International Journal of Community Medicine and Public Health
Phillip O et al. Int J Community Med Public Health. 2026 Jul;13(7):3717-3724
https://www.ijcmph.com
pISSN 2394-6032 | eISSN 2394-6040
DOI: https://dx.doi.org/10.18203/2394-6040.ijcmph20262274

Original Research Article

Association of sociodemographic and behavioural factors with perceived stress and sleep quality among undergraduate medical students: a cross-sectional study

Oorjita Phillip[1]*, Anson Simon[1], Neeraj[2]

[1]Christian Medical College and Hospital, Ludhiana, Punjab, India
[2]Department of Physiology, Christian Medical College and Hospital, Ludhiana, Punjab, India

Received: 15 April 2026
Revised: 19 June 2026
Accepted: 20 June 2026

***Correspondence:**
Dr. Oorjita Phillip,
E-mail: oorjitaphillip@outlook.com

ABSTRACT

Background: Sleep disturbance and stress are key yet underrecognized determinants of mental health among undergraduate medical students. This study examines the association between sleep quality and perceived stress, and identifies independent sociodemographic and behavioural predictors of each, within the Indian undergraduate medical training context.
Methods: This cross-sectional study included 200 undergraduate medical students from Christian Medical College, Ludhiana. Data was collected via google forms using the perceived stress scale (PSS)-10 and the Pittsburgh sleep quality index, alongside sociodemographic and behavioural variables. Statistical analysis included Pearson's correlation, partial correlation, and both univariate and multivariate linear regression. Multicollinearity was assessed using the variance inflation factor.
Results: Poor sleep quality was reported by 52.5% of participants, while 82.5% experienced moderate to high stress (mean PSS=20±7.03). A significant positive correlation was observed between sleep quality and perceived stress ($r=0.542$, $p<0.001$), which remained after adjustment for digital device use (partial $r=0.524$, $p<0.001$). Digital device use was an independent predictor of both sleep quality ($\beta=0.877$, $p=0.012$) and perceived stress ($\beta= 1.870$, $p=0.012$). Extracurricular participation showed a borderline association with lower stress.
Conclusions: Digital device overuse emerged as a significant and consistent independent predictor of both poor sleep quality and higher perceived stress. The stress-sleep association was robust after controlling for major covariates. These findings support targeted interventions targeting digital behaviour and sleep hygiene among medical students.

Keywords: Medical students, Sleep quality, Perceived stress, Digital device use

INTRODUCTION

The mental health and academic performance of medical students across the globe have been adversely affected by key unrecognised issues such as sleep disturbance and distress.[1-3]

However, in the field of medicine it is often overlooked due to hectic schedules, daily stresses and the enormous workload. This results in poor sleep habits which in turn take a toll on the learning and attentive power leading to fatigue, emotional instability and eventually burnout.[1] Previous studies among medical students have primarily focused on sleep quality and stress as separate domains.[2,3]

In contrast, the present study examines sleep quality and perceived stress together while exploring relevant

academic and behavioural determinants influencing these factors.

The association between sleep and stress is bidirectional: activation of the hypothalamic-pituitary-adrenal (HPA) axis during stress leads to elevated cortisol and sympathetic tone, disrupting the initiation and continuity of sleep.[4] On the other hand, perceived stress and emotional dysregulation are also heightened by inadequate or fragmented sleep.[3,4] Medical students are predisposed to anxiety, depression and burnout because of this perpetual cycle.[5] This ultimately hampers their long-term wellbeing and academic achievement.

Recent studies indicate that more than half of undergraduate medical students report poor sleep quality.[6] Global findings mirror this trend, with a meta-analysis estimating that nearly half of medical student's worldwide experience disrupted or inadequate sleep.[7] Furthermore, research indicates that poor sleep is associated with heightened perceived stress and reduced concentration and academic performance, reinforcing the stress-sleep imbalance.[8] Similar patterns are reported in Middle Eastern cohorts.[9]

Poor sleep quality, which was significantly associated with psychiatric morbidity among 76.75% of medical students in Himachal Pradesh, was reported by Verma et al.[10] Begum and Puchakayala found that poor sleep correlated with suboptimal sleep-hygiene practices in nearly half of first-year medical students in Telangana.[11] In Eastern India, disturbed sleep was exhibited by 66.6% of undergraduates with smartphone addiction as demonstrated by Singh et al.[12]

A high prevalence of poor sleep and elevated stress was also observed in studies done in Tamil Nadu and Telangana.[13] The major contributors to suboptimal sleep are behavioural factors, especially digital-device overuse. Melatonin secretion is suppressed by late-night screen exposure, which delays circadian rhythm and prolongs sleep onset.[1,14] Autonomic imbalance and increased cognitive arousal are attributed to excessive internet or smartphone use, aggravating emotional strain and reducing restorative sleep.[14]

While several studies have examined stress and sleep among medical students, few have simultaneously incorporated sociodemographic, and behavioural, determinants within the Indian undergraduate context, or have applied multivariate analysis to identify predictors that remain significant after mutual adjustment.[2,3,13] The present study was therefore designed to examine the association between perceived stress and sleep quality, and to identify which sociodemographic and behavioural variables are independently associated with each. Findings may inform targeted interventions such as digital behaviour regulation, sleep hygiene education, and conducting structured wellness programmes.[15]

METHODS

This prospective cross-sectional study was conducted among 200 undergraduate medical students at Christian Medical College, Ludhiana, from September 2025 to December 2025, after obtaining Institutional Ethics Committee approval and informed consent. A pre-validated, and standardised questionnaire was administered via Google Forms. The study was conducted during a non-stress period in the academic calendar avoiding examination weeks, and major assignment deadline to minimise confounding due to acute academic stress. Distribution of the questionnaires was done batch-wise so that all participants completed them under comparable and supervised conditions.

Cohen's PSS-10 was used to assess the stress levels, and Pittsburgh sleep quality index (PSQI) was used to assess the sleep quality.[16,17] Each participant's height and weight were recorded, and Quetelet index (BMI=weight in kg/height in m²) was used to calculate the body mass index (BMI). The required sample size was calculated using OpenEpi software (version 3.0). Assuming a prevalence of good sleep quality among medical students of 44%, as reported by Kumar et al in Delhi, with a 95% confidence interval and an absolute precision of 7%, the minimum required sample size was estimated to be 200 participants.[19]

The sample size was calculated using OpenEpi Version 3.0 (open-source calculator-SSPropor), applying the following formula:

$$n = \frac{[DEFF \times N \times p(1-p)}{\left(\frac{d^2}{z_1^2} - \frac{\alpha}{2}\right) \times (N-1) + p(1-P)}$$

where,

n = Target sample size; N = 1,000,000 (default population size in OpenEpi, approximating infinite population); p=0.44; d=0.07; $Z_{1-\alpha/2}$ = 1.96 (corresponding to 95% confidence interval); and DEFF = 1 (no cluster or multi-stage sampling design)

Using the above parameters, the minimum required sample size was estimated to be 194, which was rounded up to 200 participants.

Inclusion criteria

Undergraduate MBBS students aged 18-25 years and students willing to provide informed consent and complete the questionnaire were included in study.

Exclusion criteria

Students on medications known to significantly affect stress levels, mood, or body weight, students submitting incomplete questionnaires and students with a prior or

current diagnosis of a psychiatric illness (e.g., depression, anxiety disorders, psychosis, or bipolar disorder) were excluded from study.

Statistical analysis

Data was analysed using SPSS version 29.0 (IBM Corp., Armonk, NY, USA). Continuous variables were expressed as mean±SD and categorical variables as frequency (%) Group comparisons were performed using t-test, ANOVA, or non-parametric equivalents. Associations were assessed using chi-square or Fisher's exact test.

Pearson correlation was used to assess the relationship between PSS and PSQI, with partial correlations performed after adjusting for digital device use, age, and professional year.

Univariate and multivariate linear regression analyses were performed to identify independent PSQI and PSS, with separate models for each outcome.

Multicollinearity was assessed using variance inflation factor, and model fit was evaluated using R^2 and adjusted R^2. All tests were two-tailed, with $p<0.05$ considered statistically significant.

RESULTS

A total of 200 undergraduate medical students were involved in the study (Table 1). Majority (73%) of the participants were aged 19-22 years and 63.5% of the participants were females. Batch distribution is shown in Table 1. Involvement in extracurricular activities was reported by 76% participants, and 45.5% reported using digital devices for 4-6 hours daily. Only 16.5% slept with lights. Smoking and alcohol use were noted in 4.5% and 14% of participants, respectively.

Poor sleep quality was observed in 52.5% of students and 11% had PSQI scores corresponding to having sleep disorders, with regards to stress levels, 19% had high and 63.5% had moderate stress levels. Based on BMI, 41% were of normal weight and 47.5% were overweight or obese. The mean±SD scores for PSS and PSQI were 20±7.03 and 5.95±3.26, indicating moderate stress and suboptimal sleep quality.

Scores across professional batches showed a non-linear pattern (Table 2). Students from the 2024 batch (second-year MBBS) reported the highest stress (PSS 24.90±5.20) and poorest sleep quality (PSQI 7.32±3.38), whereas the 2025 batch (first-year MBBS) had the lowest stress (PSS 16.57±7.35) and best sleep quality (PSQI 4.31±3.10). Differences between batches were statistically significant on one-way ANOVA (PSQI: $F(4,196)=6.96$, $p<0.001$; PSS: $F(4,196)=12.81$, $p<0.001$). The pattern did not show a simple linear increase with seniority.

Gender differences were not significant for PSQI ($p=0.776$), and the PSS difference was borderline ($p=0.052$). Increasing daily digital device use was associated with higher scores for both outcomes, with PSQI rising from 5.19 to 6.13 to 7.45 and PSS from 18.85 to 20.17 to 22.59 across screen-time categories (PSQI: $p=0.004$; PSS: $p=0.047$).

The bar graph (Figure 1) shows a clear inverse relationship between stress category and sleep quality. Among students with high stress, 92.1% had poor sleep, whereas good sleep quality was higher among those who had low stress (77.1%).

A significant positive correlation was observed between perceived stress and sleep quality scores (PSS and PSQI) ($r=0.542$, $p<0.001$), indicating that higher stress levels were associated with poorer sleep quality (Figure 2). This relationship remained largely unchanged after adjusting for digital device use (partial $r=0.524$, $p<0.001$). A similar finding was observed when additional adjustments were made for age and professional year (partial $r=0.529$, $p<0.001$). These findings suggest that the association between stress and sleep quality is independent of screen time and year-related factors. In contrast, no significant correlations were found between PSQI and BMI ($r=0.092$, $p=0.195$) or between PSS and BMI ($r= -0.025$, $p=0.726$).

Perceived stress levels showed significant categorical associations with age ($\chi^2=27.02$, $p<0.001$), professional year ($\chi^2=36.83$, $p<0.001$), and digital device use ($\chi^2=11.66$, $p=0.023$). No significant associations were observed between stress levels and gender, extracurricular participation, sleeping with lights on, smoking, or alcohol use ($p>0.05$) (Table 3).

As shown in Table 4, Sleep quality showed significant associations with age ($\chi^2=13.29$, $p=0.033$), professional year ($\chi^2=27.31$, $p<0.001$) and digital device use ($\chi^2=13.30$, $p=0.007$). No significant relationships were observed between sleep quality and gender, extracurricular participation, sleeping with lights on, smoking, or alcohol use ($p>0.05$). Univariate analysis identified that age, professional year, and digital device use are individually associated with PSQI, and gender and digital device use are individually associated with PSS (Table 5). Given the modest R^2 values across all univariate models, multivariate analyses were performed to identify independent predictors after mutual adjustment and to clarify which univariate associations reflected confounding.

On multivariate regression (Table 6), digital device use was the only consistent independent predictor of sleep quality (PSQI: $\beta=0.877$, $SE=0.344$, $p=0.012$, 95% CI [0.20, 1.56]) and a significant independent predictor of perceived stress (PSS: $\beta=1.870$, $SE=0.737$, $p=0.012$, 95% CI [0.42, 3.33]. Extracurricular participation showed a borderline independent association with lower PSS ($\beta= -2.401$, $SE=1.165$, $p=0.041$, 95% CI [-4.70, -0.10]), which

should be regarded as exploratory given the number of predictors tested. Age and professional year, both individually significant in univariate analysis, did not retain independent significance after mutual adjustment (PSQI: p=0.424 and 0.996 respectively; PSS: p=0.173 and 0.381), indicating that their univariate effects were partly attributable to confounding with each other and with other covariates in the model. The overall R^2 values were modest (PSQI=0.085; PSS=0.095), which is unsurprising given the multifactorial nature of sleep and perceived stress; substantial residual variance is clearly attributable to factors not captured by current variable set, including academic workload, chronotype, coping style, and interpersonal stressors.

Table 1: Sociodemographic, behavioural, and descriptive characteristics of the study participants, (n=200).

Variables	Category	N	Percent (%)
Age (in years)	17-18	31	15.5
	19-20	79	39.5
	21-22	67	33.5
	23-24	23	11.5
Gender	Male	73	36.5
	Female	127	63.5
Professional year	2021	25	12.5
	2022	50	25
	2023	25	12.5
	2024	50	25
	2025	50	25
Participation in extracurriculars	Yes	152	76
	No	48	24
Digital device use (hours/day)	1-3	78	39
	4-6	91	45.5
	>6	31	15.5
Sleep with lights on	Yes	33	16.5
	No	167	83.5
Smoking	Yes	9	4.5
	No	191	95.5
Alcohol use	Yes	28	14
	No	172	86
PSQI grade	Good sleep quality	73	36.5
	Poor sleep quality	105	52.5
	Sleep disorder	22	11
PSS grade	High stress	38	19
	Moderate stress	127	63.5
	Low stress	35	17.5
BMI grade	Underweight	23	11.5
	Normal weight	82	41
	Overweight	30	15
	Obese	65	32.5
Descriptive scores (Mean±SD)	PSS	20±7.03	-
	PSQI	5.95±3.26	-

*PSQI=Pittsburgh sleep quality Index; PSS=Perceived stress scale; BMI=Body mass index; SD=standard deviation.

Table 2: Mean PSQI and PSS scores by demographic and behavioural variables.

Groups	N	PSQI score (Mean±SD)	PSS Score (Mean±SD)	P value[1]
Professional year (Batch)				
2021 (most senior)	25	6.92±2.81	19.96±6.65	F (4,196)=6.96 p<0.001*
2022	50	5.60±3.02	17.98±6.31	F (4,196)=12.81 p<0.001*
2023	25	6.32±2.75	21.28±5.73	(PSQI: above) (PSS: above)
2024 (highest stress)	50	7.32±3.38	24.90±5.20	
2025 (most junior)	51	4.31±3.10	16.57±7.35	
Gender				
Male	73	5.86±2.95	18.73±6.58	PSQI: p=0.776 PSS: p=0.052

Continued.

Groups	N	PSQI score (Mean±SD)	PSS Score (Mean±SD)	P value[1]
Female	127	6.00±3.43	20.73±7.20	
Digital device use category				
1-3 hours/day	79	5.19±3.23	18.85±7.88	F (2,197)=5.61 p=0.004*
4-6 hours/day	92	6.13±3.20	20.17±6.34	F (2,197)=3.12 p=0.047*
>6 hours/day	29	7.45±3.00	22.59±6.08	(PSQI/PSS respectively)

*Pvalues derived from one-way ANOVA (professional year, digital device use) and independent t-test (gender). p<0.05 considered statistically significant. PSQI=Pittsburgh sleep quality index; PSS=Perceived stress scale.

Table 3: Chi-square analysis of factors associated with PSS among undergraduate medical students.

Variables	χ^2	P value
Age (in years)	27.02	<0.001
Gender	4.04	0.137
Professional year	36.83	<0.001
Extracurricular participation	4.45	0.108
Digital device use	11.66	0.023
Sleep with lights on	2.05	0.345
Smoking	2.77	0.186
Alcohol use	5.71	0.057

*χ^2=Chi-square test; p<0.05 considered statistically significant.

Table 4: Chi-square analysis of factors associated with sleep quality (PSQI grades) among undergraduate medical students.

Variables	χ^2	P value
Age (in years)	13.29	0.033
Gender	2.31	0.35
Professional year	27.31	<0.001
Extracurricular participation	0.07	0.971
Digital device use	13.3	0.007
Sleep with lights on	1.74	0.437
Smoking	1.88	0.313
Alcohol use	0.5	0.842

*χ^2=Chi-square test; p<0.05 considered statistically significant.

Table 5: Results of univariate linear regression analyses: associations with sleep quality (PSQI) and PSS.

Predictor variables	Dependent variable	R^2	F	P value
Age (in years)	PSQI	0.028	5.69	0.018
Professional year	PSQI	0.02	4.07	0.045
Digital device use	PSQI	0.069	14.71	<0.001
Gender	PSS	0.024	4.91	0.028
Digital device use	PSS	0.044	9.13	0.003

*Only significant predictors (p<0.05) are shown. R^2=coefficient of determination indicating variance explained.

Table 6: Results of multivariate linear regression analyses: independent PSQI and PSS.

Predictor variables	Dep. variable	B	SE	T	P value	95% CI
Age (in years)	PSQI	0.347	0.433	0.802	0.424	-0.51, 1.20
Professional year	PSQI	-0.001	0.280	-0.005	0.996	-0.55, 0.55
Gender (Male=1)	PSQI	-0.463	0.504	-0.919	0.359	-1.46, 0.53
Extracurriculars (Yes=1)	PSQI	0.206	0.543	0.380	0.705	-0.87, 1.28
Sleep with lights (Yes=1)	PSQI	0.647	0.633	1.023	0.308	-0.60, 1.90
Smoking (Yes=1) †	PSQI	0.144	1.334	0.108	0.914	-2.49, 2.78
Alcohol use (Yes=1) †	PSQI	0.201	0.834	0.241	0.810	-1.44, 1.85
BMI (kg/m^2)	PSQI	0.082	0.054	1.527	0.129	-0.02, 0.19
Digital device use*	PSQI	0.877	0.344	2.551	0.012	0.20, 1.56
Age (in years)	PSS	1.270	0.929	1.367	0.173	-0.56, 3.10

Continued.

Predictor variables	Dep. variable	B	SE	T	P value	95% CI
Professional year	PSS	0.527	0.600	0.878	0.381	-0.66, 1.71
Gender (Male=1)	PSS	-1.239	1.081	-1.146	0.253	-3.37, 0.89
Sleep with lights (Yes=1)	PSS	0.978	1.357	0.721	0.472	-1.70, 3.66
Smoking (Yes=1) †	PSS	-3.799	2.861	-1.328	0.186	-9.44, 1.85
Alcohol use (Yes=1) †	PSS	-1.219	1.788	-0.682	0.496	-4.75, 2.31
BMI (kg/m^2)	PSS	-0.081	0.115	-0.699	0.486	-0.31, 0.15
Extracurriculars (Yes=1) ‡	PSS	-2.401	1.165	-2.061	0.041	-4.70, -0.10
Digital device use*	PSS	1.870	0.737	2.536	0.012	0.42, 3.33

*Model 1-Outcome: PSQI score. R^2=0.085, Adj. R^2=0.041, F (9,190)=1.955, p=0.047. Model 2-Outcome: PSS score R^2=0.095, Adj. R^2=0.052, F (9,190)=2.218, p=0.023. β=unstandardised regression coefficient; SE=standard error; CI=confidence interval; VIF=variance inflation factor. *p<0.05 considered statistically significant.

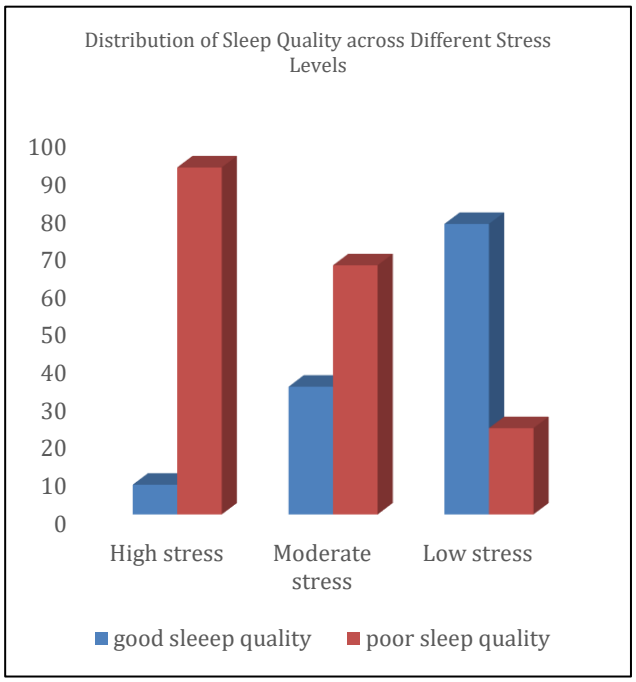

Figure 1: Distribution of sleep quality across different stress levels.

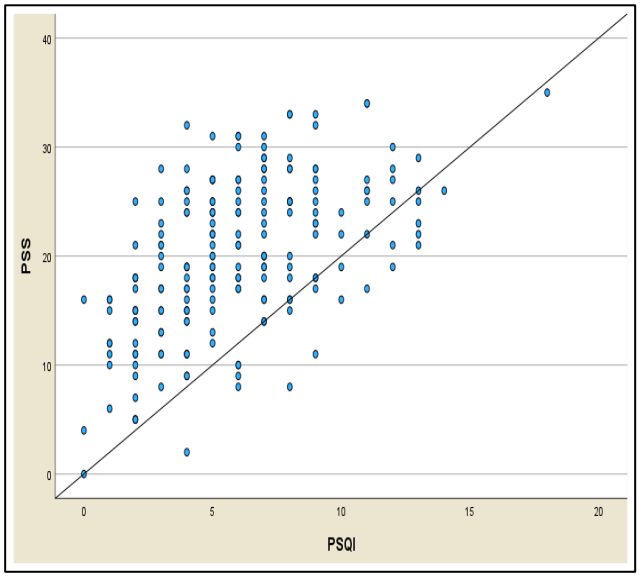

Figure 2: Scatter plot showing the correlation between PSS and sleep quality PSQI.

DISCUSSION

The relationship between perceived stress and sleep quality among undergraduate medical students was evaluated through this study, and the various factors affecting these parameters were also assessed. Out of the total participants almost more than half (52.5%) reported poor sleep quality, while moderate to high level of stress was experienced by 82.5% of the population. The mean PSS score (20±7.03) indicated moderate stress, and the mean PSQI (5.95±3.26) reflected suboptimal sleep. The significant positive correlation between poor sleep quality and perceived stress (*r*=0.542, *p*<0.001) highlights the existence of a bidirectional relationship between sleep disturbances and distress among medical students.[4,8] Despite accounting for digital device use (partial r=0.524) this relationship held up and remained consistent even after factoring in age and year of study (partial r=0.529).

Most previous studies have assessed stress and sleep quality among medical students using descriptive or comparative approaches without multivariate adjustment.[2,3] In the present study independent sociodemographic and behavioural determinants have been identified and their interrelationship with sleep quality and perceived stress has been studied by application of both univariate and multivariate analysis. This allowed independent predictors to be identified after adjusting for one another, something which has been less consistently achieved in earlier research.

The findings of this study are aligned with various studies from India and all over the world showing a rise in poor sleep patterns among medical students. As reported by Verma et al it was found in Himachal Pradesh that 76.75% medical students had poor sleep quality, and higher PSQI scores were linked to anxiety and depressive symptoms.[10] It was also found by Begum and Puchakayala that 49.16% of medical students with inadequate sleep practices reported poor sleep quality.[11] In Eastern India, 66.6% of medical undergraduates with smartphone addiction showed disturbed and poor sleep patterns as per the study done by Singh et al which confirms our finding of prolonged digital device use being associated with poor sleep quality.[12] Similar prevalence rates of poor sleep quality, ranging from 33% to 45%, have been observed in other studies conducted in various regions of India.[6,18] High perceived stress and

sleep disturbances were found in more than half the medical students as per studies done by Binjabr et al and Rao et al. The consistent findings across different settings are suggestive of the challenging nature of medical training which predisposes students to stress and sleep problems.[5,7]

Among all the factors that were examined, digital device use emerges as the most consistent predictor by independently predicting both sleep quality and perceived stress in the multivariate models. More device usage corresponded with poorer results among students. Prolonged screen exposure particularly before bedtime, led to delay in melatonin secretion and increase in cognitive simulation which resulted in delayed sleep onset.[1,14] The poor sleep quality among medical students due to disruption of autonomic function because of excessive internet usage was observed by Nayak et al which highlights the physiological effects of digital overuse.[14]

The establishment of the same association across two separate regression models, each predicting a different outcome, significantly strengthens the conclusion.

The multivariate model also found that extracurricular participation showed an independent borderline association with lower perceived stress (β=-2.401, p=0.041). This was not established by chi square or univariate analysis, but emerged after adjustment for confounders. It is possible that students experiencing higher levels of stress may be less likely to participate in extracurricular activities, which introduces the possibility of selection bias. The direction of this association is nonetheless possible, as engaging in activities outside academics can help alleviate stress through detachment from academic pressure and building social connections. There is however need for larger studies before drawing any conclusions.

Academic year and age also showed significant association with sleep and stress. A non-linear pattern was observed in the year wise data. The highest level of stress (PSS=24.90) along with poorest sleep quality (PSQI=7.32) was observed among the second-year students. In contrast the best sleep quality and least stress was reported by the first-year students. This could probably reflect the period of adjustment to medical school before the real pressures of medical school set in. Professional year failed to be an independent predictor in the multivariate model due to absence of linear progression with seniority. This also suggested that confounding with age and other correlated factors is possible.

Sleep quality and parameters like BMI, gender, or lifestyle factors (smoking, alcohol, or sleeping with lights on) showed no significant association in this study, which is also reflected in studies done in Tamil Nadu and Moradabad.[1,18] Contrary to the findings of Vasava et al no significant association between BMI and sleep quality or perceived stress was observed.[20] The small number of students who reported smoking (n=9) and alcohol use (n=28) was too small to draw any reliable conclusions.

It is vital to employ interventions focused on stress coping strategies, sleep hygiene regulation, and digital device regulation for medical students. Stress and sleep disturbances are established risk factors for psychiatric morbidity including anxiety, depression, and burnout, highlighting the need for early mental health screening.[5,10] The stress and sleep problems may be alleviated by incorporation of periodic wellness sessions, structured mental health programs, and promotion of extracurricular participation. Improved PSQI and PSS scores secondary to screen time limitation and mindfulness training have been observed in emerging research, although intervention evidence remains limited.[15]

Limitations

Some of the limitations of this study should be considered carefully. Firstly, due to the cross-sectional study design the direction of the relationship between the stress and sleep quality cannot be determined. The use of self-reported instruments introduces the possibility of recall and social desirability bias. As the collection of data was also done avoiding the examination periods, the peak stress level prevalence is possibly underestimated. The use of digital device was associated with the outcomes, but how it influences sleep or stress could not be determined given the study's design. Although it is a reasonable approach to treat device use, age, and professional year as linear variables, but variation across individual categories cannot be determined. Year-wise comparisons were limited owing to the uneven batch sizes (n=25 for 2021 and 2023 batches vs n=50 for others). The smoking (n=9) and alcohol use subgroup (n=28) were too small to draw reliable conclusions. The extracurricular finding (p=0.041) should be interpreted cautiously as there is no correction for multiple comparisons and there is a possibility of selection bias due to the relatively small group (n=48). Generalisability is limited as the study was conducted at a single private medical college. Adjusted R^2 values (PSQI: 0.041; PSS: 0.052) highlights that much of the variation which can be attributed to factors like academic workload, chronotype, and coping style remains unaccounted for.

CONCLUSION

Undergraduate medical students exhibited significant burden of poor sleep quality and moderate to high perceived stress levels. The positive association between stress and sleep quality is strong even after the behavioural and demographic factors were accounted for. This suggests a strong and significant relationship warranting clinical and institutional attention. The consistent and significant independent predictor of both the outcomes across both the regression models was

digital device over use, showing a clear dose dependent pattern strengthening the finding. Extracurricular participation showed borderline association with lower perceived stress. Despite being inconclusive at present, it is a promising to be explored in the future due to its possible protective role. There is substantial evidence to promote integration of institutional interventions that target early mental health, digital behavioural regulation and sleep hygiene education. These challenges can be alleviated by incorporating counselling in the medical curriculum. This will help in shaping healthier and more resilient healthcare professionals of the future.

ACKNOWLEDGEMENTS

Author would like to thank to Department of Physiology, Christian Medical College, Ludhiana, for their support in conducting this study. Also, to Ashly P. Koshy and Ansu P. Koshy for their assistance with statistical analysis, and all participants for their cooperation.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee Ref no.: IECBMHR/202509-506/Apprvl- STS Project/CMCH

REFERENCES

1. Gladius JH, Sowmiya K, Vidya DC, Archana LPA, William RF. A study of mobile phone usage on sleep disturbance, stress and academic performance among medical students in Tamil Nadu. Int J Community Med Public Health. 2018;5(1):365-8.
2. Mishra J, Panigrahi A, Samanta P, Dash K, Mahapatra P, Behera MR. Sleep quality and associated factors among undergraduate medical students during home confinement. Clin Epidemiol Glob Health. 2022;15:101004.
3. Azad MC, Fraser K, Rumana N, Abdullah AF, Shahana N, Hanly PJ, et al. Sleep disturbances among medical students: a global perspective. J Clin Sleep Med. 2015;11(1):69-74.
4. Hirotsu C, Tufik S, Andersen ML. Interactions between sleep, stress, and metabolism: from physiological to pathological conditions. Sleep Sci. 2015;8(3):143-52.
5. Binjabr MA, Alalawi IS, Alzahrani RA, Alghamdi AA, Alshareef MA, Alqarni AA, et al. The worldwide prevalence of sleep problems among medical students: a systematic review and meta-analysis. Curr Sleep Med Rep. 2023;9:161-79.
6. Kanyadi SR, Javali SB, Gadi NA. Sleep quality and its correlates among undergraduate students of a medical school in North Karnataka, India. Int J Community Med Public Health. 2024;11(6):2247-53.
7. Rao WW, Li W, Qi H, Hong L, Chen C, Li CY, et al. Sleep quality in medical students: a comprehensive meta-analysis of observational studies. Sleep Breath. 2020;24(3):1507-15.
8. Alotaibi AD, Alosaimi FM, Alajlan AA, Bin Abdulrahman KA. The relationship between sleep quality, stress, and academic performance among medical students. J Family Community Med. 2020;27(1):23-8.
9. Alsaggaf MA, Wali SO, Merdad RA, Merdad LA. Sleep patterns, duration and quality among Saudi medical students. Saudi Med J. 2016;37(2):173-82.
10. Verma P, Jani H, Bhanderi P, Patel B, Parlewar R. Association between sleep quality and mental health among medical students: a college-based study in Himachal Pradesh, India. J Pharm Bioallied Sci. 2025;17(1):S363-5.
11. Begum M, Puchakayala DS. Prevalence of poor sleep quality and its correlation with sleep hygiene practices among medical students in Telangana. Asian J Med Sci. 2022;13:151-5.
12. Singh G, Singh S. Prevalence of smartphone addiction and its association with sleep quality among medical undergraduates: a cross-sectional study from Eastern India. Cureus. 2025;17:e94911.
13. Mohandas A, Patnala L, Shalini MB, Varma P, Sharma S, Pattnaik S. Sleep quality and its predictors among undergraduate medical students of a teaching institute in Telangana, South India: a cross-sectional study. CHRISMED J Health Res. 2024;11:17-22.
14. Nayak A, Saranya K, Fredrick J, Madumathy R, Subramanian SK. Assessment of burden of internet addiction and its association with quality of sleep and cardiovascular autonomic function in undergraduate medical students. Clin Epidemiol Glob Health. 2021;11:100773.
15. Talaia A, Sowidan A, Fahim A, Elzohery A, Hammoda A, Kabbash I. Sleep hygiene practices and sleep quality among medical students in Egypt: a cross-sectional study. Sleep Sci Pract. 2025;9:6.
16. Cohen S, Kamarck T, Mermelstein R. A global measure of perceived stress. J Health Soc Behav. 1983;24(4):385-96.
17. Buysse DJ, Reynolds CF 3rd, Monk TH, Berman SR, Kupfer DJ. The Pittsburgh Sleep Quality Index: a new instrument for psychiatric practice and research. Psychiatry Res. 1989;28(2):193-213.
18. Goyal N, Gupta S. Sleep quality among medical students in Moradabad, Uttar Pradesh. Int J Community Med Public Health. 2020;7:274-8.
19. Kumar R, Aggarwal S, Singh A. Sleep quality and associated factors among undergraduate medical students in Delhi. Int J Community Med Public Health. 2024;11(5):1834-8.
20. Vasava PJ, Jasani PK, Sochaliya KM, Makwana MH, Kapadiya MR, Kadri SA, et al. Assessing sleep quality and influencing factors among medical undergraduates: a cross-sectional study. Cureus. 2025;17(2):e78919.

Cite this article as: Phillip O, Simon A, Neeraj. Association of sociodemographic and behavioural factors with perceived stress and sleep quality among undergraduate medical students: a cross-sectional study. Int J Community Med Public Health 2026;13:3717-24.