ORIGINAL ARTICLE

Patterns of Bedtime Screen Use and Sleep Quality Among Future Healthcare Professionals: A Cross-Sectional study

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Abstract

Background: Bedtime screen use (BSU) has become pervasive among young adults, particularly students in health-related fields which contributes to poor sleep quality. **Objective:** To determine the prevalence of BSU and its association with sleep quality among medical and paramedical students in Puducherry. **Methods:** A cross-sectional study was conducted from February-April 2025 among 611 medical and paramedical students at a private university in Puducherry. The questionnaire included questions related to BSU and Sleep Quality (PSQI). Data was analyzed using SPSS v24. **Results:** BSU was reported in 83.5% of students, with smartphones being the predominant device (91.2%). Among them, females were more likely to engage in BSU. Students from dental and residing off-campus away from family had three- and eight-times higher odds of BSU, respectively. While medical and AHS students had significantly higher odds of poor sleep quality. Students residing off-campus away from family were nearly three times more likely to have poor sleep quality. BSU was associated with longer sleep latency, shorter sleep duration, daytime dysfunction, and higher global PSQI scores ($p<0.05$). **Conclusion:** BSU is highly prevalent among future healthcare professionals and associated with impaired sleep quality.

Keywords

Bedtime Screen Use, Sleep Quality, Healthcare Professionals, Puducherry, Students

Introduction

Bedtime screen use has become increasingly prevalent among young adults, affecting their sleep patterns and overall well-being (1). Blue light emitted from electronic devices suppresses melatonin production and disrupts circadian rhythms (2). Prolonged evening screen exposure is consistently linked with delayed sleep onset and poor sleep quality (3).

Among health professionals, the pervasive bedtime screen usage is particularly concerning. In Morocco, 97% of medical and pharmacy students reported bedtime screen use, and around 35% experienced poor sleep quality (PSQI > 5) (4). Similar patterns were observed in Indian study conducted by Krishnan et al (5). At Al-Azhar University in Cairo, 96.5% of medical students used smartphones at bedtime, with roughly two-thirds classified as poor sleepers (6). Another Indian study conducted in Manipur found that 95.8% of students engaged in gadget use before sleeping, and about 55.5% reported impaired sleep quality (7).

Despite these insights from various regions, there is limited evidence focusing specifically on medical and paramedical students in Puducherry, a relatively small region with a high concentration of healthcare facilities and medical institutions (8). Understanding the prevalence of bedtime screen use and its impact on sleep quality in this population is essential, as healthcare professionals face demanding schedules and high stress, amplifying the consequences of poor sleep. With this background, this study aimed to determine the prevalence of bedtime screen use among medical and paramedical students in Puducherry.

Material & Methods

Study design, setting, population & duration: A cross-sectional survey was carried out for a period of three months from February to April 2025 among medical and paramedical students of a private deemed to be University in Puducherry. The medical and paramedical (dental, nursing and allied health science) students aged

18 to 25 years who were willing to participate and consented for the study were included. The study excluded students with any comorbidities, chronic illness and on any medications.

Sample size & sampling technique: Considering the prevalence of poor sleep problem after using the smartphone was 63.39% from the study done by Chatterjee S et al, among medical students in North India (9). With absolute precision of 5%, design effect of 1.5, with 95% confidence interval (CI), the sample size was calculated using the formula recommended in the "WHO manual for sample size determination in health studies" (10). $n = \frac{[DEFF \times Np(1-p)]}{((d^2 / Z_{(1-\propto/2)^2} * (N-1) + p * (1-p))}$ where p = 63.39; q = (1-p) 100-63.39 = 36.61; $Z_{(1-a/2)}$ = 1.96; d = 5; DEFF =1.5. 535. Considering nonresponse rate of 10%, the sample size was inflated to 588.5 and finally rounded off to the nearest high figure of 590 students, yet we attained 611 students. Convenient sampling was employed to collect data from the study subjects.

Data collection: A pre-tested, face-validated, self-administered, semi-structured questionnaire was used for data collection using google forms. The questionnaire comprised of three sections with first section included the socio-demographic profile, the second section captured bedtime screen use, and the third section covered the PSQI which is a standardized tool for assessing the sleep quality under various domains with a Cronbach's score of 0.83 (11).

Statistical analysis: The captured data was exported into MS excel 2021 version and analysis was performed using standard software Statistical Package for the Social Sciences (SPSS) (v24.0; IBM Corp, Armonk, New York) software. The data was presented in the form of frequency and percentages for qualitative variables and mean±SD (standard deviation) for quantitative variables. Appropriate tests of significance were used to find out the association depending on the nature and distribution of variables like Chi-square test or Fisher's exact test for categorical variables and Mann-Whitney U test for numerical variables. Multivariable logistic regression analysis has been applied to determine the predictors for poor sleep quality. The p-value <0.05 was considered to be statistically significant.

Ethical consideration: This study was approved by the Institutional Review Board (IRB) of Mahatma Gandhi Medical College and Research Institute (IRB No: MGMCRI/2024/05/04/IHEC/25), and the requirement for informed consent was obtained.

RESULTS

This study aimed to determine the prevalence of bedtime screen use among medical and paramedical students aged 18–25 years in Puducherry and to assess its association with sleep quality in this population.

The study subjects had a mean age of 18.9 ± 1.39 years. Majority of the participants were aged below 20 years, 534 (87.4%). Of the 611 respondents, two-third population were female 402 (65.8%). The students were from various academic majors, with medical students constituting nearly one-third 188 (30.8%) of the study participants. Over half of the participants, 333 (54.5%), resided in hostels. The socioeconomic status, classified according to the Modified B.G. Prasad scale (12). showed that around two-thirds of the students 384 (62.9%) belonged to upper class families that around. Table 1 indicates the socio-demographic profile of the study participants.

Table 2 illustrates the patterns of bedtime screen use. Among the 611 study participants, a large proportion of students, 510 (83.5%) reported bedtime screen usage, while only 101 (16.5%) refrained from such use. Among those 510 bedtime screen users, smartphones were the predominant device 465 (91.2%) used. Regarding the frequency of bedtime screen use, one-third of the respondents 180 (35.3%) used screens on 1–2 nights in the last week. The most common bedtime screening activity was listening to music 146 (28.6%).

Table 3 gives the predictors of bedtime screen use among study participants. Gender was found to be a significant predictor. Males were significantly less likely to engage in bedtime screen use compared to females (aOR (adjusted odds ratio) = 0.55, 95% CI (confidence interval): 0.34–0.89, p 0.015). Studying major emerged as an important determinant. Compared to nursing students, those from medical (aOR = 2.60, 95% CI: 1.18–5.72, p 0.017), dental (aOR = 3.19, 95% CI: 1.39–7.32, p 0.006), and allied health sciences (aOR = 0.52, 95% CI: 0.28–0.99, p 0.049) showed significant differences. Students residing off-campus away from family were more than eight times as likely to use screens at bedtime compared to those living with family (aOR = 8.53, 95% CI: 1.96–37.13, p 0.004).

The predicators of poor sleep quality have been shown in table 4. Study major and type of residence emerged as significant predictors. Compared to nursing students, medical students had about twice the odds of poor sleep quality (aOR = 2.10, 95% CI: 1.16–3.81, p 0.0149), and allied health sciences (AHS) students also had significantly higher odds (aOR = 1.97, 95% CI: 1.13–3.43, p 0.016). Residence off-campus away from family was associated with nearly a threefold increase in the odds of poor sleep quality compared to living with family (aOR = 2.84, 95% CI: 1.48–5.43, p 0.0016). The unadjusted analysis showed that using electronic devices in bed was associated with poor sleep quality (OR = 1.643, p 0.034), although this association became borderline non-significant after adjusting for other factors (OR = 1.613, p 0.0573).

Table 5 presents the association between bedtime screen use and different components of the PSQI among study participants. Students who reported bedtime screen use showed longer mean sleep latency (0.96 ± 0.83 vs. 0.74 ± 0.80; *p* 0.0125), shorter sleep duration (0.96 ± 1.01 vs. 0.61 ± 0.80; *p* 0.0029), greater daytime dysfunction (0.82 ± 0.82 vs. 0.57 ± 0.75; *p* 0.0027), and more frequent sleep disturbances (1.03 ± 0.62 vs. 0.87 ± 0.70; *p* 0.0268).

Table 1: Socio-demographic characteristics of study subjects (N = 611)

Variable	Result n (%)
Gender	
Female	402 (65.8)
Male	209 (34.2)
Age group (in years)	
Below 20	534 (87.4)
21 – 25	77 (12.6)

Variable	Result n (%)
Study Major	
Allied Health Sciences (AHS)	134 (21.9)
Dental	135 (22.1)
Medical	188 (30.8)
Nursing	154 (25.2)
Type of Residence	
Hostel	333 (54.5)
Off campus away from family	57 (9.3)
With family	221 (36.2)
Socioeconomic Status (SES) (Modified B.G. Prasad's scale)	
Upper class (I)	384 (62.9)
Upper middle class (II)	76 (12.4)
Middle class (III)	64 (10.5)
Lower middle class (IV)	71 (11.6)
Lower class (V)	16 (2.6)

Table 1: Patterns of bedtime screen use

Variables	Results n (%)
Bedtime screen use	
Yes	510 (83.5)
No	101 (16.5)
Type of device used during bedtime (n = 510)	
Smartphone	465 (91.2)
Television	16 (3.1)
Tablets	18 (3.5)
Laptops	10 (2.0)
Video game desktop	1 (0.2)
Frequency of bedtime screen use in the past one week (n = 510)	
0 nights	35 (6.9)
1-2 nights	180 (35.3)
3-4 nights	118 (23.1)
5-7 nights	177 (34.7)
Type of activity engaged during bedtime screen use (n = 510)	
Listening to music	146 (28.6)
Watching movies/series	123 (24.1)
Social media scrolling	111 (21.8)
Talking over phone/ Chatting or Texting	42 (8.2)
Gaming	31 (6.1)
General internet surfing	25 (4.9)
Reading books/ Browsing related to academics	22 (4.3)
Clicking picture/ Making reels	8 (1.6)
Online shopping	2 (0.4)

Table 3: Predictors of bedtime screen use among study subjects

Variables	Bedtime screening		OR (CI)	p-value	aOR (CI)	p-value
	Yes (n = 510)	No (n = 101)				
Gender						
Male	169 (33.1)	40 (39.6)	0.755 (0.487-1.172)	0.210	0.554 (0.339-0.891)	0.015*
Female	341 (66.9)	61 (60.4)	Ref		Ref	
Age (years)						
<20	443 (86.9)	91 (90.1)	0.726 (0.360-1.465)	0.371	0.910 (0.416-1.988)	0.813
21-25	67 (13.1)	10 (9.9)	Ref		Ref	
Socio-economic Status (SES)						
I	317 (62.2)	67 (66.3)	0.675 (0.150-3.044)	0.766	0.470 (0.093-2.361)	0.359
II	67 (13.1)	9 (8.9)	1.063 (0.207-5.465)	0.900	1.203 (0.213-6.795)	0.834
III	54 (10.6)	10 (9.9)	0.771 (0.151-3.929)	0.805	0.899 (0.162-4.994)	0.904
IV	58 (11.4)	13 (12.9)	0.637 (0.128-3.153)	0.627	0.744 (0.136-4.068)	0.734
V	14 (2.7)	2 (2.0)	Ref		Ref	
Study Major						
Medical	163 (32.0)	25 (24.8)	2.677 (1.525-4.696)	< 0.001#	2.602 (1.183-5.720)	0.017*
Dental	123 (24.1)	12 (11.9)	4.208 (2.089-8.475)	< 0.001#	3.192 (1.391-7.321)	0.006*
AHS	129 (25.3)	25 (24.8)	2.118 (1.201-3.737)	0.009#	0.523 (0.278-0.999)	0.049*
Nursing	95 (18.6)	39 (38.6)	Ref		Ref	
Type of Residence						
Hostel	281 (55.1)	52 (51.5)	1.463 (0.942- 2.261)	0.005#	0.854 (0.495-1.470)	0.569
OCAF^	55 (10.8)	2 (2.0)	7.428 (1.747-31.581)	0.001#	8.533 (1.961-37.134)	0.004*
With family	174 (34.1)	47 (46.5)	Ref		Ref	

*#Chi-square test and *Multivariable Logistic Regression were applied; p-value < 0.05 has been considered statistically significant. ^OCAF – Off campus away from family; AHS – Allied health science; OR – odd's ratio; aOR – adjusted odd's ratio; CI – confidence interval. SES based on Modified B.G. Prasad scale.*

Table 4: Predictors of poor sleep quality among study subjects

Variables	Sleep quality		OR (CI)	p-value	aOR (CI)	p-value
	Poor (n = 239)	Good (n = 372)				
Gender						
Male	82 (34.3)	127 (34.1)	1.000 (0.721-1.420)	0.967	0.844(0.579-1.231)	0.379

Female	157 (65.7)	245 (65.9)	Ref		Ref	
Age (years)						
< 20	214 (89.5)	320 (86.0)	1.391 (0.840-2.317)	0.201	1.032 (0.583-1.834)	0.915
21-25	25 (10.5)	52 (14.0)	Ref		Ref	
Socioeconomic Status (SES)						
I	176 (73.6)	208 (55.9)	2.538 (0.804-8.012)	<0.001#	3.211 (0.962-10.741)	0.058
II	22 (9.2)	54 (4.5)	1.222 (0.355-4.204)	0.780	1.795 (0.494-6.520)	0.374
III	21 (8.8)	43 (11.6)	1.465 (0.421-5.093)	0.574	2.085 (0.573-7.621)	0.267
IV	16 (6.7)	55 (14.8)	0.872 (0.247-3.080)	0.816	1.448 (0.393-5.412)	0.582
V	4 (1.7)	12 (3.2)	Ref		Ref	
Study Major						
Medical	94 (39.3)	94 (25.3)	2.851 (1.799-4.514)	<0.001#	2.099 (1.161-3.812)	0.015*
Dental	52 (21.8)	83 (22.3)	1.786 (1.083-2.943)	0.023#	1.413 (0.791-2.531)	0.246
AHS	53 (22.2)	81 (21.8)	1.865 (1.132-3.073)	0.014#	1.968 (1.131-3.432)	0.016*
Nursing	40 (16.7)	114 (30.7)	Ref		Ref	
Type of Residence						
Hostel	141 (59.0)	192 (51.6)	1.686 (1.178-2.463)	<0.001#	1.196 (0.775-1.841)	0.4216
OCAF^	31 (13.0)	26 (7.0)	2.741 (1.512-4.968)	<0.001#	2.839 (1.481-5.432)	0.002*
With family	67 (28.0)	154 (41.4)	Ref		Ref	
Bed time screen use						
Yes	209 (87.5)	301 (80.9)	1.643 (1.041-2.613)	0.034#	1.613 (0.990-2.641)	0.057
No	30 (12.5)	71 (19.1)	Ref			

*#Chi-square test and *Multivariable Logistic Regression were applied; p-value < 0.05 has been considered statistically significant. ^OCAF – Off campus away from family; AHS – Allied health science; OR – odd's ratio; aOR – adjusted odd's ratio; CI – confidence interval. SES based on Modified B.G. Prasad scale.*

Table 5: Association between bedtime screening and sleep quality

PSQI Components	Bedtime screening (mean ± SD)		p-value
	Yes (n = 510)	No (n = 101)	
Sleep latency (C1)	0.96 ± 0.83	0.74 ± 0.80	0.012*
Sleep duration (C2)	0.96 ± 1.01	0.61 ± 0.80	0.003*
Daytime dysfunction (C3)	0.82 ± 0.82	0.57 ± 0.75	0.003*
Sleep disturbance (C4)	1.03 ± 0.62	0.87 ± 0.70	0.027*
Sleep efficiency (C5)	0.44 ± 0.80	0.54 ± 0.96	0.657
Sleep quality (C6)	0.96 ± 0.76	0.64 ± 0.63	< 0.001*
Use of sleep medications (C7)	0.16 ± 0.48	0.27 ± 0.68	0.192
Global PSQI score	5.33 ± 2.80	4.26 ± 2.80	0.004*

**p-value < 0.05 has been considered statistically significant; Mann-Whitney U test was applied. PSQI – Pittsburgh Sleep Quality Index; SD – standard deviation.*

DISCUSSION

The study subjects in the present study had a mean age of 18.9 ± 1.39 years. Majority of the participants were aged below 20 years (87.4%), and two-third of the students were female (65.8%). In contrast, an Indian study among medical students by Sharma et al., nearly half of the students were in the age group of 20–22 years and 58.9% of the respondents were male (13). In this study, over half of the students (54.5%) resided in hostels which was comparable to the previous study findings by Sharma et al (13).

This study revealed a high prevalence of bedtime screen use (83.5%) among medical and paramedical students in Puducherry, with smartphones being the most commonly used device. These findings align with earlier studies from Morocco (97%), Egypt (96.5%), and India (92.1%), indicating that bedtime device use is a global phenomenon among health science students (4,6,13). The predominant bedtime screening activity was listening to music (28.6%) in the present study which differs from a study from New Zealand by Smith et al., where social media browsing (88%) and texting/instant messaging (77%) was most common bedtime screen activities suggesting cultural or lifestyle variations in screen use habits (14).

Among this study population, females were more likely to engage in bedtime screen use. A study from United States by Nagata et al., had documented similar findings where female gender was determined to be more associated with bedtime screen use (15). In this present research, students residing off-campus away from family had eight-times increased bedtime scree use. According to certain studies, social isolation and loneliness among college students were strong predictors of screen use and smartphone addiction (16,17). This could be due to increased vulnerability of the students and lack of parental supervision.

In this study, medical and allied health sciences students had significantly higher odds of poor sleep quality. In addition, residence off campus away from family was a strong predictor, possibly due to fewer lifestyle restrictions and irregular routines. A systematic review and meta-analysis of the literature examining sleep patterns in students, especially those in medical and allied health sciences, confirm the user's assertion that

these students have a significantly higher risk of experiencing poor sleep quality (18).

Bedtime screen users in this study demonstrated significantly poor sleep parameters, including longer sleep latency, reduced sleep duration, and greater daytime dysfunction. These findings were parallel to the results of a study from New Delhi, India by Sinha et al (19). In addition, literature shows that evening exposure to blue light disrupts circadian rhythms and suppresses melatonin secretion, leading to delayed sleep onset and impaired restorative sleep (20,21).

Conclusion

In summary, this study underscores the high prevalence of bedtime screen use and its association with impaired sleep quality among future healthcare professionals in Puducherry. Interventions promoting screen hygiene, sleep education, and healthier bedtime routines could be incorporated into student wellness programs to mitigate these effects.

Recommendation

Promoting structured sleep-hygiene and digital-hygiene interventions is essential to reduce the high prevalence of bedtime screen use and its adverse impact on sleep among future healthcare professionals. Targeted support for students living away from family and those in high-risk academic streams can help prevent long-term sleep-related morbidity and improve academic functioning.

Limitation of the Study

Strengths of this study include the use of a standardized and validated sleep quality tool (PSQI) and a relatively large, diverse sample. However, the self-reported measures may be subject to recall bias. Furthermore, convenient sampling may reduce generalizability.

Relevance of the Study

This study provides region-specific evidence from Puducherry showing that bedtime screen use is highly prevalent and significantly disrupts multiple components of sleep quality among health-science students. It identifies unique predictors—such as academic stream and residence type—offering actionable insights for tailored interventions within educational institutions.

Authors Contribution

All authors have contributed equally.

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Nil

Conflict of Interest

There are no conflicts of interest.

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Declaration of Generative AI and AI Assisted Technologies in the Writing Process

The authors haven't used any generative AI/AI assisted technologies in the writing process.

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