

Internet Addiction and Mental Distress Among Undergraduate Medical Students: A Sequential Explanatory Mixed-Methods Study

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ABSTRACT

Background: Problematic internet use is increasingly relevant among medical students because of extensive academic and recreational dependence on digital technology. This study assessed moderate/severe internet addiction, mental distress, associated factors, and experiences underlying severe internet addiction.

Methods: A sequential explanatory mixed-methods study was conducted among 200 undergraduate medical students at a teaching hospital in Eastern India. Stratified random sampling selected 50 students from each of four MBBS phases. Internet addiction was assessed using the 20-item Internet Addiction Test (IAT), with scores ≥ 50 defining moderate/severe addiction. Mental distress was assessed using the SRQ-20, with scores ≥ 8 indicating distress. Bivariate analyses and separate multivariable logistic regression models were performed. Variables with $p < 0.20$ and epidemiological relevance were considered for multivariable analysis. Sparse cells were assessed, and during- and post-working-hour categories were combined in the internet-addiction model because of complete separation. All 14 students with severe addiction underwent in-depth interviews, followed by thematic analysis and integration using a joint display.

Results: Moderate/severe internet addiction was present in 95/200 (47.5%; 95% CI: 40.7–54.4%), while mental distress was present in 72/200 (36.0%; 95% CI: 29.7–42.9%). IAT and SRQ-20 scores were positively correlated (Spearman's $\rho = 0.463$, $p < 0.001$). Screen time was independently associated with internet addiction (AOR 1.38, 95% CI 1.19–1.54) and mental distress (AOR 1.18, 95% CI 1.06–1.31). Qualitative analysis identified coping escape, entertainment/social validation, and loss of control with late-night use.

Conclusion: Problematic internet use and mental distress were common and significantly correlated among medical students. The findings represent associations and do not establish causality or temporal direction.

Keywords: Internet addiction; medical students; mental distress; IAT; SRQ-20; mixed-methods study; screen time.

INTRODUCTION

Internet use has become deeply embedded in academic and social life, and medical students are especially vulnerable because their training demands long study hours, constant online communication, and regular dependence on digital resources. At the same time, excessive or poorly regulated internet use has been recognized as a public health concern, with evidence that it can interfere with sleep, concentration, emotional regulation, academic functioning, and social relationships. A systematic review of medical students found that internet addiction disorder is positively associated with psychiatric morbidity, with moderate correlations reported for anxiety, depression, and stress, and a smaller association with sleep problems. ^[1]

The burden of internet addiction among medical students is substantial. A 2024 systematic review of 13 studies involving 4,787 medical students estimated a worldwide pooled prevalence of 29% (95% CI 19%–41%), approximately five times that seen in the general population. ^[2] Studies from India have also shown a considerable burden, including reports of moderate-to-severe internet addiction around one-third of medical undergraduates and strong associations with psychological distress, depression, anxiety, stress, and poor sleep quality. ^[3,4] These findings suggest that internet addiction is not simply a behavioural habit but a multidimensional problem with psychological and academic consequences.

The relevance of the present study is strengthened by the fact that most available studies on internet addiction among medical students are quantitative and cross-sectional, which limits understanding of how students actually experience prolonged use, why certain behaviours persist, and how psychological distress interacts with digital behaviour. Existing literature indicates that problematic internet use may function as a coping strategy for stress, loneliness, and emotional strain, but the lived context behind these associations is less well

described. ^[5] In medical students, this gap is especially important because early identification of excessive internet use may help prevent worsening distress, sleep disruption, procrastination, and impaired academic performance.

Against this background, the present study was designed as a sequential explanatory mixed-methods study among undergraduate medical students in Eastern India. The quantitative phase assessed the distribution of internet addiction and mental distress and examined their correlates using the Internet Addiction Test (IAT-20) and the Self-Reporting Questionnaire (SRQ-20). The qualitative phase, limited to participants with severe internet addiction, explored the behavioural and psychosocial context of excessive internet use so that the numerical associations could be interpreted more meaningfully. The overall objective was to determine the burden of internet addiction, examine its relationship with mental distress, and understand the reasons and patterns underlying severe internet use among MBBS students.

MATERIALS & METHODS

This study adopted a sequential explanatory mixed-methods design, comprising an initial quantitative cross-sectional phase followed by a qualitative phase using in-depth interviews (IDIs), with subsequent integration of findings from both components. The study was conducted among undergraduate MBBS students at a teaching hospital in Eastern India. The quantitative phase was undertaken to determine the magnitude and factors associated with internet addiction and mental distress, while the qualitative phase was designed to provide contextual explanations for the quantitative findings by exploring the experiences and behavioral patterns of students with severe internet addiction.

Quantitative phase: The study population comprised undergraduate students from all four phases of the MBBS course. Students

aged 18 years or above, enrolled in the institution during the study period, and willing to participate after providing written informed consent were eligible. Students who were unavailable during data collection despite repeated attempts, declined participation, or returned substantially incomplete questionnaires were excluded. The sample size for the quantitative component was estimated using a reported prevalence by Abbas et al. of moderate-to-severe internet addiction of 35.3%.^[6] Using the single-population proportion formula, with a 95% confidence level, and absolute precision of 7%, the minimum sample size was calculated as 179. After allowing 10% for non-response or incomplete data, the required sample was approximately 199, which was rounded to 200 participants to facilitate equal representation from the four phases of MBBS. A stratified random sampling technique was employed. The undergraduate students were divided into four strata according to their academic phases. The list of eligible students from each phase constituted the respective sampling frame. From each stratum, 50 students were selected by simple random sampling, yielding a total quantitative sample of 200 students.

Quantitative data were collected using a structured, self-administered questionnaire containing socio-demographic and internet use variables. The questionnaire additionally incorporated the 20-item Internet Addiction Test (IAT-20)^[7] and Self-Reporting Questionnaire-20 (SRQ-20).^[8] The IAT-20 consists of 20 items rated on a six-point Likert scale ranging from 0 (Not Applicable) to 5 (Always), producing a total score between 0 and 100. Participants were classified as having normal internet use (0–30), mild internet addiction (31–49), moderate internet addiction (50–79), or severe internet addiction (80–100). For analytical purposes, the outcome was dichotomized as normal/mild (IAT <50) and moderate/severe internet addiction (IAT ≥50). The IAT has demonstrated good psychometric consistency in the Indian

setting, with the English version reporting a Cronbach's alpha of 0.905, indicating excellent internal consistency.^[9] The SRQ-20 consists of 20 dichotomously scored items and was used to screen for mental distress. A total score of ≥8 was considered indicative of mental distress, while a score <8 was classified as absence of mental distress. Previous validation studies have demonstrated good internal consistency of the SRQ-20, with Cronbach's alpha generally exceeding 0.80.^[10] Standardized administration and scoring procedures were maintained for both instruments to ensure consistency of measurement across participants.

Qualitative phase: Following completion of the quantitative phase, participants with severe internet addiction (IAT score 80–100) were eligible for the qualitative component. All 14 participants meeting this predefined criterion were invited and participated in in-depth interviews (IDIs); thus, participant selection was criterion-based and comprised the complete severe-internet-addiction subgroup identified in the quantitative phase. A semi-structured interview guide was used to explore participants' experiences, patterns, motivations, and perceived reasons for excessive internet use. Interviews were conducted in a private setting, audio-recorded with permission, and supplemented with field notes. The interviews were transcribed verbatim and anonymized before analysis. The researchers familiarized themselves with the transcripts through repeated reading, identified meaningful segments, generated initial codes, and grouped related codes into categories. These categories were subsequently examined to develop overarching themes. Representative quotations were selected to support the interpretation of each theme while maintaining participant anonymity. Analytic rigor was enhanced through systematic documentation of coding decisions, iterative review of codes and themes, and

comparison of interpretations within the research team. As the qualitative sample comprised all participants meeting the predefined severe-IAT criterion, information adequacy was assessed across the complete subgroup rather than by applying a predetermined numerical saturation target.

Integration of the quantitative and qualitative findings was undertaken during interpretation using a joint display approach. The qualitative findings were used to explain and contextualize important quantitative associations, particularly those relating to screen time, timing of internet use, mental distress, and patterns of excessive internet use. The integrated findings were used to develop an overall interpretation of the study results. The sequential explanatory pathway is presented in Figure 1. The study was undertaken after approval from the Institutional Ethics Committee. Written informed consent was obtained from all participants, including separate permission for audio-recording of interviews. Participation was voluntary, and confidentiality and anonymity were maintained using unique participant identifiers. Quantitative records, interview recordings, transcripts, and field notes were securely stored and were accessible only to the research team.

Statistical Analysis

Data were compiled in Microsoft Excel and analysed using Jamovi version 2.3.28. Continuous variables were summarized using mean $\pm$ standard deviation or median with interquartile range (IQR), as appropriate, while categorical variables were presented as frequencies and percentages. The distribution of continuous variables was assessed before selecting the appropriate statistical test. As the IAT and SRQ-20 scores and screen-time-related variables were not assumed to follow a normal distribution, comparisons of continuous variables between outcome groups were performed using the Mann–Whitney U test. Associations between

categorical variables were assessed using the Pearson chi-square test or Fisher's exact test when expected cell frequencies were small. The two primary binary outcomes were moderate/severe internet addiction, defined as an IAT score ≥ 50 , and mental distress, defined as an SRQ-20 score ≥ 8 . Correlations between IAT score and SRQ-20 score was assessed using Spearman's rank correlation.

For multivariable analysis, separate binary logistic regression models were developed for moderate/severe internet addiction and mental distress. Variables considered epidemiologically relevant and/or showing $p < 0.20$ in bivariate analysis were considered for inclusion in the respective multivariable models. Adjusted odds ratios (AORs) with 95% confidence intervals (CIs) were reported. Multicollinearity among candidate predictors was assessed before fitting the final models. Sparse contingency cells were examined before modelling, and the original four-category maximum-use variable was reviewed for sparse-cell problems. In particular, the "during working hours" category contained no participants with moderate/severe internet addiction; therefore, conventional maximum-likelihood logistic regression produced an unstable estimate because of complete separation. To obtain a stable model, the during-working-hours and post-working-hours categories were combined for the internet-addiction model, while the categories were retained separately in the mental-distress model where estimation was possible.

Overall model performance was assessed using the likelihood-ratio chi-square test and McFadden's pseudo- R^2 , with model calibration/fit examined as part of model diagnostics. Statistical significance was set at a two-sided $p < 0.05$.

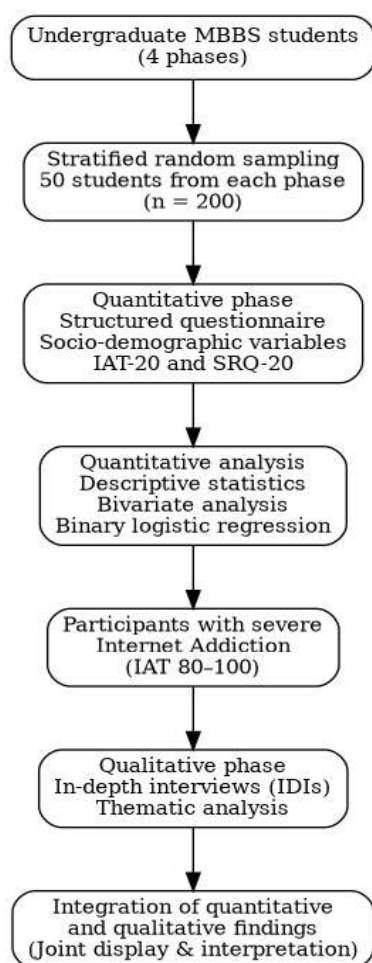


Figure 1. Flow diagram of the sequential explanatory mixed-methods study

RESULT

The overall participant profile, internet-use characteristics, and distribution of the two study outcomes are presented in Table 1, while Figure 2 illustrates the categorical distribution of internet addiction and mental distress. Of the 200 participants, 95 (47.5%; 95% CI: 40.7–54.4%) had moderate-to-severe internet addiction (IAT score ≥ 50), while 72 (36.0%; 95% CI: 29.7–42.9%) screened positive for mental distress (SRQ-20 score ≥ 8). The distribution of IAT categories showed that 32 (16.0%) participants had normal internet use, 73 (36.5%) had mild addiction, 81 (40.5%) had moderate addiction, and 14 (7.0%) had severe internet addiction. Thus, both moderate-to-severe internet addiction and mental distress represented substantial health concerns among the study population. Most participants reported intensive academic use of the internet, with mobile access being nearly universal and social media, entertainment, and gaming also forming important patterns of use. The mean IAT score was close to the threshold of problem.

Table 1. Socio-demographic, internet-use and outcome profile of participants (n=200)

Variable		Value
Age (years), mean $\pm$ SD		23.41 $\pm$ 1.62
Sex	Male	156 (78.0)
	Female	44 (22.0)
Present residence	Hostel	126 (63.0)
	Own home	14 (7.0)
	Paying guest	50 (25.0)
	Rented	10 (5.0)
BG Prasad classification (March 2026)	Upper	136 (68.0)
	Upper middle	36 (18.0)
	Middle	15 (7.5)
	Lower middle	7 (3.5)
	Lower	6 (3.0)
Number of devices used	1	42 (21.0)
	2	124 (62.0)
	3	29 (14.5)
	4	5 (2.5)
Maximum usage	Anytime	73 (36.5)
	During working hours	10 (5.0)
	Post working hours	60 (30.0)
	Late night (post 12AM)	57 (28.5)
Internet cost last month (Rs), mean $\pm$ SD		604.76 $\pm$ 670.09
Screen time yesterday (hours), mean $\pm$ SD		8.10 $\pm$ 3.48

Sources of internet access*	Mobile network	191 (95.5)
	Wi-Fi connection	83 (41.5)
	Broadband	12 (6.0)
Types of devices used*	Mobile	200 (100.0)
	Tablet	116 (58.0)
	Laptop	72 (36.0)
Purposes of internet usage*	Academic purpose	196 (98.0)
	Social media	169 (84.5)
	Entertainment	155 (77.5)
	Gaming	70 (35.0)
IAT score, mean $\pm$ SD		49.36 $\pm$ 20.50
SRQ score, mean $\pm$ SD		6.58 $\pm$ 4.84

* Multiple responses were permitted. IAT = Internet Addiction Test; SRQ = Self-Reporting Questionnaire.

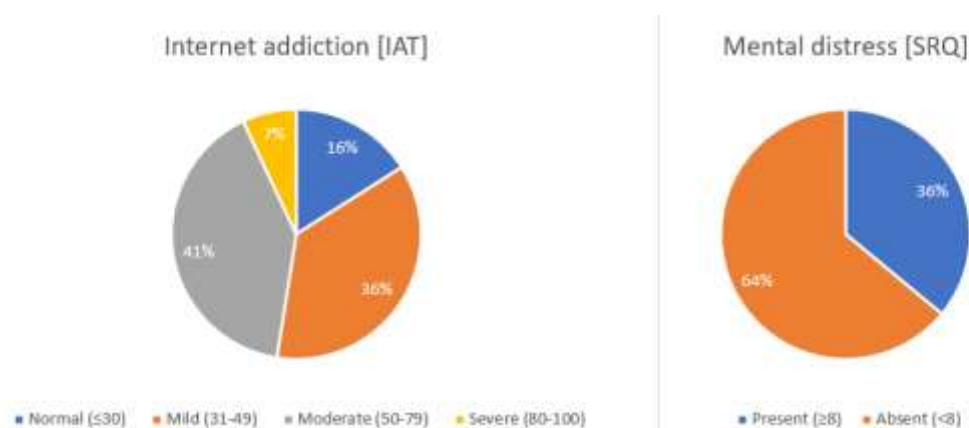


Figure 2. Distribution of internet addiction and mental distress (N = 200)

The associations between participant characteristics and the two binary outcome variables are summarized in Table 2. Correlation analysis demonstrated a statistically significant positive relationship between internet addiction severity and mental distress, with higher IAT scores associated with higher SRQ-20 scores (Spearman's $\rho = 0.463$, $p < 0.001$). In the bivariate analysis, maximum device-use period was significantly associated with moderate/severe internet addiction, while screen time yesterday and monthly internet expenditure were also significantly

associated with the outcome. For mental distress, significant associations were observed with BG Prasad socioeconomic classification, maximum device-use period, and screen time yesterday. Gender showed a borderline association with mental distress, whereas age, present residence, and number of devices used daily were not significantly associated with either outcome. Overall, behavioral characteristics of internet use, particularly duration and timing of use, demonstrated stronger and more consistent associations with the two outcomes than most baseline demographic characteristics.

Table 2. Bivariate analysis of factors associated with moderate/severe internet addiction and mental distress (n=200)

Variable	Category	Internet addiction			Mental distress		
		Normal/Mild	Moderate/Severe	p-value	Absent	Present	p-value
Age (years)*	Median (IQR)	23 (3.0)	23 (2.0)	0.756	23 (2.0)	23 (2.0)	0.450
Gender n (%) †	Female	26 (59.1)	18 (40.9)	0.322	23 (52.3)	21 (47.7)	0.067
	Male	79 (50.6)	77 (49.4)		105 (67.3)	51 (32.7)	
Present	Hostel	68 (54.0)	58 (46.0)	0.901	83 (65.9)	43 (34.1)	0.426

residence n (%) §	Own home	6 (42.9)	8 (57.1)		11 (78.6)	3 (21.4)	
	Paying guest	26 (52.0)	24 (48.0)		28 (56.0)	22 (44.0)	
	Rented	5 (50.0)	5 (50.0)		6 (60.0)	4 (40.0)	
BG Prasad classification n (%) §	Class 1	80 (58.8)	56 (41.2)	0.058	86 (63.2)	50 (36.8)	0.031
	Class 2	15 (41.7)	21 (58.3)		22 (61.1)	14 (38.9)	
	Class 3	7 (46.7)	8 (53.3)		13 (86.7)	2 (13.3)	
	Class 4	1 (14.3)	6 (85.7)		6 (85.7)	1 (14.3)	
	Class 5	2 (33.3)	4 (66.7)		1 (16.7)	5 (83.3)	
Number of devices used daily n (%) §	1	22 (52.4)	20 (47.6)	0.993	25 (59.5)	17 (40.5)	0.740
	2	64 (51.6)	60 (48.4)		79 (63.7)	45 (36.3)	
	3	16 (55.2)	13 (44.8)		21 (72.4)	8 (27.6)	
	4	3 (60.0)	2 (40.0)		3 (60.0)	2 (40.0)	
Maximum device usage n (%) †	Anytime	19 (26.0)	54 (74.0)	<0.001	32 (43.8)	41 (56.2)	<0.001
	During working	10 (100.0)	0 (0.0)		9 (90.0)	1 (10.0)	
	Post-working	49 (81.7)	11 (18.3)		49 (81.7)	11 (18.3)	
	Late night	27 (47.4)	30 (52.6)		38 (66.7)	19 (33.3)	
Screen time yesterday (hr)*	Median (IQR)	6 (4.0)	9 (5.0)	<0.001	7 (4.0)	9 (5.0)	<0.001
Internet expenditure last month (₹) *	Median (IQR)	400 (200)	499 (325)	0.007	400 (205)	500(275)	0.125

* Mann-Whitney U test; † Chi square test; § Fisher's exact test; Outcome definition: moderate/severe internet addiction = IAT score ≥ 50 , mental distress present = SRQ ≥ 8 .

The adjusted regression analyses are presented in Table 3, and the significant predictors are graphically summarized in Figure 3. After adjustment for variables meeting the predefined criterion for inclusion in the multivariable models, screen time on the preceding day remained independently associated with both outcomes. Each additional hour of screen time was associated with higher odds of moderate/severe internet addiction and mental distress. For moderate/severe internet addiction, participants whose maximum internet use occurred during and post-working hours had significantly lower odds compared with those reporting use at

any time, while late-night use showed a borderline association. For mental distress, maximum use during post-working hours and late-night use were independently associated with lower odds compared with unrestricted use throughout the day. Socioeconomic status was independently associated with mental distress, with significantly lower odds observed among the middle and lower-middle BG Prasad categories compared with the reference category. Internet expenditure did not retain statistical significance in either adjusted model. Both multivariable models were statistically significant overall.

Table 3. Multivariable logistic regression for moderate/severe internet addiction and mental distress (n=200)

Outcome	Predictor	Adjusted OR (95% CI)	p-value
Moderate/severe internet addiction	Screen time yesterday (per hour)	1.38 (1.19–1.54)	<0.001
	Internet cost last month (per Rs.)	1.00 (0.99–1.01)	0.651
	BG Prasad classification [Reference: Lower]	0.37 (0.04–3.11)	0.359
	Upper middle	0.72 (0.08–6.72)	0.776

		Middle	1.06 (0.10–11.79)	0.961
		Lower middle	3.01 (0.14–62.96)	0.477
	Maximum usage [Reference: Anytime]	During and post working hours	0.12 (0.05–0.31)	<0.001
		Late night (post 12AM)	0.44 (0.19–1.02)	0.055
Mental distress	Screen time yesterday (per hour)		1.18 (1.06–1.31)	0.002
	Internet cost last month (per Rs.)		1.00 (0.99–1.01)	0.248
	Male vs female		0.52 (0.23–1.15)	0.104
	BG Prasad classification [Reference: Lower]	Upper	0.13 (0.01–1.44)	0.095
		Upper middle	0.11 (0.01–1.33)	0.082
		Middle	0.03 (0.00–0.60)	0.021
		Lower middle	0.02 (0.00–0.65)	0.027
	Maximum usage [Reference: Anytime]	During working hours	0.21 (0.02–1.86)	0.159
		Post working hours	0.19 (0.08–0.48)	<0.001
		Late night (post 12AM)	0.42 (0.19–0.93)	0.031

Internet addiction model fit: $\chi^2=88.7$, $df=8$, $p<0.001$; McFadden $R^2=0.321$. Mental distress model fit: $\chi^2=52.2$, $df=10$, $p<0.001$; McFadden $R^2=0.200$. $p<0.2$ in bivariate analysis is considered as predictor here.

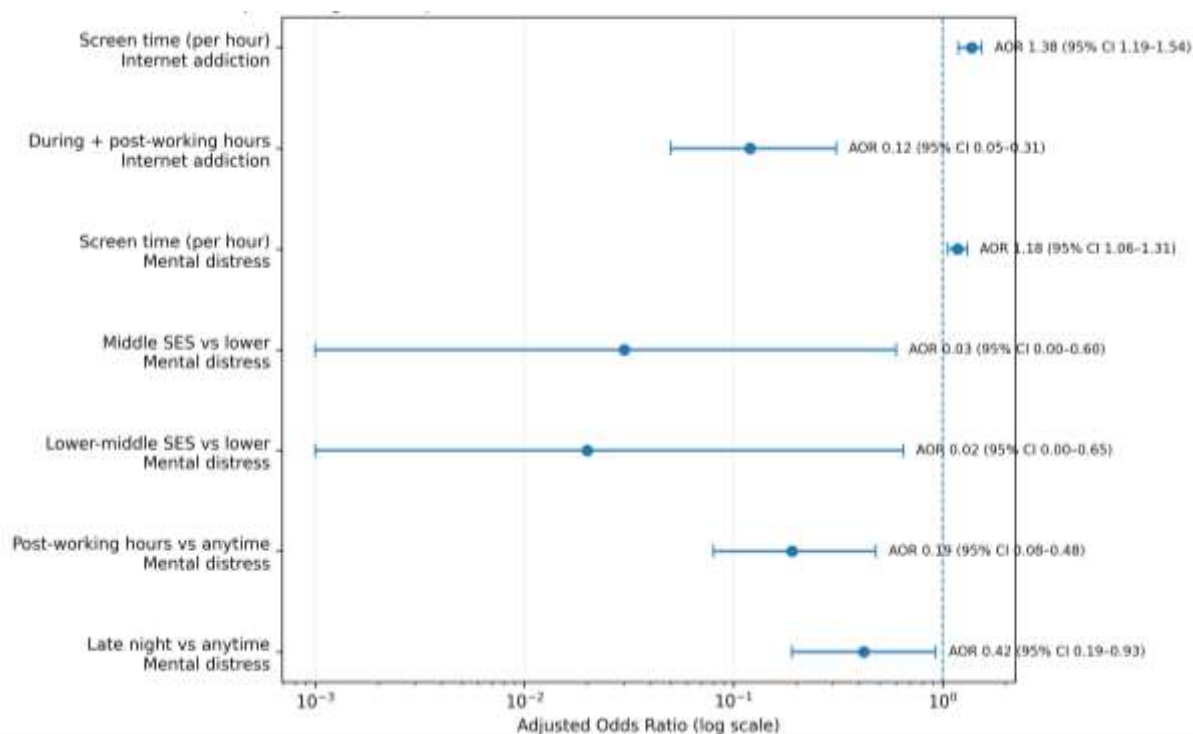


Figure 3: Forest plot of significant predictors of moderate/severe internet addiction and mental distress

Three major themes emerged from the in-depth interviews: internet use as a coping escape, entertainment and social validation, and loss of control with late-night

compulsive use (Table 4). Participants described turning to the internet to cope with academic pressure, loneliness, boredom, and emotional strain, while social media, short-form videos, and gaming provided immediate gratification and opportunities for social connection. Fear of missing out, repeated checking, and

difficulty disengaging from online content further reinforced prolonged use. Loss of control was particularly evident around bedtime, when intentions to stop were frequently overridden by continued scrolling, notifications, and “one more video” behavior.

Table 4. Qualitative findings among participants with severe internet addiction (n=14)

Sl. No.	Theme	Codes	Illustrative quotation	Interpretation
1.	Internet use as a coping escape	Academic stress, loneliness, boredom, emotional relief	“When academic pressure builds up, I go online to distract myself for a while.”	Suggests internet use is not merely recreational but functions as a short-term coping mechanism.
2.	Entertainment and social validation	Reels/videos, gaming, social media checking, fear of missing out	“I open social media for a break, but I keep checking again and again because I do not want to miss anything.”	Reflects entertainment dependency and the need for social connection/validation.
3.	Loss of control and late-night compulsive use	Using longer than intended, bedtime scrolling, notification-driven return	“I decide to stop, but one more video turns into an hour or more.”	Consistent with compulsive use, poor self-regulation, and delayed bedtime behaviour.

Integration of the quantitative and qualitative findings demonstrated substantial convergence between the two components of the study (Table 5). The observed relationships of screen time and timing of device use with the study outcomes were contextualized by narratives of prolonged scrolling, binge-watching, repeated checking, and delayed bedtime. Similarly, the positive correlation between mental distress and internet addiction severity was complemented by participants’

descriptions of using the internet as an escape from academic and emotional stress. Taken together, the integrated findings suggest that severe internet addiction among medical students may be sustained by an interconnected cycle of stress-related coping, reward-seeking behavior, social reinforcement, and poorly regulated late-night internet access, with sleep disruption and academic procrastination emerging as important reported difficulties associated with problematic internet use.

Table 5: Joint display integrating quantitative and qualitative findings

Quantitative signals	Qualitative explanations
Screen time yesterday was strongly associated with both outcomes	Students described prolonged scrolling, binge watching, repeated checking and difficulty stopping once online
Post working hours and late-night device use was associated with the outcomes	Interviewees reported bedtime use, notification-driven return, ‘one more video’ behavior and sleep delay
Mental distress was common and correlated with internet addiction severity	Participants used internet as an escape from academic pressure, loneliness and emotional strain
Social media and entertainment were dominant purpose of internet usage	Reported fear of missing out, habit loops, instant reward and passive scrolling
Integrated interpretation: Severe internet addiction appears to be maintained by stress coping, reward seeking, unregulated late-night access with sleep deprivation and academic procrastination as potential consequences	

DISCUSSION

The present study found that moderate-to-severe problematic internet use and mental distress were common among undergraduate medical students, with a statistically significant positive correlation between IAT and SRQ-20 scores. Almost half of the participants had moderate-to-severe internet addiction, while more than one-third screened positive for mental distress. These findings indicate a substantial coexistence of problematic internet use and psychological distress in this population. The qualitative findings among students with severe internet addiction provided additional context, with participants describing internet use in relation to academic stress, loneliness, boredom, emotional relief, entertainment, social validation, and difficulty controlling prolonged or late-night use. These qualitative observations help contextualize the quantitative associations but, given the cross-sectional design, do not establish a temporal or causal relationship between internet use and mental distress.

The prevalence of moderate-to-severe internet addiction in the present study was higher than estimates reported in some previous studies among medical students, although substantial variation has been documented across settings. A meta-analysis involving 3,651 medical students reported a pooled prevalence of internet addiction of 30.1%, with a prevalence of 32.2% when Young's Internet Addiction Test was used.^[11] The authors also reported considerable heterogeneity between studies, suggesting that differences in populations, settings, assessment instruments, and methodological approaches may contribute to variation in prevalence estimates. Our estimate of 47.5% may partly reflect the use of the IAT ≥ 50 threshold to define the combined moderate/severe category, the inclusion of students from all four MBBS phases through stratified sampling, and institution-specific patterns of internet exposure. A 2024 study from Patna, Bihar reported moderate-to-severe internet

addiction in 28.5% of medical students,^[12] while a study from Bangalore reported internet addiction in 20.1% of participants.^[13] Although these studies also used Young's IAT-20, differences in participant characteristics, institutional environment, patterns of internet access, and cut-off categories may account for the observed differences.

The positive association between internet addiction and mental distress is consistent with findings from previous Indian studies. A South Indian study of medical undergraduates reported moderate-to-severe internet addiction in 31.6% of participants and psychological distress in 41.3%, with a statistically significant association and positive correlation between addiction and distress scores.^[3] In the present study, IAT and SRQ-20 scores were similarly positively correlated (Spearman's $\rho=0.463$, $p<0.001$), suggesting that greater severity of problematic internet use was associated with greater psychological distress. The somewhat different magnitude of association may partly reflect differences in the instruments used to assess psychological symptoms, as the present study used the SRQ-20 whereas the previous study used the K10. These instruments differ in their item content and scoring despite both being screening measures for psychological distress. Importantly, the present cross-sectional data cannot determine whether psychological distress precedes problematic internet use, whether problematic internet use contributes to distress, or whether both are influenced by common underlying factors. Accordingly, the observed association should be interpreted as an overlap between the two conditions rather than evidence of a direction of effect.

Screen time was the most consistent behavioural correlate in the present study. Greater screen time on the preceding day was independently associated with both moderate-to-severe internet addiction and mental distress after adjustment. Each additional hour of screen time was

associated with higher odds of moderate-to-severe internet addiction and mental distress. These findings are compatible with the broader literature indicating an association between greater digital exposure and problematic internet use and psychological symptoms among students. The Patna study similarly identified boredom, academic use, entertainment, and social media as important contexts for excessive internet use among medical students. [12] The qualitative findings in the present study provide further explanation for this quantitative pattern: participants described prolonged scrolling, repeated checking of social media, entertainment use, and difficulty stopping once they had begun using the internet. These accounts suggest that high screen time may reflect several overlapping behaviours rather than a single type of internet activity.

The timing of internet use was also significantly associated with both outcomes in the present study. Maximum use during or after working hours was associated with lower odds of moderate-to-severe internet addiction compared with participants reporting unrestricted use throughout the day, while post-working-hour and late-night use were associated with lower odds of mental distress in the adjusted model. These findings should be interpreted cautiously because the reference category represented participants reporting use at any time, and therefore the observed odds ratios describe statistical differences between usage-pattern categories rather than protective effects of a particular period of internet use. In addition, the cross-sectional design prevents determination of whether the timing of internet use preceded or followed psychological symptoms. The qualitative findings nevertheless indicated that late-night use, repeated checking, and difficulty stopping were prominent experiences among participants with severe internet addiction, providing contextual support for the importance of temporal patterns of use. Socioeconomic status was independently associated with mental distress in the

adjusted analysis. Participants belonging to the middle and lower-middle BG Prasad categories had significantly different odds of mental distress compared with the reference socioeconomic category. However, this finding should be interpreted cautiously because some socioeconomic categories contained relatively few participants, resulting in wide confidence intervals. The bivariate association between socioeconomic status and mental distress was statistically significant, whereas socioeconomic status was not independently associated with moderate-to-severe internet addiction after adjustment. This distinction suggests that socioeconomic characteristics may have a more complex relationship with psychological distress than with problematic internet use in this study population. Further studies with larger samples and more detailed assessment of socioeconomic and psychosocial circumstances would be required to clarify these relationships.

The qualitative component complemented the quantitative findings by identifying three major themes among participants with severe internet addiction: internet use as a coping escape; entertainment and social validation; and loss of control with late-night compulsive use. Participants described turning to the internet during academic pressure, loneliness, boredom, and emotional strain, while social media, videos, and gaming provided entertainment and social connection. Difficulty stopping once online and returning to the internet in response to notifications were also prominent experiences. Similar themes have been reported in a mixed-method study from northeast India, which identified stress and loneliness, entertainment dependency, social validation, compulsive use, and academic avoidance as important dimensions of problematic internet use among medical students. [5] The qualitative findings in the present study should therefore be regarded as explanatory and contextual rather than as evidence that these factors caused severe internet addiction.

The sequential explanatory design allowed the qualitative findings to provide context for the quantitative associations. In particular, the strong association between screen time and both outcomes could be understood alongside participants' descriptions of prolonged scrolling, repeated checking, and difficulty disengaging from online content. Similarly, the association between mental distress and internet addiction was consistent with participants' descriptions of using internet activities for distraction and emotional relief. The joint interpretation therefore indicates that problematic internet use and mental distress may coexist within a complex behavioural and psychosocial context involving academic pressure, emotional coping, entertainment seeking, social interaction, and difficulties with self-regulation. However, these interpretations remain associative because the quantitative component was cross-sectional and the qualitative component was restricted to students with severe internet addiction.

The major strengths of this study were its sequential explanatory mixed-methods design, stratified random sampling across all four MBBS phases, use of standardized IAT and SRQ-20 instruments, and integration of quantitative and qualitative findings through a joint display. The study also specifically explored severe internet addiction through in-depth interviews, providing contextual understanding of the quantitative associations. Limitations include the cross-sectional quantitative design, which precludes establishing temporality or causality, the single-centre setting limiting generalizability, reliance on self-reported measures.

CONCLUSION

Internet addiction and mental distress were common among undergraduate medical students and were significantly correlated. Greater screen time was independently associated with both outcomes, while patterns of maximum internet use and socioeconomic status were also associated

with the respective outcomes after adjustment. Qualitative findings among students with severe internet addiction highlighted academic stress, loneliness, emotional coping, entertainment, social validation, and difficulty controlling internet use as important contextual factors. These findings indicate an important coexistence of problematic internet use and psychological distress but cannot establish causality or temporal direction. Medical colleges may consider screening for problematic internet use and mental distress alongside digital well-being education and accessible counselling support.

Declaration by Authors

Ethical Approval: The study was conducted after obtaining approval from the Institutional Ethics Committee of the concerned institution [Memo No.-BSMC/IEC/4111; date: 19.11.2024]. Written informed consent was obtained from all participants before enrolment. Participation was voluntary, and confidentiality and anonymity of participants were maintained throughout the study

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