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PROBLEMATIC INTERNET USE AND ITS ASSOCIATION WITH PSYCHOLOGICAL DISTRESS AND BEDTIME PROCRASTINATION AMONG MBBS STUDENTS IN SOUTH INDIA: A CROSS-SECTIONAL STUDY

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ABSTRACT

Background: Problematic internet use may coexist with psychological distress and delayed bedtime among MBBS students, but Indian evidence examining these concerns together is limited.

Materials and Methods: An analytical cross-sectional study was performed from June 25 to July 25, 2026, involving 185 MBBS students at an educational institution in Eluru, Andhra Pradesh. Participants undertook the Internet Addiction Test (IAT), the Depression Anxiety Stress Scale-21 (DASS-21), and the Bedtime Procrastination Scale (BPS). The principal analyses employed continuous metrics and Spearman correlations; the secondary categorical analyses utilized exact or chi-square tests along with effect sizes.

Results: The mean age was 20.61±1.31 years (valid n=184), and 109 participants (58.9%) were female. Twenty-seven students (14.6%; 95% CI, 10.2%-20.4%) had IAT scores of 50 or higher. DASS-21 scores above the normal range were observed for depression in 104 students (56.2%), anxiety in 93 (50.3%), and stress in 50 (27.0%). IAT scores correlated positively with depression (rho=0.570), anxiety (rho=0.563), stress (rho=0.575), and bedtime procrastination (rho=0.413); all $p<0.001$. In a secondary protocol-defined comparison, higher bedtime procrastination was associated with greater unadjusted odds of an IAT score of 50 or higher (OR, 4.02; 95% CI, 1.73-9.35).

Conclusion: Problematic internet use was consistently associated with psychological distress and bedtime procrastination among MBBS students. Although causality cannot be inferred, the clustering of these concerns supports evaluating integrated, non-punitive strategies addressing digital self-regulation, mental health, and sleep and warrants multicentre longitudinal studies using objective digital-use and sleep measures.

Keywords: anxiety; bedtime procrastination; depression; MBBS students; problematic internet use; stress.

INTRODUCTION

The internet is integral to communication, education, healthcare, and access to information. For MBBS students, it supports online learning, literature searches, clinical guidelines, and self-directed study. When use becomes difficult to control, however, it may interfere with academic work, social functioning, psychological well-being, and daily routines.[1-3]

Problematic internet use is best understood here as a pattern of impaired control and adverse consequences measured with a screening instrument, rather than as a formal psychiatric diagnosis. Features commonly described include preoccupation, unsuccessful attempts to reduce use, mood modification, conflict, and continued use despite harm.[1-3] This distinction is important because high internet exposure alone may reflect legitimate educational demands.

Psychological stress is often related to medical training due to the academic workload, examinations, career uncertainty and the emotional stress of clinical learning.[4] Problematic internet use and psychological distress may reciprocally influence each other via avoidance coping, disturbed routines, social withdrawal or attempts to regulate negative emotions.[5,6] However, the cross-sectional studies cannot infer temporal direction. "Bedtime procrastination" refers to delaying sleep until later than planned, in the absence of external reasons to postpone sleep.[7,8] Digital activities may facilitate this behaviour through continuous content, immediate rewards, and reduced self-regulation late in the day. Although problematic internet use, psychological distress, and bedtime procrastination have each been studied among university students, evidence evaluating all three among Indian MBBS students is limited. This study therefore aimed to describe problematic internet use and examine its association with depression, anxiety, stress, and bedtime procrastination among MBBS students in South India.

MATERIALS AND METHODS

Study design and setting

This analytical cross-sectional study was conducted at Alluri Sitarama Raju Academy of Medical Sciences, a tertiary-care teaching institution in Eluru, Andhra Pradesh, India, from 25 June to 25 July 2026.

Participants and sampling

MBBS students who were available during the study period, were willing to participate, provided electronic informed consent, and submitted complete questionnaires were included. In accordance with the approved protocol, students receiving medication for depression or anxiety were excluded.

Data were collected through a self-administered online Google Form using convenience sampling. A total of 185 complete eligible responses were included in the analysis.

Sample size

The minimum sample size was calculated using Cochran's formula, $n = Z^2p(1-p)/d^2$. At a 95% confidence level ($Z = 1.96$), an anticipated prevalence of 42.7% from an Indian college-student study[9] and an absolute precision of 8%, the required sample was 146.9, rounded to 147. After adding 10% for possible non-response or incomplete questionnaires, the target was approximately 162 participants. The final sample of 185 exceeded this target.

Measures

Young's Internet Addiction Test (IAT): The IAT contains 20 items scored from 0 (not applicable) to 5 (always), producing a total score from 0 to 100.[1] The prespecified score bands used in the study protocol were 0-30 (normal), 31-49 (mild), 50-79 (moderate), and 80-100 (severe). These bands represent questionnaire severity categories, not clinical diagnoses. The primary analyses used continuous IAT scores. Due to only two participants in the severe range, secondary categorical analyses were conducted comparing scores below 50 to scores of 50 or greater. In this sample, internal consistency was excellent (Cronbach's $\alpha = 0.943$).

Depression Anxiety Stress Scale-21 (DASS-21): The English DASS-21 contains seven items for each of the depression, anxiety, and stress domains, rated from 0 to 3.[10,11] Subscale totals were multiplied by two. The prespecified severity ranges were the following: depression, 0-9 normal, 10-13 mild, 14-20 moderate, 21-27 severe, and 28 or higher extremely severe; anxiety, 0-7 normal, 8-9 mild, 10-14 moderate, 15-19 severe, and 20 or higher extremely severe; and stress, 0-14 normal, 15-18 mild, 19-25 moderate, 26-33 severe, and 34 or higher extremely severe. DASS-21 scores quantify symptom severity and should not be interpreted as clinical diagnoses. Cronbach's alpha was 0.913 for depression, 0.909 for anxiety, and 0.918 for stress.

The Bedtime Procrastination Scale (BPS) evaluates bedtime procrastination using a 9-item instrument created by Kroese and associates.Items were rated from 1 (strongly disagree) to 5 (strongly agree), with positively worded items reverse-scored so that higher totals indicated greater bedtime procrastination. Scores could range from 9 to 45. The continuous BPS score was used in the primary analysis. Because no validated clinical cut-off is available, the protocol-defined ranges of 9-27 and 28-45 were used only for secondary descriptive analyses and were labelled as lower/average and higher bedtime procrastination. Internal consistency was acceptable (Cronbach's alpha = 0.791).

Ethical considerations

Participation was voluntary, and electronic informed consent was obtained before access to the

questionnaire. The Institutional Ethics Committee of Alluri Sitarama Raju Academy of Medical Sciences, Eluru, approved the study (Approval No. 054/2026, dated 24 June 2026).

Statistical analysis

Data were entered in Microsoft Excel and analysed using IBM SPSS Statistics version 31.0 (IBM Corp., Armonk, NY, USA). Continuous variables were summarised the mean and standard deviation or the and standard deviation or median and interquartile range, as appropriate; categorical variables were reported as frequencies and percentages.

Cronbach's alpha was calculated for each scale and DASS-21 subscale. Spearman rank correlation was the primary method for evaluating associations between continuous IAT, DASS-21, and BPS scores. Secondary categorical analyses used Fisher-Freeman-Halton exact tests for 4x2 tables because of sparse expected cell counts and Pearson chi-square for the 2x2 IAT-BPS comparison. Cramer's V or phi was reported as the effect size. The unadjusted odds ratio and 95% confidence interval were calculated for the IAT-BPS comparison. Multivariable modelling was not undertaken because only 27 participants had an IAT score of 50 or higher, limiting stable estimation. Tests were two-sided, and $p < 0.05$ was considered statistically significant.

RESULTS

Participant characteristics

A total of 185 complete responses were analysed. Of the participants, 109 (58.9%) were female and 76 (41.1%) were male. After exclusion of one implausible age entry from the age summary, the mean age among 184 participants was 20.61±1.31 years; the median was 20 years (IQR, 20-21), and the range was 18-30 years (Table 1).

Problematic internet use, psychological distress, and bedtime procrastination

The mean IAT score was 34.79±17.32. Seventy students (37.8%) had scores in the normal range, 88 (47.6%) in the mild range, 25 (13.5%) in the moderate range, and 2 (1.1%) in the severe range. Overall, 27 students (14.6%; 95% CI, 10.2%-20.4%) had an IAT score of 50 or higher (Table 2).

DASS-21 scores above the normal range were observed in 104 students (56.2%) for depression, 93 (50.3%) for anxiety, and 50 (27.0%) for stress. Severe or extremely severe symptom scores were reported by 27 students (14.6%) for depression, 46 (24.8%) for anxiety, and 12 (6.5%) for stress (Table 2).

The mean BPS score was 25.54±5.60 (range, 9-45). In the secondary protocol-defined categories, 127 students (68.6%) were classified as having lower/average bedtime procrastination and 58 (31.4%) as having higher bedtime procrastination (Table 1).

Associations with problematic internet use

IAT scores correlated positively with depression (rho=0.570), anxiety (rho=0.563), stress (rho=0.575), and bedtime procrastination (rho=0.413); all $p<0.001$ (Table 3).

The proportion with an IAT score of 50 or higher increased across worsening DASS-21 categories. It rose from 4.9% among students with normal depression scores to 40.7% among those with severe or extremely severe scores (exact $p<0.001$; Cramer's V=0.343); from 5.4% to 28.3% across the corresponding anxiety categories (exact p=0.002; Cramer's V=0.274); and from 8.1% to 41.7% across the corresponding stress categories (exact $p<0.001$; Cramer's V=0.335) (Table 4).

In the secondary BPS comparison, 16 of 58 students (27.6%) in the higher bedtime-procrastination category had an IAT score of 50 or higher, compared with 11 of 127 (8.7%) in the lower/average category (Pearson chi-square=11.44, df=1, $p<0.001$; phi=0.249). The unadjusted odds were approximately four times greater in the higher BPS category (OR, 4.02; 95% CI, 1.73-9.35) (Table 5)

Table 1. Participant characteristics and scale summaries (n=185)

Characteristic	Summary
Age, years (valid n=184)	Mean 20.61±1.31; median 20 (IQR, 20-21); range 18-30
Female sex	109 (58.9%)
Male sex	76 (41.1%)
IAT score	Mean 34.79±17.32
BPS score	Mean 25.54±5.60; range 9-45
Lower/average bedtime procrastination (BPS 9-27)	127 (68.6%)
Higher bedtime procrastination (BPS 28-45)	58 (31.4%)

Table 2. Distribution of IAT and DASS-21 severity categories (n=185)

Measure/domain	Category	n (%)
IAT	Normal (0-30)	70 (37.8%)
	Mild (31-49)	88 (47.6%)
	Moderate (50-79)	25 (13.5%)
	Severe (80-100)	2 (1.1%)
	Score ≥50	27 (14.6%)
Depression	Normal	81 (43.8%)

	Mild	21 (11.4%)
	Moderate	56 (30.3%)
	Severe	17 (9.2%)
	Extremely severe	10 (5.4%)
Anxiety	Normal	92 (49.7%)
	Mild	11 (5.9%)
	Moderate	36 (19.5%)
	Severe	11 (5.9%)
	Extremely severe	35 (18.9%)
Stress	Normal	135 (73.0%)
	Mild	13 (7.0%)
	Moderate	25 (13.5%)
	Severe	8 (4.3%)
	Extremely severe	4 (2.2%)

Table 3. Correlations of IAT score with psychological distress and bedtime procrastination (n=185)

Variable	Spearman rho	p value
Depression score	0.570	<0.001
Anxiety score	0.563	<0.001
Stress score	0.575	<0.001
BPS score	0.413	<0.001

Table 4. Association between DASS-21 severity and IAT category (n=185)

DASS-21 domain	Severity	IAT <50, n (%)	IAT ≥50, n (%)
Depression	Normal	77 (95.1%)	4 (4.9%)
	Mild	19 (90.5%)	2 (9.5%)
	Moderate	46 (82.1%)	10 (17.9%)
	Severe/extremely severe	16 (59.3%)	11 (40.7%)
Anxiety	Normal	87 (94.6%)	5 (5.4%)
	Mild	9 (81.8%)	2 (18.2%)
	Moderate	29 (80.6%)	7 (19.4%)
	Severe/extremely severe	33 (71.7%)	13 (28.3%)
Stress	Normal	124 (91.9%)	11 (8.1%)
	Mild	11 (84.6%)	2 (15.4%)
	Moderate	16 (64.0%)	9 (36.0%)
	Severe/extremely severe	7 (58.3%)	5 (41.7%)

Fisher-Freeman-Halton exact tests: depression p<0.001, anxiety p=0.002, stress p<0.001. Cramer's V calculated from Pearson chi-square was 0.343, 0.274, and 0.335, respectively

Table 5. Association between protocol-defined bedtime-procrastination category and IAT category (n=185)

Bedtime-procrastination category	IAT <50, n (%)	IAT ≥50, n (%)	Total
Lower/average (BPS 9-27)	116 (91.3%)	11 (8.7%)	127
Higher (BPS 28-45)	42 (72.4%)	16 (27.6%)	58
Total	158	27	185

Pearson chi-square=11.44, df=1, p<0.001; phi=0.249. Unadjusted OR=4.02 (95% CI, 1.73-9.35). The BPS categories were protocol-defined and are not validated clinical thresholds

DISCUSSION

In the present study among MBBS students, 14.6% had IAT scores of 50 or higher, while 47.6% were in the mild score range. Greater problematic internet-use scores were consistently associated with higher depression, anxiety, stress, and bedtime-procrastination scores. Stress showed the largest correlation, although the correlations with depression and anxiety were similar in magnitude. These findings indicate clustering of digital-use difficulties, psychological symptoms, and delayed bedtime; they do not establish that one causes another.

Prevalence estimates for problematic internet use vary considerably because studies differ in populations, sampling methods, instruments, and cut-offs.[12-14] An Indian systematic review reported pooled estimates ranging from approximately 20% at an IAT threshold of 50 to about 41% at a threshold of 40.[13] The 14.6% estimate in the present study is therefore lower than the pooled estimate based on the same threshold, but close to the 15.9% reported in a recent Indian college-student study.[16] The lower estimate may reflect the local patterns of internet use, examination timing, or selection introduced by convenience sampling and the protocol exclusion of students receiving treatment for depression or anxiety.

The positive correlations with depression, anxiety, and stress are consistent with university-student literature .[14-16] Several mechanisms are plausible. Students experiencing distress may use online activities to avoid academic demands or regulate negative emotions, while poorly controlled use may displace study, physical activity, face-to-face

interaction, and sleep, thereby increasing distress.[2,5,6] Prevalent underlying elements, such as challenges in self-regulation or academic pressure, may also play a role in both. Due to the simultaneous measurement of exposure and outcome, the directionality and independence of these associations remain indeterminate. The correlation with bedtime procrastination was less pronounced than the connections with DASS-21 domains, yet it still held significance. Digital platforms can prolong usage past designated bedtimes via incessant content and prompt reinforcement. Previous cross-sectional and longitudinal studies have associated problematic smartphone usage with delays in bedtime and sleep-related issues. The present study did not measure the timing or purpose of internet use, sleep duration, sleep quality, chronotype, or objective screen exposure, so bedtime procrastination should not be interpreted as a demonstrated causal pathway.

The findings also require distinction between educational internet use and impaired control. MBBS students depend on online resources for lectures, journals, clinical applications, guidelines, and peer communication. Interventions should therefore not frame all screen time as harmful. A more appropriate focus would be loss of control, functional impairment, late-night recreational use, maladaptive coping, and persistent sleep disruption. Medical colleges could evaluate integrated approaches combining digital-wellness education, stress-management skills, sleep-hygiene guidance, and accessible counselling rather than isolated restrictions on device use.

This study has several strengths. It assessed problematic internet use, three dimensions of psychological distress, and bedtime procrastination in the same sample using established instruments with acceptable to excellent internal consistency. Continuous scores were prioritised, and effect sizes and confidence intervals were reported. The main limitations are the cross-sectional design, convenience sampling, restriction to one institution, and reliance on online self-report. Recall, social desirability, selection, and common-method biases are possible. The study did not separate academic from recreational internet use or collect objective digital-use and sleep measures. The protocol-defined BPS categories lack validated clinical cut-offs and were therefore used only in secondary analyses. Excluding students receiving medication for depression or anxiety may have underestimated psychological distress and altered observed associations. Finally, the small number of participants with IAT scores of 50 or higher prevented reliable adjustment for potential confounders; all categorical associations and the odds ratio are unadjusted.

CONCLUSION

Among MBBS students at a South Indian medical college, higher problematic internet-use scores consistently clustered with greater depression, anxiety, stress, and bedtime procrastination, and approximately one in seven participants had IAT scores of 50 or higher. The cross-sectional, single-centre design precludes causal inference and population-level generalisation; nevertheless, the convergence of these findings identifies an educationally relevant pattern of co-occurring concerns. Medical colleges should evaluate integrated, non-stigmatising approaches that strengthen digital self-regulation, psychological support, and healthy sleep practices rather than relying on blanket screen-time restrictions. Multicentre longitudinal studies across different stages of medical training, incorporating objective digital-use and sleep measures and adequate control of confounding, are needed to clarify directionality and determine whether such approaches improve student well-being.

DECLARATIONS

Ethics approval and consent to participate: Electronic informed consent was obtained from all participants. The study was approved by the Institutional Ethics Committee of Alluri Sitarama Raju Academy of Medical Sciences, Eluru (Approval No. 054/2026, dated 24 June 2026).

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