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Original Article

Association between night-time screen exposure, sleep disturbance, and psychological distress among young adults: a hospital-based cross-sectional observational study.

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Abstract

Background:

Night-time exposure to smartphones and other digital screens has become common among young adults and is increasingly linked with delayed sleep, reduced sleep quality, and emotional distress. Hospital-based assessment of this behavioural pattern provides useful evidence for early counselling and preventive mental health strategies.

Objectives:

To assess the association between night-time screen exposure, sleep disturbance, and psychological distress among young adults attending a tertiary care teaching hospital.

Methods:

This hospital-based cross-sectional observational study included 250 young adults at Government Medical College, Vikarabad, Telangana, India, from August 2025 to January 2026. Demographic details, lifestyle factors, screen exposure, sleep characteristics, and psychological distress categories were recorded using a structured data collection form and standardized questionnaire-based assessment. Associations were analysed using Pearson chi-square tests and adjusted logistic regression.

Results:

The mean age was 21.8 ± 3.1 years, and females constituted 56.4%. Night-time screen exposure above 2 hours was reported by 46.4%. Sleep disturbance was present in 50.4%, and moderate-to-severe psychological distress was observed in 42.4%. Sleep disturbance increased from 25.0% in participants with less than 1 hour of night-time screen exposure to 78.9% in those with more than 4 hours. Psychological distress increased from 17.3% to 65.8% across the same exposure categories. Night-time screen exposure above 2 hours independently predicted sleep disturbance and psychological distress.

Conclusion:

Prolonged nighttime screen exposure was significantly associated with sleep disturbance and psychological distress among young adults. These findings support routine screening of bedtime digital habits in young adult health assessments.

Recommendations:

Screen-time education, sleep hygiene counselling, and behavioural interventions should be integrated into youth-friendly outpatient services.

Keywords: Night-time screen exposure; Sleep disturbance; Psychological distress; Young adults; Smartphone use; Sleep hygiene

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Introduction

Digital screen exposure has become a defining feature of contemporary young adult life. Smartphones, tablets, laptops, and streaming platforms are used for education, communication, entertainment, and social interaction. Although these devices have clear benefits, their unrestricted use during the late evening and pre-sleep period has raised concern in public health and behavioural medicine[1]. Young adults are especially vulnerable because academic schedules, social media engagement, online gaming, and irregular sleep routines often converge during the same developmental period. Reviews of electronic media use have consistently shown adverse associations with sleep timing, sleep duration, and sleep quality among adolescents and young populations [1,2].

Night-time screen exposure influences sleep through several mechanisms. Exposure to short-wavelength light emitted from digital screens suppresses melatonin secretion, delays circadian phase, and increases alertness at a time when physiological sleep drive should be rising [3,4]. Beyond light exposure, interactive digital content produces cognitive and emotional arousal. Messaging, social media scrolling, video viewing, and online gaming prolong wakefulness and reduce the ability to disengage before sleep. Systematic evidence indicates that bedtime access to portable screen-based media devices is associated with inadequate sleep quantity, poor sleep quality, and excessive daytime sleepiness [5].

Sleep disturbance is not only a sleep-related outcome but also an important correlate of psychological health. Poor sleep can impair emotional regulation, attention, memory consolidation, and stress recovery. Among students and young adults, sleep disturbance has been associated with depression, anxiety, stress, and nonspecific psychological distress [6,7]. Smartphone overuse and social media engagement have also been linked with poor sleep quality and symptoms of depression and anxiety in university-based samples [8,9]. These findings suggest that night-time screen exposure could contribute to a behavioural pathway connecting digital habits, poor sleep, and mental health symptoms.

The clinical relevance of this issue is increasing in India because young adults frequently seek care for headache, fatigue, reduced concentration, anxiety symptoms, and sleep complaints in general hospital settings. However, bedtime digital habits are not always assessed during routine

consultations. Local hospital-based evidence is required to support practical screening, health education, and sleep hygiene counselling. The use of validated sleep and psychological distress assessment tools also improves the interpretation of such behavioural data [10,11].

The present study was conducted to assess the association between night-time screen exposure, sleep disturbance, and psychological distress among young adults attending Government Medical College, Vikarabad, Telangana, India. The specific objectives were to describe the demographic and lifestyle profile of the study population, estimate the prevalence of prolonged night-time screen exposure, sleep disturbance, and psychological distress, compare sleep and psychological outcomes across screen exposure categories, and identify factors independently associated with sleep disturbance and psychological distress.

Methodology

Study design and setting

This hospital-based cross-sectional observational study was conducted at Government Medical College, Vikarabad, Telangana, India. The study was carried out over six months, from August 2025 to January 2026. The hospital caters to young adults attending outpatient and general clinical services, providing an appropriate setting to evaluate lifestyle-related sleep and psychological health concerns in a routine healthcare environment.

Study population and sample size

A total of 250 young adults were included. Participants aged 18 to 26 years who attended the hospital during the study period and provided informed consent were recruited using a consecutive sampling method until the required sample size was achieved. The sample size was considered adequate for estimating common sleep disturbance and psychological distress patterns in young adults and for performing exposure-based subgroup comparisons.

Eligibility criteria

Young adults aged 18 to 26 years who were able to understand the questionnaire and provide reliable responses were included. Participants with diagnosed major psychiatric illness, current use of sedative medication, known neurological disorder, shift-work schedule, acute severe illness, or incomplete questionnaire responses were excluded. These exclusions were applied to reduce



confounding from pre-existing clinical conditions that strongly influence sleep and psychological status.

Study variables and assessment tools

The main exposure variable was night-time screen exposure, recorded as average screen use during the night-time or pre-sleep period and categorized as less than 1 hour, 1 to 2 hours, 2 to 4 hours, and more than 4 hours. Information was also collected on total daily screen time, main nighttime device, screen use within 30 minutes before sleep, blue-light filter or night-mode use, caffeine intake after evening, residence, and physical activity. Sleep disturbance was assessed using questionnaire-based sleep parameters consistent with the Pittsburgh Sleep Quality Index framework, in which higher scores indicate poorer sleep quality [10]. Psychological distress was graded using the Depression Anxiety Stress Scale-21 severity categories, and moderate-to-severe distress was considered clinically relevant for analysis [11].

Data collection procedure

Data were collected using a structured proforma administered in a quiet setting after obtaining written informed consent. Demographic details, lifestyle characteristics, screen exposure behaviour, sleep duration, sleep onset latency, daytime sleepiness, sleep disturbance, and psychological distress categories were recorded. Participants were requested to report their usual pattern over the preceding month to reduce day-to-day variability. Completed forms were reviewed for completeness before data entry.

Bias control

Potential selection bias was reduced through consecutive recruitment of all eligible participants according to predefined inclusion and exclusion criteria. Information and measurement bias were limited by using the same structured proforma, standardized questionnaire-based assessments, uniform instructions, and a quiet data-collection setting for every participant. Participants reported their usual pattern during the preceding month to reduce day-to-day fluctuation, and completed forms were checked for missing or inconsistent entries before data entry. Major clinical conditions and medications likely to influence sleep or

psychological status were excluded. Potential confounding was addressed using multivariable logistic regression adjusted for age, sex, residence, evening caffeine intake, and physical activity. Recall and social desirability bias related to self-reported screen exposure could not be eliminated completely.

Ethical considerations

The study protocol was approved by the Institutional Ethics Committee of Government Medical College, Vikarabad, Telangana, India. Written informed consent was obtained from all participants before enrolment. Participation was voluntary, confidentiality was maintained, and no identifying personal information was included in the analysis. Participants with marked sleep or psychological distress symptoms were advised to undergo appropriate clinical evaluation.

Statistical analysis

Data were entered into a spreadsheet and analysed using standard statistical methods. Continuous variables were expressed as mean and standard deviation, while categorical variables were summarized as frequency and percentage. Pearson chi-square tests were used to assess associations between the four night-time screen exposure categories and the binary outcome variables. The chi-square statistic, degrees of freedom, and p-value were reported. Logistic regression analysis was performed to identify factors independently associated with sleep disturbance and psychological distress after adjustment for age, sex, residence, evening caffeine intake, and physical activity. A p-value below .05 was considered statistically significant.

Results

A total of 250 young adults were included in the study. The mean age of the participants was 21.8 ± 3.1 years. Females constituted 56.4% of the study population. Most participants were undergraduate students, and a substantial proportion reported regular smartphone use during the nighttime period. The mean total daily screen exposure was 6.4 ± 2.3 hours, while the mean night-time screen exposure was 2.3 ± 1.4 hours. The baseline demographic and lifestyle characteristics are presented in Table 1.



Table 1: Baseline Demographic and Lifestyle Characteristics of the Study Population

Variable	Category/value	Frequency/mean	Percentage/SD
Total sample size	—	250	100.0
Age, years	Mean $\pm$ SD	21.8	± 3.1
Age group	18–20 years	86	34.4
	21–23 years	104	41.6
	24–26 years	60	24.0
Sex	Male	109	43.6
	Female	141	56.4
Educational status	Undergraduate	178	71.2
	Postgraduate	72	28.8
Residence	Hostel / shared accommodation	104	41.6
	With family	146	58.4
Caffeine intake after evening	Present	84	33.6
Regular physical activity	Present	76	30.4

Note. Values are presented as n (%) unless otherwise indicated. SD = standard deviation.

Night-time screen exposure of more than 2 hours was reported by 116 participants, accounting for 46.4% of the study population. Smartphone use was the most common mode of exposure. Sleep duration of less than 6 hours was observed in 36.4% of participants. Overall, sleep

disturbance was present in 126 participants, giving a prevalence of 50.4%. Psychological distress was identified in 42.4% of participants, with moderate-to-severe distress observed more commonly among those with longer night-time screen exposure, as shown in Table 2.

Table 2: Pattern of Screen Exposure, Sleep Characteristics, and Psychological Distress

Variable	Category/value	Frequency/mean	Percentage/SD
Total daily screen time, hours	Mean $\pm$ SD	6.4	± 2.3
Night-time screen exposure, hours	Mean $\pm$ SD	2.3	± 1.4
Night-time screen exposure	<1 hour	52	20.8
	1–2 hours	82	32.8
	2–4 hours	78	31.2
	>4 hours	38	15.2
The main device used at night	Smartphone	189	75.6
	Laptop/tablet	45	18.0
	Television / other devices	16	6.4
Screen use within 30 minutes before sleep	Present	197	78.8



Variable	Category/value	Frequency/mean	Percentage/SD
Blue-light filter/night mode use	Regular	62	24.8
Sleep duration, hours	Mean $\pm$ SD	6.3	± 1.2
Sleep duration <6 hours	Present	91	36.4
Sleep onset latency >30 minutes	Present	103	41.2
Daytime sleepiness	Present	117	46.8
Sleep disturbance	Present	126	50.4
Psychological distress	Normal	83	33.2
	Mild	61	24.4
	Moderate	66	26.4
	Severe	31	12.4
	Very severe	9	3.6
Moderate-to-severe psychological distress	Present	106	42.4

Note. Values are presented as n (%) unless otherwise indicated. SD = standard deviation.

The prevalence of sleep disturbance increased progressively with longer nighttime screen exposure. Sleep disturbance was observed in 25.0% of participants with less than 1 hour of exposure and in 78.9% of those reporting more than 4 hours. Pearson chi-square analysis confirmed a significant association between night-time screen exposure category

and sleep disturbance, $\chi^2(3, N = 250) = 33.24, p < .001$. Psychological distress increased from 17.3% in the lowest exposure group to 65.8% in the highest exposure group, and this association was also significant, $\chi^2(3, N = 250) = 30.47, p < .001$ (Table 3).

Table 3: Association of Night-Time Screen Exposure with Sleep Disturbance and Psychological Distress

Night-time screen exposure	Total n	Sleep disturbance n (%)	Psychological distress n (%)
<1 hour	52	13 (25.0)	9 (17.3)
1–2 hours	82	34 (41.5)	28 (34.1)
2–4 hours	78	49 (62.8)	44 (56.4)
>4 hours	38	30 (78.9)	25 (65.8)
Total	250	126 (50.4)	106 (42.4)
χ^2 (df)	—	33.24 (3)	30.47 (3)
p	—	< .001	< .001

Note. Pearson chi-square tests compared the four night-time screen-exposure categories. Sleep disturbance: $\chi^2(3, N = 250) = 33.24, p < .001$; psychological distress: $\chi^2(3, N = 250) = 30.47, p < .001$.

Participants with night-time screen exposure of more than 2 hours had significantly higher odds of sleep disturbance and psychological distress. On adjusted analysis, night-time

screen exposure of more than 2 hours remained independently associated with sleep disturbance after controlling for age, sex, caffeine intake, residence, and



physical activity. Sleep disturbance also showed a strong independent association with psychological distress. The logistic regression findings are shown in Table 4.

Table 4: Logistic Regression Analysis of Factors Associated with Sleep Disturbance and Psychological Distress

Outcome variable	Predictor	Adjusted ratio	odds	95% CI	p
Sleep disturbance	Night-time screen exposure >2 hours	3.21		1.84–5.58	< .001
Sleep disturbance	Screen use within 30 minutes before sleep	2.14		1.18–3.88	.012
Sleep disturbance	Caffeine intake after evening	1.76		1.01–3.09	.047
Sleep disturbance	Regular physical activity	0.64		0.36–1.14	.129
Psychological distress	Night-time screen exposure >2 hours	2.96		1.70–5.16	< .001
Psychological distress	Sleep disturbance	4.12		2.31–7.36	< .001
Psychological distress	Sleep duration <6 hours	2.08		1.18–3.68	.011
Psychological distress	Regular physical activity	0.58		0.32–1.05	.073

Note. CI = confidence interval. Adjusted models included age, sex, residence, evening caffeine intake, and physical activity as covariates.

Overall, the findings demonstrate a significant positive association between prolonged night-time screen exposure, sleep disturbance, and psychological distress among young adults. Participants with higher night-time screen use showed shorter sleep duration, greater sleep latency, more daytime sleepiness, and higher psychological distress scores compared with those reporting lower night-time screen exposure.

Discussion

The present hospital-based cross-sectional observational study found a high burden of night-time screen exposure, sleep disturbance, and psychological distress among young adults. Nearly half of the participants reported night-time screen exposure exceeding 2 hours, and more than three-fourths used screens within 30 minutes before sleep. Sleep disturbance was present in 50.4%, while moderate-to-severe psychological distress was observed in 42.4%. These findings highlight bedtime screen exposure as a relevant behavioural factor in young adults attending clinical settings.

The graded increase in sleep disturbance across exposure categories is one of the key findings. Sleep disturbance

increased from 25.0% among participants using screens for less than 1 hour at night to 78.9% among those using screens for more than 4 hours. This pattern is consistent with earlier reviews reporting that screen time is commonly associated with shortened sleep duration, delayed sleep timing, and poorer sleep quality [1,2]. The findings also agree with evidence from portable screen-device meta-analysis, where bedtime device access and use were associated with poor sleep outcomes and excessive daytime sleepiness [5].

The biological plausibility of this association is strong. Evening exposure to light-emitting digital devices alters circadian physiology, suppresses melatonin, and delays sleep onset [3,4]. In addition, smartphones and social media platforms provide continuous cognitive and emotional stimulation. This interactive engagement differs from passive environmental light exposure because it sustains attention, social anticipation, and reward-driven checking behaviour. Studies among young adults have shown that social media use, especially before bed, is associated with higher sleep disturbance [12,13].

Psychological distress also increased with longer nighttime screen exposure. Participants exposed to screens for more than 4 hours had a psychological distress prevalence of 65.8%, compared with 17.3% among those with less than 1



hour of exposure. This finding is supported by studies showing associations between smartphone overuse, depression, anxiety, stress, and poor sleep quality among university and medical student populations [8,14]. In the adjusted model, sleep disturbance was strongly associated with psychological distress, suggesting that poor sleep could be an important behavioural pathway linking night-time screen use with emotional symptoms.

Regular physical activity showed a protective effect for both outcomes, although the association did not reach statistical significance. Caffeine intake after evening and screen use within 30 minutes before sleep were independently associated with sleep disturbance. These observations reinforce the importance of addressing modifiable lifestyle factors rather than focusing only on total screen duration. Counselling young adults about device-free pre-sleep routines, reduced evening caffeine intake, and consistent sleep schedules could offer practical benefits in routine clinical care.

Generalizability: The study findings apply to young adults attending similar government teaching hospitals in semi-urban and urban Indian settings, particularly where smartphone use is common, and sleep complaints are frequently reported. However, interpretation should consider the hospital-based sampling frame, self-reported exposure measurement, and regional lifestyle patterns. Broader community-based multicentre studies will improve external validity across educational, socioeconomic, and occupational groups.

Conclusion

This hospital-based cross-sectional observational study demonstrated a significant association between prolonged night-time screen exposure, sleep disturbance, and psychological distress among young adults. Nearly half of the participants reported night-time screen exposure above 2 hours, while sleep disturbance and moderate-to-severe psychological distress were common. A clear exposure-response pattern was observed, with higher screen exposure linked to greater sleep disturbance and psychological distress. Night-time screen exposure above 2 hours independently predicted both outcomes, and sleep disturbance showed a strong association with psychological distress. These findings support routine assessment of bedtime digital habits and sleep health in young adult clinical encounters.

Limitations

This study used a cross-sectional design, so the temporal sequence between night-time screen exposure, sleep disturbance, and psychological distress cannot be established. Screen exposure and sleep variables were self-reported, introducing recall and reporting bias. The hospital-based sample limits wider community representation. Objective measures such as actigraphy, screen-tracking applications, and clinical psychiatric interviews were not used.

Recommendations

Young adults should be counselled to reduce screen exposure during the last hour before sleep and avoid prolonged smartphone use after lights-off. Hospitals and colleges should include sleep hygiene education in routine health promotion activities. Clinicians should ask about bedtime screen habits when young adults present with fatigue, insomnia, headache, poor concentration, anxiety, or depressive symptoms. Use of blue-light filters alone should not replace behavioural screen restriction. Structured digital wellness programmes, evening caffeine reduction, regular physical activity, and referral pathways for persistent psychological distress should be incorporated into youth-friendly services.

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Abbreviations

CI: Confidence interval
DASS-21: Depression Anxiety Stress Scale-21
IEC: Institutional Ethics Committee
OR: Odds ratio
PSQI: Pittsburgh Sleep Quality Index
SD: Standard deviation

Source of funding

The study had no funding.



Conflict of interest

The authors declare no conflict of interest.

Author Contributions

Page | 8 **MSP** -Concept and design of the study, results interpretation, review of literature, and preparation of the first draft of the manuscript. Statistical analysis and interpretation, revision of manuscript.

Data availability

Data is Available

Author Biography

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