table 1).

In terms of mobile phone usage, among 280 people, three people (1.1%) had low usage, 254 people (90.7%) had normal usage, and 23 people (8.2%) had excessive usage. In addition, among all students, 183 people (65.4%)

**Table 1.** Demographic information of the study subjects

Demographic characteristics		Frequency	Percent
Gender	Male	114	59.3
	Female	166	40.7
Age group	18–20	101	36.1
	21–23	161	57.5
	24	18	6.4
Field of study	Medicine	81	28.9
	Laboratory sciences	29	10.4
	Nursing	36	12.9
	Midwifery	19	6.8
	Operating room	23	8.2
	Emergency medicine	6	2.1
	Health management services	31	11.1
	Public health	20	7.1
	Environmental health	16	5.7
	Occupational health	19	6.8
Marital status	Single	256	94.6
	Married	15	5.4

had good sleep quality, and 97 people (34.6%) had poor sleep quality.

The overall average sleep quality score was  $4.82 \pm 2.27$ . There was a significant relationship between sleep quality and variables of gender and age ( $P=0.04$ ). However, there was no significant relationship between the sleep quality and marital status variables and field of study (Table 2).

The overall average score of dependence on mobile phones among students was  $2.07 \pm 1.30$ . There was a significant relationship between dependence on mobile phones and the variable of gender ( $P=0.04$ ). There was no significant relationship between the score of dependence on mobile phones and the variables of age ( $P=0.07$ ), marital status ( $P=0.97$ ), and field of study ( $P=0.19$ ) (Table 3).

In investigating the quality of sleep, the analysis showed that in terms of good sleep quality, environmental health students had the highest percentage (68.8%), and emergency medicine students had the lowest percentage (16.7%). Additionally, the analysis showed that there was no significant relationship between sleep quality and fields of study ( $P>0.05$ ) (Table 4).

Examining the degree of dependence on mobile phone in different fields of study showed that the lowest usage rate belonged to students of medicine (7.4%) and the highest to students of laboratory sciences (17.2%). In addition, the findings show that there was no significant relationship between mobile phone addiction and fields of study ( $P<0.05$ ) (Table 4).

Based on Pearson's correlation analysis, a statistically significant correlation was found between mobile phone dependence and sleep quality ( $P<0.011$  and  $n=280$ ), so increasing mobile phone dependence was associated

**Table 2.** The average and standard deviation distribution of sleep quality among Bam University of Medical Sciences students

Demographic variables		Sleep quality Mean $\pm$ SD	P value
Gender	Male	$5.11 \pm 2.32$	0.04
	Female	$4.54 \pm 2.23$	
Age group	18–20	$5.08 \pm 1.95$	0.04
	21–23	$5.24 \pm 2.50$	
	$\leq 24$	$3.83 \pm 1.97$	
Field of study	Medicine	$4.91 \pm 2.47$	0.19
	Laboratory sciences	$5.72 \pm 2.80$	
	Nursing	$4.69 \pm 2.40$	
	Midwifery	$5.53 \pm 1.80$	
	Operating room	$5.22 \pm 1.53$	
	Emergency medicine	$7.00 \pm 2.36$	
	Health management services	$5.06 \pm 1.86$	
	Public health	$4.60 \pm 2.45$	
	Environmental Health	$4.31 \pm 2.38$	
	Occupational health	$5.63 \pm 1.83$	
Marital status	Single	$5.12 \pm 2.28$	0.18
	Married	$4.29 \pm 2.70$	

**Table 3.** Frequency distribution of the average dependence on mobile phones among students of Bam University of Medical Sciences

Demographic variables		Dependence on mobile phones Mean $\pm$ SD	P value
Gender	Male	$2.11 \pm 0.35$	0.04
	Female	$2.04 \pm 0.26$	
Age group	18–20	$2.03 \pm 0.30$	0.07
	21–23	$2.11 \pm 0.31$	
	$\leq 24$	$2.00 \pm 0.00$	
Field of study	Medicine	$2.06 \pm 0.38$	0.19
	Laboratory sciences	$2.17 \pm 0.38$	
	Nursing	$2.17 \pm 0.00$	
	Midwifery	$2.00 \pm 0.21$	
	Operating room	$2.04 \pm 0.41$	
	Emergency medicine	$2.17 \pm 0.36$	
	Health management services	$2.06 \pm 0.00$	
	Public health	$2.00 \pm 0.37$	
	Environmental health	$2.00 \pm 0.00$	
	Occupational health	$2.00 \pm 0.30$	
Marital status	Single	$2.07 \pm 0.07$	0.97
	Married	$2.07 \pm 0.02$	

with decreased sleep quality. The Pearson's correlation coefficient was also reported as 0.152.

## Discussion

The results of this study showed that there was a positive and significant relationship between dependence on mobile phones and sleep quality. Regarding dependence

**Table 4.** Examining the frequency of having good sleep quality and excessive use of mobile phones in different fields of study

	Field of study	Medicine	Laboratory sciences	nursing	Midwifery	Operating room	Emergency medicine	Health management services	Public health	Environmental Health	Occupational health
Having good sleep quality	Frequency	53	15	23	10	14	1	21	13	11	9
	Percent	65.4	51.7	63.9	52.6	60.9	16.7	67.7	65.0	68.8	47.4
	P value	$P > 0.05$									
Excessive use of mobile phones	Frequency	6	5	6	0	1	1	3	0	1	0
	Percent	7.4	17.2	16.7	0	4.3	16.7	9.7	0	6.3	0
	P value	$P > 0.05$									

on mobile phone, among 280 people, three people (1.1%) had low usage, 254 people (90.7%) had normal usage, and 23 people (8.2%) had excessive usage. Also, Regarding the sleep quality score, 183 people (65.4%) had good sleep quality, and 97 people (34.6%) had poor sleep quality.

The findings showed that the level of dependence on mobile phone in male students was higher than that of female students, and female students had better sleep quality than male students. It is possible that as male students spent their daily time online and stayed up late at night, the level of mobile phone usage was higher among them. Considering the correlation between excessive use of mobile phones and sleep quality, they also had poorer sleep quality than female students.

In the examination of the degree of dependence on mobile phones and the quality of sleep among different fields of study, students of medicine were found to have the lowest degree of dependence (7.4%), and the highest degree of dependence of mobile phones was related to laboratory sciences (17.2%). According to the curriculum flowchart for medical students, they naturally spend more time on academic activities than other students, and these activities create order, such as regular and timely sleep schedules, in their life schedules.

In addition, regarding the level of sleep quality, the environmental health students had better sleep quality (68.8%) than other students, and the emergency medicine students (16.7%) had poorer sleep quality than students of other fields of study.

The results of this research regarding the relationship between mobile phone addiction and sleep quality are consistent with other studies (19-21). The results of Mohammadbeigi and colleagues' research in Iran showed that mobile phone addiction affects the sleep quality of medical students. It appears that excessive use of mobile phones has a negative effect on their attention, and this relationship is revealed through lack of sleep (22). In a study conducted by Gupta et al on 1000 medical students, it was shown that there was a significant relationship between the use of mobile phones and waking up (23). The proper use of a mobile phone can have many practical applications, as long as its use is not so excessive as to create obstacles for other activities, such as sleeping. Most people do not put aside their mobile phones while

resting and sleeping. As a result, they waste time and get occupied with the virtual world, losing hours of sleep and quality of sleep. In their research, Lowry et al aimed to investigate the relationship between grade point average (GPA) and the quantity and quality of sleep of students at the University of Minnesota. They found that deprivation of an average amount of weekly and nightly sleep significantly correlated with students' GPA (24). Figueiro and colleagues' research in 2011 showed that short-wave light from mobile phones causes sleep disorders by suppressing or delaying melatonin onset. Looking at the mobile phone screen before going to bed affects the user's brain, sleep quality, and leads to dysfunction during the day (25). It is well documented that reduced sleep duration and quality may affect cognitive function, general health, and mood, which may, in turn, cause delayed sleep onset. The research conducted by Shrivastava and Saxena in 2014 among the students of the University of Medical Sciences showed that the use of mobile phones at night had a significant relationship with the quality of sleep. Students who use mobile phones for more than two hours will face sleep deprivation and daytime sleepiness, which can greatly impact their cognitive and learning abilities (26). As sleep is one of the most important biological mechanisms in mood regulation, students whose sleep is disturbed due to the excessive use of these gadgets are more likely to experience symptoms of major depression, such as difficulty concentrating, decreased energy, and decreased daily sleeping time. In addition, students who suffer from sleep disturbance and depression use mobile phones and other information and communication tools as a means of passing the time (27).

In conducting the study, the researchers faced limitations such as the non-cooperation of some of the participants in completing the questionnaire. Complete and clear explanations were provided about the questionnaire questions, and this issue was resolved as much as possible as this subject is essential to students.

### Conclusion

According to the results of this research, there is a relationship between the excessive use of mobile phones and the quality of sleep, i.e., an increase in the use of mobile phones will lead to poor sleep quality. According



to this research, this excessive use is highly prevalent among students and has adverse effects on health, academic performance, energy, etc. Therefore, in order to reduce the dependence on mobile phone among students, officials should use solutions such as increasing scientific, cultural, research, and entertainment programs so that, even in their spare time, students use their mobile phones in a helpful way and increase their knowledge and awareness on the subject.

### Acknowledgments

The authors would like to thank all the researchers whose study results were used in this article and also all the people who cooperated in completing the questionnaire.

### Authors' Contribution

**Conceptualization:** Saeed Mirzaei, Mohammad Javad Akbarian.

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**Project administration:** Sadeh Dameyar.

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**Writing—original draft:** Sadeh Dameyar.

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### Competing Interests

The authors hereby declare that there was no conflict of interest regarding the present study.

### Ethical Approval

Regarding ethical considerations, verbal consent was obtained from all participants in the research, and they were assured that the questionnaires were anonymous and confidential and that the data were analyzed in groups. This research was approved by the Ethics Committee of Bam University of Medical Sciences with the ethical code IR.MUBAM.REC.1402.021.

### Funding

None.

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