

RESEARCH

Open Access



# Prevalence of sleep disturbances and its relationship with mobile phone overuse among an Iranian sample of students: a necessity for attention

Fatemeh Elahi<sup>1</sup>, Mahya Mojahedi<sup>2\*</sup> , Hamid Salehiniya<sup>3</sup> and Mohammad Reza Raeisoon<sup>4</sup>

## Abstract

**Background and objectives** Sleep disturbances are recognized as a potential core feature of some major psychiatric conditions, and overuse of mobile phones in recent years can leave potential negative effects on this central feature, which is especially important to assess among students. Our study aimed to investigate the prevalence of sleep disturbances and its relationship with mobile phone overuse among an Iranian sample of university students.

**Methods** After 406 Iranian students from the Birjand University of Medical Sciences completed the demographic data, Mobile Phone Problematic Use Scale (MPPUS), and Pittsburgh Sleep Quality Index (PSQI) questionnaires, data were analyzed using independent *t*-test, analysis of variance, and Pearson correlation coefficient.

**Results** 74.4% of individuals had a moderate to severe problem with their subjective sleep quality, and 33.7% had moderate to severe problems with delay in falling asleep. Additionally, 44.1% of individuals experienced mild to moderate problems in sleep duration, and most of them (97.3%) severely suffered from inadequate sleep efficiency. In terms of sleep disorders, 78.8% of individuals reported a mild problem. Furthermore, most individuals (81.3%) have not used sleep-inducing medications to fall asleep, and in terms of daily dysfunction, 75.57% individuals had mild to moderate problems. Additionally, a significant positive correlation of 0.244 was observed between the score of sleep disturbances and mobile phone overuse ( $P < 0.05$ ).

**Conclusions** The prevalence of sleep disturbances was quite considerable, and there was a significant positive relationship between excessive mobile phone use and sleep disturbances among the target group.

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

\*Correspondence:

Mahya Mojahedi  
mah.mojahedi@gmail.com

Full list of author information is available at the end of the article



© The Author(s) 2023. **Open Access** This article is licensed under a Creative Commons Attribution 4.0 International License, which permits use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons licence, and indicate if changes were made. The images or other third party material in this article are included in the article's Creative Commons licence, unless indicated otherwise in a credit line to the material. If material is not included in the article's Creative Commons licence and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder. To view a copy of this licence, visit <http://creativecommons.org/licenses/by/4.0/>.

## Introduction

Sleep disturbances are considered one of the most important psychiatric symptoms and disorders to the extent that they are now potentially considered as the centerpiece of psychopathology for many major psychiatric disorders such as mood [1], anxiety, and psychotic disorders [2]. Sleep disturbances can also cause cognitive impairments in affected individuals [3]. Additionally, they can directly and indirectly, by exacerbating other disorders, lead to a decline in personal and interpersonal performance and have negative impacts on the academic or professional status of individuals [4, 5].

Excessive mobile phone use is accompanied by various definitions. Sometimes, it is defined as mobile phone addiction [6], sometimes as problematic use of mobile phones [7], and sometimes as objective smartphone use [8]. Although there are different definitions of this concept, in any case, it refers to excessive use and the problems it causes for the individual and their relationships with others.

Among various social subgroups, perhaps one of the most vulnerable is students. Reasons for this may include their need to quickly search for various scientific data and review some texts and scientific references electronically by connecting their phones to Internet. On the other hand, with the growing prevalence of social networks and the creation of various virtual groups of students and non-students that exchange various scientific and non-scientific information, the tendency to create enjoyable, low-cost entertainments using various relevant applications among the large volume of their activities could provide other reasons for the vulnerability of this group.

So far, a considerable amount of studies have been conducted on mobile phone overuse and its relationship with psychological problems, many of which have shown various effects such as depression, anxiety, and more [9, 10].

Among these, an increasing number of studies have been conducted on students, and their results largely indicate undesirable relationships between excessive use of mobile phones and various psychological disorders [11, 12].

However, limited studies have been conducted in Iran on this topic, and to the best of our knowledge, no study has yet been published on the prevalence of sleep disturbances and their correlation with excessive mobile phone use among universities located in East Central Iran. Therefore, the aim of our study is to investigate these issues among students of the Birjand University of Medical Sciences, which is one of the most prominent universities in the East Central region of Iran.

## Methods

The study was conducted from 2020 to 2021. After obtaining informed consent, 406 students from the Birjand University of Medical Sciences were selected using convenience sampling. Then, the participants completed the demographic data, Pittsburgh Sleep Quality Index (PSQI), and Mobile Phone Problematic Use Scale (MPPUS) questionnaires.

Due to the COVID-19 pandemic and the necessity of social distancing, this research was conducted online. As a result, an electronic questionnaire was created, and the corresponding link was made available through various social media platforms, such as the Birjand University of Medical Sciences channel.

The inclusion criteria were being a student of the Birjand University of Medical Sciences and having informed consent to participate in the study. The exclusion criteria were suffering from a chronic physical or psychological illness, experiencing a recent adverse event (such as a death in the family), unwillingness to continue participating in the study, the submission of questionnaire with the same ID, incomplete questionnaires, and completion of the questionnaire in less than 5 min.

The demographic data included were age, sex, education level, and type of residence.

## Tools

### Pittsburgh Sleep Quality Index (PSQI) questionnaire

This questionnaire was developed in 1989. The questionnaire consists of 19 items, including 7 subscales: sleep quality, sleep latency, sleep duration, sleep efficiency, sleep disturbances, use of sleep medication, and daytime dysfunction. The items are rated on a four-point Likert scale ranging from 0 (no problem) to 3 (serious problem). Finally, the scores for each subscale are added together to obtain a total score ranging from 0 to 21. A global score of 5 or greater indicate poor sleep quality [13]. The Cronbach's alpha coefficient of the Persian version of this questionnaire was reported to be 0.79 [14].

### Mobile Phone Problematic Use Scale (MPPUS) questionnaire

This questionnaire consists of 23 questions divided into 4 components: individual performance, time management, self-control, and social relationships. The questionnaire uses a 5-point Likert scale ranging from strongly disagree (score 1) to strongly agree (score 5). The minimum total score on the questionnaire is 23, and the maximum is 115 [15]. The scores for each component are combined to calculate the mobile phone overuse score, which is the main variable of the research. Based on the overuse score, individuals are classified into three levels: scores between 23 and 46 indicate a mild overuse level, scores between

46 and 92 indicate a moderate overuse level, and scores above 92 indicate a severe overuse level. The Cronbach's alpha coefficient for this questionnaire was 0.92 [15].

**Statistical analysis**

Finally, the collected data were analyzed using the SPSS-16 software, with independent *t*-tests, analysis of variance (ANOVA), and Pearson correlation coefficient. Mean and standard deviation were reported for quantitative variables, while frequency and percentage were reported for qualitative variables. The significance level was set at 0.05.

**Result**

Overall, 406 individuals participated in this study. Table 1 shows the demographic findings of the participants. Most of the participants were female and aged between 20 and 25 years. The highest number of participants was at the medical pre-clerkship level, while the lowest number had a post-diploma degree. The number of individuals

who lived in dormitories was equal to those who lived off-campus.

Based on Table 1, the mean score of sleep disturbance in the age group of 26–30 was significantly higher than the age group of 20–25 (*p*-value < 0.001). The highest mean score of sleep disturbance and its relationship with educational level was also related to the medical internship, while the lowest mean score was related to the medical clerkship. There was no significant relationship between the mean score of sleep disturbance with gender and type of residence (*p*-value > 0.05).

According to Table 2, 74.4% of individuals had a moderate to severe problem with their subjective sleep quality, and 33.7% had moderate to severe problems with delay in falling asleep. Additionally, 44.1% of individuals experienced mild to moderate problems in sleep duration, and most of them (97.3%) severely suffered from inadequate sleep efficiency. In terms of sleep disorders, 78.8% of individuals reported a mild problem. Furthermore, most individuals (81.3%) have not used sleep-inducing medications to fall asleep, and in terms of daily dysfunction, 75.57% individuals had mild to moderate problems.

**Table 1** Frequency distribution of participants and comparison of the mean score of sleep disturbance and mobile phone overuse based on demographic data

Variables		Frequency (percentage)	Sleep disturbances score S.D ± mean	<i>p</i>
Age	20–25	302 (74.4)	13.59 ± 6.38	< 0.001
	26–30	104 (25.6)	16.38 ± 6.78	
Sex	Male	139 (34.2)	13.77 ± 6.63	0.24
	Female	267 (65.8)	14.59 ± 6.56	
Education level	Post-diploma	6 (1.5)	13.83 ± 5.94	0.015
	Bachelor's	94 (32.2)	14.68 ± 7.02	
	Master's	31 (7.6)	14.93 ± 8.13	
	Medical pre-clerkship	97 (23.9)	13.53 ± 5.77	
	Medical clerkship	90 (22.2)	12.77 ± 6.38	
	Medical internship	88 (21.7)	16.20 ± 6.25	
Type of residence	On-campus housing	197 (48.5)	14.04 ± 6.59	0.42
	Off-campus housing	209 (51.5)	14.56 ± 6.59	

**Table 2** Frequency distribution of sleep quality scales in participants

	Normal	Mild problem	Moderate problem	Severe problem
Subjective sleep quality	18 (4.4)	86 (21.2)	240 (59.1)	62 (15.3)
Delayed sleep onset	79 (19.5)	190 (46.80)	100 (24.6)	37 (9.1)
Sleep duration	208 (51.2)	123 (30.3)	56 (13.8)	19 (4.7)
Sleep efficacy	4 (1.0)	7 (1.7)	--	395 (97.3)
Sleep disorders	31 (7.6)	320 (78.8)	55 (13.5)	--
Use of sleep-inducing medications	330 (81.3)	56 (13.8)	12 (3.0)	8 (2.0)
Daily dysfunction	65 (16)	163 (40.1)	144 (35.47)	34 (8.4)

In terms of mobile phone overuse, 46 (9.8%) of the participants reported mild, 337(83%) reported moderate, and 23 (5.6%) reported severe overuse. The mean score of mobile phone overuse in the participants was reported to be  $66.90 \pm 17.13$ . The mean score in the personal performance domain was  $23.98 \pm 7.64$ , time management domain was  $18.31 \pm 5.46$ , self-control domain was  $11.62 \pm 3.62$ , and social relationships domain was  $12.97 \pm 3.10$ .

According to Table 3, a positive correlation of 0.244 was observed between the score of sleep disturbance and mobile phone overuse, which was significant. A significant relationship was observed between the score of sleep disturbance and mobile phone overuse in the domains of personal performance, time management, and self-control, but no significant relationship was observed between sleep disturbance and mobile phone overuse in the domain of social relationships.

**Discussion**

In line with our study, several studies from different countries demonstrated a significant prevalence of poor sleep quality among university students [4, 5, 16, 17], but the prevalence of sleep disturbances among the Iranian sample, students of the Birjand University of Medical Sciences, was considerably higher. This finding may be attributed to various factors, such as differences in methodology, cultural diversity, and the impact of the COVID-19 pandemic during our evaluation.

Consistent with some other studies, the prevalence of sleep disturbances varied significantly among certain demographic factors such as age [18] and educational level (internship level with night shifts vs. clerkship level without night shifts) [19]. But, according to our study, there were no significant differences between sleep disturbances and some other demographic factors, gender and type of residence, which was compatible with limited studies [20].

The findings of our study revealed that the majority of students had moderate mobile phone overuse which is in line with some other studies [21].

Compatible with some studies, a positive significant correlation was observed between the score of sleep disturbance and mobile phone overuse [22, 23].

We found a significant relationship between sleep disturbance and mobile phone overuse in the areas of personal performance, time management, and self-control. However, there was no significant relationship found between sleep disturbance and mobile phone overuse in the domain of social relationships. Since we were unable to find a study that specifically examines this issue, we can hypothesize that excessive involvement with mobile phones, which can also occur when using them in bed or before sleep, disrupts the sleep-wake pattern even more and causes more sleep disturbances throughout the day, leading to more problems in personal performance, time management, and self-control. However, conversely, a person who already has problems in these areas by excessive use of a mobile phone may end up having sleep and wake pattern disruptions and sleep quality problems. On the other hand, mobile phones can potentially increase social connections through virtual communication, and some consumers may even consider these virtual connections as good social relationships. This could lead to an underestimation of the negative effects of mobile phone use on social relationships by answering a self-reported questionnaire.

The limitations of this study included the use of self-reported questionnaires and conducting the study during the COVID-19 pandemic.

**Conclusion**

These findings highlight the importance of addressing sleep disturbances in university students, as they may contribute to the development of psychological symptoms and disorders, as well as academic difficulties. Moreover, excessive mobile phone use may act as a major

**Table 3** Correlation coefficient of sleep disturbance and mobile phone overuse

		Sleep	Mobile phone	Personal	Time	Self-management	Social interactions
Sleep	Correlation coefficient (p-value)	1	0.244 (<0.001)	0.206 (<0.001)	0.288 (<0.001)	0.237 (<0.001)	0.055 (0.26)
Mobile phone	Correlation coefficient (p-value)		1	0.927 (<0.001)	0.914 (<0.001)	0.823 (<0.001)	0.666 (<0.001)
Personal	Correlation coefficient (p-value)			1	0.799 (<0.001)	0.654 (<0.001)	0.483 (<0.001)
Time	Correlation coefficient (p-value)				1	0.703 (<0.001)	0.494 (<0.001)
Self-management	Correlation coefficient (p-value)					1	0.538 (<0.001)

catalyst in this regard. Therefore, it is recommended that students be informed about the prevalence of sleep disturbances, its adverse relationship with mobile phone use, and its potential correlation with psychologic and academic problems as well as the implementation of behavioral and cognitive interventions aimed at improving sleep quality.

#### Acknowledgements

We appreciate all individuals who help us with this study. Also, we appreciate vice chancellor of Birjand University of Medical Sciences for supporting this study.

#### Authors' contributions

M. M. conceived, designed, and drafted the study, F. E. participated in performing the study, H. S. performed the statistical analysis, and MR. R. collaborated in designing the study.

#### Funding

This study was extracted from a dissertation funded by vice chancellor of research, Birjand University of Medical Sciences, Iran.

#### Availability of data and materials

If requested by the referees and journal editor, the study data will be provided to them.

#### Declarations

##### Ethics approval and consent to participate

This study has been approved by the research ethics committee of Birjand University of Medical Sciences with the code of IR.BUMS.REC.1399.446.

##### Consent for publication

Not applicable.

##### Competing interests

The authors declare no competing interests.

##### Author details

<sup>1</sup>Student Research Committee, School of Medicine, Birjand University of Medical Sciences, Birjand, Iran. <sup>2</sup>Department of Psychiatry, School of Medicine, Birjand University of Medical Sciences, Birjand, Iran. <sup>3</sup>Epidemiology and Biostatistics Group, School of Public Health, Birjand University of Medical Sciences, Birjand, Iran. <sup>4</sup>Department of Community Medicine, School of Medicine, Birjand University of Medical Sciences, Birjand, Iran.

Received: 7 June 2023 Accepted: 2 August 2023

Published online: 20 October 2023

#### References

1. Baglioni C, Battagliese G, Feige B, Spiegelhalder K, Nissen C, Voderholzer U et al (2011) Insomnia as a predictor of depression: a meta-analytic evaluation of longitudinal epidemiological studies. *J Affect Disord* 135(1–3):10–19
2. Krystal AD (2012) Psychiatric disorders and sleep. *Neurol Clin* 30(4):1389–1413
3. Lo JC, Ong JL, Leong RL, Gooley JJ, Chee MW (2016) Cognitive performance, sleepiness, and mood in partially sleep deprived adolescents: the need for sleep study. *Sleep* 39(3):687–698
4. Osaigbovo O, Ogbolu E, Okeahialam B, Zoakah A (2023) Sleep disorder and its effect on academic performance of medical students in Jos, North Central Nigeria. *J Epidemiol Soc Niger* 6(1):53–66
5. Alhousseini NK, Ramadan M, Almasry Y, Atout M, Hamsho K et al (2020) Effects of Sleep Quality on Academic Performance and Psychological Distress Among Medical Students in Saudi Arabia. *Health Scope* 11(2):e123801. <https://doi.org/10.5812/jhealthscope-123801>
6. Panova T, Carbonell X (2018) Is smartphone addiction really an addiction? *J Behav Addict* 7(2):252–259
7. Oviedo-Trespalacios O, Nandavar S, Newton JDA, Demant D, Phillips JG (2019) Problematic Use of Mobile Phones in Australia... Is It Getting Worse? *Front Psychiatry* 10:105. <https://doi.org/10.3389/fpsy.2019.00105>
8. Elhai JD, Tiamiyu MF, Weeks JW, Levine JC, Picard KJ, Hall BJ (2018) Depression and emotion regulation predict objective smartphone use measured over one week. *Personality Individ Differ* 133:21–28
9. Elhai JD, Dvorak RD, Levine JC, Hall BJ (2017) Problematic smartphone use: a conceptual overview and systematic review of relations with anxiety and depression psychopathology. *J Affect Disord* 207:251–259
10. Demirci K, Akgönül M, Akpınar A (2015) Relationship of smartphone use severity with sleep quality, depression, and anxiety in university students. *J Behav Addict* 4(2):85–92
11. Aljomaa SS, Qudah MFA, Albursan IS, Bakhiet SF, Abduljabbar AS (2016) Smartphone addiction among university students in the light of some variables. *Comput Hum Behav* 61:155–164
12. Zhang C-h, Li G, Fan Z-y, Tang X-j, Zhang F (2021) Mobile phone addiction mediates the relationship between alexithymia and learning burnout in Chinese medical students: a structural equation model analysis. *Psychol Res Behav Manag* 14:455–65
13. Buysse DJ, Reynolds CF III, Monk TH, Berman SR, Kupfer DJ (1989) The Pittsburgh Sleep Quality Index: a new instrument for psychiatric practice and research. *Psychiatry Res* 28(2):193–213
14. Farrahi Moghaddam J, Nakhaee N, Sheibani V, Garrusi B, Amirakfi A (2012) Reliability and validity of the Persian version of the Pittsburgh Sleep Quality Index (PSQI-P). *Sleep and Breathing* 16:79–82
15. Khajehmadi M, Pooladi S, Bahreini M (2017) Design and assessment of psychometric properties of the addiction to mobile questionnaire based on social networks. *Iran J Psychiatric Nurs* 4(4):43–51
16. Sun Y, Wang H, Jin T, Qiu F, Wang X (2022) Prevalence of sleep problems among chinese medical students: a systematic review and meta-analysis. *Frontiers in Psychiatry* 13:753419. <https://doi.org/10.3389/fpsy.2022.753419>
17. Piro RS, Alhakem SSM, Azzez SS, Abdulah DM (2018) Prevalence of sleep disorders and their impact on academic performance in medical students/University of Duhok. *Sleep Biol Rhythms* 16:125–132
18. Dunn C, Goodman O, Szklo-Coxe M (2022) Sleep duration, sleep quality, excessive daytime sleepiness, and chronotype in university students in India: A systematic review. *J Health Soc Sci* 7(1):36–52. <https://doi.org/10.19204/2022/SLPD3>
19. Nojumi M, Ghalehbandi M, Kafashi S (2009) Sleep pattern in medical students and residents. *Arch Iran Med* 12(6):542–9
20. Saat N, Hanawi S, Chan K, Hanafiah H, Teh S, Aznan S, et al (2020) Sleep quality among university students: associations between demographic factors and physical activity level. *Int J Pharm Res Allied Sci* 9(3):57–65
21. Daei A, Ashrafi-Rizi H, Soleymani MR (2019) Nomophobia and health hazards: Smartphone use and addiction among university students. *Int J Prev Med* 10:202. [https://doi.org/10.4103/ijpvm.IJPVM\\_184\\_19](https://doi.org/10.4103/ijpvm.IJPVM_184_19)
22. Demir YP, Sümer MM (2019) Effects of smartphone overuse on headache, sleep and quality of life in migraine patients. *Neurosciences J* 24(2):115–121
23. Bazzazian S, Besharat M, Ehsan HB, Rajab A (2010) The moderating role of coping strategies in relationship between illness perception, quality of life and HbA1c in patients with type I diabetes. *Iran J Endocrinol Metab* 12(3):213–309

#### Publisher's Note

Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.