Relationship between Cellphone Overuse with Sleep Quality and Self-efficacy in Clinical Performance of Nurse and Midwifery Students

Abstract

Background: Identification of the factors related to students' academic success and clinical self-efficacy plays a significant role in their ability to provide independent patient care. The present study was conducted to investigate the relationship of cell phone overuse with sleep quality and self-efficacy in the clinical performance of nursing and midwifery students. **Materials and Methods:** This descriptive-correlational study was conducted on 211 nursing and midwifery students of Isfahan University of Medical Sciences in 2021–2022. Data collection tools included the Cell-Phone Over-Use Scale (COS), the Pittsburgh Sleep Quality Index (PSQI), and the Self-Efficacy in Clinical Performance (SECP). Data were analyzed using stata-16 software. **Results:** 28% of students had cellphone overuse and 63% had poor sleep quality and 17.10% had low self-efficacy in clinical performance. Students with cellphone overuse had higher levels of poor sleep quality compared to those with normal levels of cellphone use ($p < 0.05$). Moreover, those with poor sleep quality had lower self-efficacy for clinical performance ($p < 0.05$). **Conclusions:** Cell phone overuse can reduce self-efficacy in clinical performance by interfering with students' sleep quality. Thus, students should be trained to use cell phones more appropriately.

Keywords: *Cell phone, self-efficacy, sleep quality*

Arezoo Beiromvand[1], Shahnaz Kohan[2], Shadi Taghavian[1], Reza Beiranvand[3], Hanieh Amiri[4], Maryam Kianpour[5], Niko Sadeghi[6]

[1]Department of Midwifery and Reproductive Health, School of Nursing and Midwifery, Isfahan University of Medical Sciences, Isfahan, Iran, [2]Nursing and Midwifery Care Research Center, Faculty of Nursing and Midwifery, Isfahan University of Medical Sciences, Isfahan, Iran, [3]Department of Public Health, Khomein University of Medical Science, Khomein, Iran, [4]Department of Nursing, School of Nursing, Arak University of Medical Sciences, Arak, Iran, [5]Nursing and Midwifery Care Research Center, Faculty of Nursing and Midwifery, Isfahan University of Medical Sciences, Isfahan, Iran, [6]Department of Nursing School, Dezful University of Medical Sciences, Dezful, Iran

Introduction

Self-efficacy in clinical performance is the ability to organize and manage care independently and process-based.[1] Self-efficacy in clinical performance is synonymous with the style of clinical skill and provision of basic patient care, based on knowledge and experience in the framework of the stages of patient examination, planning, implementation, and assessment of care. Moreover, if self-efficacy is combined with clinical skills, students will be able to make more efficient decisions when faced with a patient.[2] In other words, clinical self-efficacy leads to competence and independent patient care. Increased self-efficacy in clinical performance improves students` performance in the clinic, and lack of attention to its improvement undoubtedly decreases the quality of care.[3] Given the critical role of medical students in improving the health and progress of the country, explaining the factors associated with their academic success is a significant research problem in higher education research.[4] Sleep quality and cellphone overuse are among the factors affecting the self-efficacy of medical students.[5]

Prolonged cell phone use before going to bed can directly reduce sleep time. Moreover, some cellphone users browse different websites before going to sleep, and the inappropriate content of these websites may cause tension and excitement in the person, leading to sleep disorders in these users. Additionally, cellphone overuse can affect the onset and release of melatonin through several physiological and psychological pathways[6] such as exposure to the light of cellphone screens, which in turn disturb the rhythm of sleeping and awakening.[7] Sleep quality consists of mental indicators related to the sleep experience, such as how satisfied you are with your sleep and how you feel when you wake up.[8] Decreased levels of melatonin have been reported in studies investigating the adverse effects of cell phones on human life. Biologically, melatonin is depleted

by exposure to electromagnetic fields and causes sleep disturbances.[6] Inadequate sleep, fragmented sleep, and waking up at the very beginning and end of sleep can seriously affect learning ability, academic performance, and neuro-behavioral function.[9]

Given the significance of self-efficacy in the clinical performance of students in ensuring the health of patients and promoting the health of society, The present study was conducted to investigate the relationship of cell phone overuse with sleep quality and self-efficacy in the clinical performance of nursing and midwifery students.

Materials and Methods

The data for this descriptive-correlational study were collected from October 2021 to July 2022. The study sample, with a confidence level of 95% and a power of 80%, consisted of 211 undergraduate nursing and midwifery students in the 7th and 8th semesters, selected by convenience sampling. Inclusion criteria were the consent of the participants for participating in the study, (7th and 8th semester), no use of sleeping pills, no use of medication for psychological disorders such as depression and anxiety, and having a cellphone for more than 6 months. The data collection tools included three questionnaires Cell-Phone Over-Use Scale (COS), Pittsburgh Sleep Quality Index (PSQI), and Self-efficacy in Clinical Performance Scale (SECP), which were completed by the students as self-reports. The Cell Phone Overuse Scale (COS) was developed by Genaro *et al*.[10] It consists of 21 questions without any subscales, based on a 6-point Likert scale (never = 1, almost never = 2, sometimes = 3, often = 4, almost always = 5, and always = 6), and a higher score indicates more cellphone overuse. Those who scored above 75 were considered to be overusing, while moderate users scored between 26 and 75, and normal users scored 25 or less. The reliability of this questionnaire (Cronbach's alpha) was reported to be 0.87 on male and female Spanish students. The validity of the scale was calculated as 0.71. Moreover, the reliability of this tool was calculated in the study of Hashemi *et al*.[11] to be 0.88 based on the internal consistency coefficient.

The Pittsburgh Sleep Quality Index (PSQI) examines a person's sleep quality from their own perspective over the past 4 weeks. This questionnaire consists of 18 questions in seven subscales: subjective sleep quality (question 18), sleep latency (total scores of questions 2 and 6), sleep duration (question 4), sleep efficiency and sleep disturbances (total scores of questions 6 to 15), use of sleep medication (question 15), and daytime dysfunction (total scores of questions 16 and 17). This gives an overall score for sleep quality, with a score of ≤5 indicating good sleep quality and a score greater than 5 indicating poor sleep quality. The score of each subscale ranges from 0 to 3, indicating the normal, moderate, and severe situation, respectively. The validity and reliability of this questionnaire in previous studies were obtained to be 0.86 and 0.89,

respectively.[12] In the research conducted by Shadzi *et al*.,[13] the reliability of the scale was relatively high and its Cronbach's alpha coefficient was reported to be 0.70.

The Self-efficacy in Clinical Performance Scale was made by Cheraghi *et al*.[14] (2017). The final scale consists of four dimensions (assessment, diagnosis/planning, implementation, evaluation) and has a 5-point Likert scale with 37 items. The total score of the tool can be divided into three categories weak (37-92.5), medium (92.6-138.75), and optimal (138.6-185). The internal reliability of the total scale was alpha = 0.96 and the Cronbach's alpha of the dimensions ranged from 0.90 to 0.92. It should be noted that this standard questionnaire has been used in studies not only for the population of nurses but also for midwives.[15]

The data were analyzed using Stata-16 software. For data analysis, first, total sleep quality in two ways (a score of ≤5 is indicative of good sleep quality and a score of >5 indicates poor sleep quality), subscales of sleep quality (subjective sleep quality, sleep latency, sleep duration, sleep efficiency, sleep disturbances, use of sleep medications, and daytime dysfunction), self-efficacy in clinical performance and the main exposure of the study, the level of cellphone use (normal, moderate, and overuse) were adjusted ordinally. Logistic regression and ordinal logistic regression as well as estimation of odds ratio and cumulative odds ratio were used to examine the relationship of cellphone level of use with total sleep quality and sleep quality subscales. Ordinal logistic regression was also used to examine the relationship between overall sleep quality and clinical performance self-efficacy. To control for the confounding effect of baseline characteristics, each of these variables was included separately in the regression models and the measurement of the relationship with total sleep quality and sleep quality subscales. If there was a significant relationship, the variable was included in the models examining the relationship of cellphone use level with overall sleep quality and sleep quality subscales. The analyses were conducted at a significance level of 0.05.

Ethical considerations

After the approval of the proposal in the Research Council and the approval of the study in the Ethics Committee with the number IR.MUI.NUREMA.REC.1400.128, a letter of introduction was obtained to conduct the study in the related research environment. For data collection, the researchers went among the students and introduced themselves. Then, by explaining the goals of the research and the methods of conducting it, as well as each student's role in it, the researchers obtained the students' written consent to cooperate and participate in the research.

Results

The mean age of the students was 22.86 (2.12) years and other demographic information of the participants is shown in Table 1. Based on the results, 63% of the

Table 1: The status of the baseline characteristics of the participants

Baseline characteristics	Number (percent)	95% Confidence Interval	
		Lower bound	Upper bound
Gender			
Male	77 (36.49%)	30.23%	43.32%
Female	134 (63.51%)	56.76%	69.76%
Marital status			
Single	160 (75.82%)	69.55%	81.15%
Married	51 (24.18%)	18.84%	30.44%
Live in dormitory			
Yes	135 (63.98%)	57.24%	70.20%
No	76 (36.02%)	59.79%	42.75%
Being employed			
Yes	70 (33.17%)	27.12%	39.84%
No	140 (66.83%)	60.15%	72.87%
Semester			
Seven	98 (46.44%)	39.78%	53.23%
Eight	113 (53.56%)	46.76%	60.21%
The field of study			
Midwifery	47 (22.3%)	17.13%	28.42%
Nurse	164 (77.70%)	71.57%	82.86%
Interested in their field of study			
Without	6 (2.80%)	1.27%	6.21%
Little	30 (14.20%)	10.10%	19.64%
Moderate	146 (69.20%)	62.60%	75.08%
High	29 (13.70%)	9.70%	19.11%
Age:mean (Standard Deviation)	22.86 (2.12)	22.57	23.15

Table 2: The status of sleep quality, Mobile usage levels, and self-efficacy in clinical performance

Variable	Number (Percent)	95% Confidence Interval	
		Lower Bound	Upper Bound
Total sleep quality			
Good quality	78 (37)	0.30	0.43
Poor quality	133 (63)	0.56	0.69
Subjective sleep quality			
Very good	22 (10.40)	0.06	0.14
Relatively good	89 (42.20)	0.35	0.48
Relatively bad	64 (30.30)	0.24	0.36
Very bad	36 (17.10)	0.11	0.22
Sleep latency			
0 hours	56 (26.50)	0.20	0.32
1 hours	82 (38.90)	0.32	0.45
2 hours	55 (26.10)	0.20	0.32
3 hours	18 (8.50)	0.04	0.12
Sleep duration			
>7 hours	33 (15.60)	0.10	0.20
6–7 hours	104 (49.30)	0.42	0.56
5–6 hours	51 (24.20)	0.18	0.29
<5 hours	23 (10.90)	0.06	0.15
Sleep efficiency			
>85%	66 (31.30)	0.24	0.37
75–84%	97 (46)	0.39	0.52
65–74%	33 (15.60)	0.10	0.20
<65%	15 (7.10)	0.03	0.10
Sleep disturbances			
Does not have	42 (19.90)	0.14	0.25
Mild	102 (48.3)	0.41	0.55
Moderate	50 (23.70)	0.17	0.29
Severe	17 (8.10)	0.04	0.11
Use of sleep medications			
Never	138 (65.40)	0.58	0.71
Less than once a week	36 (17.10)	0.11	0.22
Once or twice a week	17 (8.10)	0.04	0.11
≥3 times a week	20 (9.50)	0.05	0.13
Day time dysfunction			
Does not have	60 (28.40)	0.22	0.34
Mild	96 (45.50)	0.38	0.52
Moderate	41 (19.40)	0.14	0.24
Severe	14 (6.60)	0.03	0.10
Mobile usage levels			
Normal	33 (15.60)	0.10	0.20
Moderate	119 (56.60)	0.49	0.63
Over	59 (28)	0.21	0.34
Self-efficacy in clinical performance			
Weak	36 (17.10)	0.11	0.22
Medium	82 (38.90)	0.32	0.45
Optimal	93 (44.10)	0.37	0.50

participants had poor sleep quality. In the evaluation of the sleep quality subscales, it was found that 17.10% had very poor subjective sleep quality, 8.5% had more than 3 hours of sleep latency, 10.90% of the participants slept less than 5 hours, 7.10% of them sleep efficiency was lower than 65%, 8.10% suffered from severe sleep disturbances, and 9.5% reported using sleep medication more than three times a week. Additionally, 28% had cellphone overuse and 17.10% had low self-efficacy in clinical performance [Table 2].

Investigating the relationship between the level of cellphone overuse and sleep quality and its subscales, the results showed that the subjects with cellphone overuse had a higher chance of having a lower subjective sleep quality (OR = 2.31, 95% CI = 1.04, 5.14, $p < 0.039$), longer sleep latency (OR = 6.84, 95% CI = 2.83, 16.52, $p < 0.001$), shorter sleep duration (OR = 5.36, 95% CI = 2.18, 13.17, $p < 0.001$), lower sleep efficiency (OR = 5.94, 95% CI = 2.42, 14.61, $p < 0.001$), more sleep disturbances (OR = 4.60, 95% CI = 1.91, 11.03, $p < 0.001$), more use of sleep medications (OR = 2.91, 95% CI = 1.13, 7.52, $p < 0.027$), more daytime dysfunction (OR = 4.66, 95% CI = 2.03, 10.72, $p < 0.001$), and also lower total sleep quality (OR = 2.85, 95% CI = 1.17, 6.96, $p < 0.021$), compared to the subjects with a normal level of cellphone use [Table 3]. Examining the relationship between sleep

Table 3: Relationship between mobile over use and subscales of sleep quality

Subscale of sleep quality	OR*	95% CI**	*p***
Subjective sleep quality	OR=2.31, 95% CI=1.04, 5.14, *p*<0.039		
Sleep latency	OR=6.84, 95% CI=2.83, 16.52, *p*<0.001		
Sleep duration	OR=5.36, 95% CI=2.18, 13.17, *p*<0.001		
Sleep efficiency	OR=5.94, 95% CI=2.42, 14.61, *p*<0.001		
Sleep disturbances	OR=4.60, 95% CI=1.91, 11.03, *p*<0.001		
Use of sleep medications	OR=2.91, 95% CI=1.13, 7.52, *p*<0.027		
Day time dysfunction	OR=4.66, 95% CI=2.03, 10.72, *p*<0.001		
Total sleep quality	OR=2.85, 95% CI=1.17, 6.96, *p*<0.021		

*Cumulative Odds Ratio (Regarding the subjective sleep quality adjusted for marital status, the sleep duration adjusted for the academic semester, the sleep efficiency adjusted for the type of residence, the sleep disturbances adjusted for gender and type of residence). **Confidence Interval. ***p-Value for Ordinal Logistic Regression

quality and students` self-efficacy in clinical performance, the results indicated that the subjects with poor sleep quality had a lower chance of having optimal self-efficacy in clinical performance, and this relationship was statistically significant (OR = 0.26, 95% CI = 0.14, 0.45, p < 0.001).

Discussion

The present study was conducted to investigate the relationship of cellphone overuse with sleep quality and self-efficacy in the clinical performance of nursing and midwifery students. Based on the results of the present study, 28% had cellphone overuse and 63% had poor sleep quality, and a significant relationship was observed between the level of cellphone use and the total and all subscales of sleep quality of the students. Similar to our results, in the study of Mohammadbeigi *et al*.,[16] the prevalence of cellphone overuse and the prevalence of sleep disturbance among the medical students of Qom University were 30.70% and 33.70%, respectively, and the results of the study revealed that excessive use of mobile phones leads to poor sleep quantity and quality. Figueiro found that short-wave light from cell phones can cause sleep disturbances by suppressing or delaying the onset of melatonin release. Looking at a mobile phone screen before going to bed affects the user's brain and leads to daytime dysfunction by negatively affecting their latent sleep.[17] Li *et al*.[18] found a significant correlation between excessive cell phone use, sleep quality, anxiety, and depression in their meta-analysis study. If people use their cell phones excessively during the night, they may keep them next to their bed and the reflex reaction to the sound of the phone may reduce their sleep quality. Excessive engagement with cell phones, such as texting late at night, is inconsistent with sleep quality recommendations.[19] Shrivastava *et al*.[20] found a significant relationship between the hours of cellphone use and sleep disturbances in both sexes; however, the time of cellphone use was not significantly correlated with sleep duration, sleep efficiency, sleep latency, and daytime dysfunction. The reason is that individual differences in the duration of sleep people get are an important factor.[21]

Based on other results of the present study, 17.10% reported poor self-efficacy in clinical performance, and there was a significant relationship between students' self-efficacy in clinical performance and their sleep quality. In other words, students with poor sleep quality are less likely to have optimal clinical performance self-efficacy. In this regard, Rathakrishnan *et al*.[22] investigated the effect of sleep quality on the academic performance of Malaysian students and found that lower sleep quality can lead to lower academic performance of students. Shrivastava and Saxena Singh found in their research that cellphone use for more than two hours during the day can cause sleep deprivation and daytime sleepiness in medical students by affecting their cognitive and learning abilities.[20] Thus, students' academic and educational activities may affect sleep quality, and on the other hand, poor sleep quality may be associated with lower academic performance among students.[21] However, according to a study by Khonya *et al*.[21] (2016), there was no statistically significant difference in sleep duration between students with good, average, and limited academic performance. There were limitations to this study, including the inability to control for the role of cultural, family, and mental health factors in the amount of cell phone use, and inadequate control of other variables associated with poor sleep quality such as anxiety, and the lack of assessment of the content browsed on the phone before going to sleep, which could affect sleep quality. As such, it is recommended that future researchers use other tools such as interviews in their studies and pay attention to variables such as cultural, family, and mental health factors.

Conclusion

Based on the results of the present study, cell phone overuse is a strong risk factor that negatively affects the sleep quality of students, and poor sleep quality, in turn, can reduce students' clinical performance self-efficacy. Thus, in order to reduce the negative effects of cellphone overuse on the sleep quality of students and increase their clinical performance self-efficacy, we need to inform students about the negative effects of cellphone overuse. Moreover, educational planners should have more control in this regard.

References

1. Pourteimour S, Yaghmaei S, Ghorbani R. Comparison of the effects of smartphone-based applications and inquiry-based learning on self-efficacy in clinical performance of undergraduate nursing students in the neonatal intensive care unit. J Med Edu Dev 2024;17:9-17.

2. Pourteimour S, Jamshidi H, Parizad N. Clinical belongingness and its relationship with clinical self-efficacy among nursing students: A descriptive correlational study. Nurs Midwifery Stud 2021;10:47-51.

3. Goroshati N, Mousavi P, Cheraghian B, Abbaspoor Z. Research paper comparison of the self-efficacy of clinical performance of midwife and non-midwife healthcare workers in health centers of Ahvaz, Iran. Jundishapur Sci Med J 2024;22:565-73.

4. Fazlali M, Farshidi F. The study of cell phone use and its relationship with sleep quality and academic performance of high school students. Info Commun Technol Educ Sci 2016;6:5-21.

5. Mayrhofer M, Matthes J, Einwiller S, Naderer B. User generated content presenting brands on social media increases young adults' purchase intention. Int J Advert 2020;39:166-86.

6. Joshi SC, Woodward J, Woltering S. Nighttime cell phone use and sleep quality in young adults. Sleep Biol Rhythms 2021;20:97-106.

7. Liu S, Wing YK, Hao Y, Li W, Zhang J, Zhang B. The associations of long-time mobile phone use with sleep disturbances and mental distress in technical college students: A prospective cohort study. Sleep 2019;42. doi: 10.1093/sleep/zsy213.

8. Fabbri M, Beracci A, Martoni M, Meneo D, Tonetti L, Natale V. Measuring subjective sleep quality: A review. Int J Environ Res Public Health 2021;18:1082.

9. Mohamadi E, Bana Derakshan H, Borhani F, Hoseinabadi Farahani M, Hoseingholi P, Naderi Ravesh N. Relationship between nursing students' achievement motivation and self-efficacy of clinical performance. Iran J Nurs 2014;27:33-43.

10. Genaro C, Flores N, Gómez-Vela M, González-Gil F, Caballo C. Problematic internet and cell-phone use: Psychological, behavioral, and health correlates. Addict Res Theory 2007;15:309-20.

11. Hashemi S, Ghazanfari F, Ebrahimzadeh F, Ghavi S, Badrizadeh A. Investigate the relationship between cell-phone over-use scale with depression, anxiety and stress among university students. BMC Psychiatry 2022;22:755.

12. Buysse DJ, Reynolds CF III, Monk TH, Berman SR, Kupfer DJ. The pittsburgh sleep quality index: A new instrument for psychiatric practice and research. Psychiatry Res 1989;28:193-213.

13. Shadzi MR, Rahmanian M, Heydari A, Salehi A. Structural validity of the Pittsburgh sleep quality index among medical students in Iran. Sci Rep 2024;14:1538.

14. Cheraghi F, Hassani P, Yaghmaei F, Alavi-Majed H. Developing a valid and reliable self-efficacy in clinical performance scale. Int Nurs Rev 2009;56:214-21.

15. Rezaei F, Golmakani N, Mazloum SR. Relationship between spiritual intelligence and self-efficacy of clinical performance in midwives working in maternity and health centers of Mashhad in 2015. Iran J Obstet Gynecol Infertil 2016;19:1-10.

16. Mohammadbeigi A, Valizadeh F, Saadati M, Sharifimoghadam S, Ahmadi A, Mokhtari M, *et al*. Sleep quality in medical students; the impact of over-use of mobile cell-phone and social networks. J Res Health Sci 2016;16:46-50.

17. Figueiro MG, Wood B, Plitnick B, Rea MS. The impact of light from computer monitors on melatonin levels in college students. Neuroendocrinol Lett 2011;32:158-63.

18. Li Y, Li G, Liu L, Wu H. Correlations between mobile phone addiction and anxiety, depression, impulsivity, and poor sleep quality among college students: A systematic review and meta-analysis. J Behav Addict 2020;9:551-71.

19. White AG, Buboltz W, Igou F. Mobile phone use and sleep quality and length in college students. Int J Humanit Soc Sci 2011;1:51-8.

20. Shrivastava A, Saxena Y. Effect of mobile usage on serum melatonin levels among medical students. Indian J Physiol Pharmacol 2014;58:395-9.

21. Khonya Y, Karimi N, Raofi MB, Mohagheghi A. Comparison of sleep quality index and subscales (sleep latency, sleep duration and sleep efficacy) among students at good, average and limited academic performance at Tabriz university of medical sciences. Educ Dev Judishapur 2016;7:204-13.

22. Rathakrishnan B, Bikar Singh SS, Kamaluddin MR, Yahaya A, Mohd Nasir MA, Ibrahim F, *et al*. Smartphone addiction and sleep quality on academic performance of university students: An exploratory research. Int J Environ Res Public Healt 2021;18:8291.