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INTERNET ADDICTION AND SLEEP QUALITY AMONG UNIVERSITY STUDENTS IN SOLAN, HIMACHAL PRADESH

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Abstract: Internet Addiction (IA) has become a cause for concern among university students, with more evidence that excessive use of the internet results in negative health consequences. Quality of sleep is an important, though under-investigated, aspect impacted by Internet Addiction (IA) within fast digitising higher education settings, like in India. **Objective:** The purpose of this study was to assess Internet Addiction among undergraduate university students and examine its association with global and component sleep quality. **Methods:** A descriptive, cross-sectional correlation design was used with a sample of 250 undergraduate students in the universities of Himachal Pradesh, India. Internet Addiction level and Sleep Quality were measured by the Internet Addiction Test (IAT) and the Pittsburgh Sleep Quality Index (PSQI). In the data analysis, descriptive statistics, Pearson's correlation coefficients, and independent samples t-tests were employed. **Results:** The findings revealed a high rate of problematic use of the internet, with 52.1% of participants suffering from moderate to severe levels of Internet Addiction. The correlations between Internet Addiction and global sleep quality ($r = 0.63$, $p < .001$), which suggested a worse sleep quality in students with higher levels of IA. There were also strong relationships with sleep latency, sleep disturbances, use of sleep medication, and daytime dysfunction. 'Male' and 'hostel staying' were the major predictors for having IA. **Conclusion:** The results emphasise the prominent role of Internet Addiction as a significant behavioural risk factor for poor sleep quality in university students. Interventions targeting digital self-regulation and sleep hygiene are critical to support student well-being in higher education.

Keywords: Internet Addiction, Problematic Internet Use, Sleep Quality, University Students, Digital Behaviour, Sleep Latency, Daytime Dysfunction

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1. INTRODUCTION

The virtualisation has radically changed the landscape of higher education by integrating web-based technologies in education, testing, socialisation, and recreational practices. Internet use is becoming an inseparable part of the daily life of university students who often count on digital platforms to engage in the academic environment and have social accessibility (Haleem et al., 2022). Although moderate internet use is associated with learning and communication capabilities, improper and overuse have been found to result in maladaptive behavioural outcomes in young adults (Cai et al., 2023). According to recent evidence in the global landscape, the proportion and time spent online by university students have been growing significantly over the past decade, raising the issue of behavioural control and wellbeing (Rouvinen et al., 2021). The concept of internet addiction (IA) is being re-conceptualised as a behavioural addiction that is marked by diminished self-control, compulsive use of online behaviours, and constant utilisation despite a harmful effect (Billieux et al., 2019). The modern theoretical frameworks underscore the fact that IA is not only overuse but rather dysfunctional thinking and emotional processes, which strengthen maladaptive behaviour (Howlett & Paulus, 2024). The interaction of the Person-Affect-Cognition-Execution (I-PACE) model offers a broad understanding of IA by putting the focus on the interaction of multiple factors, starting with individual vulnerabilities, affective response, cognitive bias, and the control mechanisms of the executive (Brand et al., 2019). The empirical neurocognitive studies have also revealed that an impairment in the inhibitory ability and an increase in reward sensitivity are crucial in the maintenance of internet addiction use (León Méndez et al., 2024). Students in universities are one of the most vulnerable groups to internet addiction. Academic stress, flexible daily practices, and fewer parental controls and constant access to smartphones all tend to contribute to the extent of uncontrolled and unregulated use of the internet (Zhang & Zeng, 2024). Research that has been done after 2020 suggests that internet use is even more widespread among college students due to the growth of online education and socialisation through the Internet (Liu & Lin, 2024). Consequently, internet addiction has become an increasingly problematic behavioural health issue in most institutions of higher learning across the globe (Kuss & Lopez-Fernandez, 2016). Among the health areas that have been the most reliable to have a negative impact on because of overuse of the internet is the quality of sleep. Sleep quality is a multidimensional variable comprising the measures of sleep latency, sleep duration, sleep disturbance, and daytime functioning (Saffari et al., 2022). The quality of sleep among university students is extremely high, and it is linked with impaired cognitive functioning, emotional regulation disturbances, and a lack of academic engagement (Yaghmour et al., 2023). Lack of adequate and poor sleep has also

been associated with an increase in psychological distress and overall well-being among young adults as of recently (Vestergaard et al., 2024). A number of behavioural processes describe the interrelationship between addiction to the internet and disturbance of sleep. The use of the internet during the night has been observed to cause cognitive and emotional arousal that makes it hard to disengage and leads to lengthy bedtime routines (Scott et al., 2019). The long hours of exposure to online materials usually replaces the sleep time, which reduces the duration of sleep and alters sleep-wake patterns (AlShareef, 2022). The physiological processes also play a role in sleeping disruption because the light of the blue colour introduced by digital screens inhibits the secretion of melatonin and disrupts circadian control (Silvani et al., 2022). Recent experimental results support the fact that evening screen exposure has a substantial impact on the specimen's sleep latency and subjective sleep quality (Šmotek et al., 2020). Empirical evidence shows that there is a high relationship between internet addiction and low sleep outcomes. The meta-analytic results published in recent years indicate that people with greater levels of internet addiction use are at a significantly increased risk of sleeping disturbances and poor functioning during the day (Alimoradi et al., 2019). These results have been supported by later systematic reviews, which show that there are congruent relationships between internet addiction, delayed sleep onset, and reduced sleep duration (Li et al., 2020). There is still evidence in the literature of cross-sectional studies within the population of university students in different cultural backgrounds that internet addiction is a strong predictor of worse quality of sleep in the world (Lin et al., 2019). Additional literature also indicates that component-level sleep disorders, specifically sleep latency and daytime dysfunction, can be more sensitive measures of excessive internet use than composite measures of sleep alone (Li et al., 2024). The demographic variables also seem to have an effect on internet addiction tendencies and sleep disturbance. The studies show that male students are more likely to report that they use the internet addiction with more often, and this is possible to explain by the fact that they spend more time doing things that are related to entertainment (Su et al., 2019). Another significant variable is the living arrangement, in which students who are staying in hostels or shared accommodation in the university tend to exhibit higher internet addiction scores in contrast to those who are staying with their family (HAYAT et al., 2020). These demographic factors indicate that contextual influences should be taken into account when studying the concept of behavioural addiction and sleep outcomes in students of universities. The rapid digitalisation and growing numbers of smartphones among students in the Indian setting have drastically changed the daily routine and sleep-wake habits of students (Goel et al., 2023). According to recent Indian research studies, internet addiction use is overwhelming among university students, especially after an increase in online and blended learning spaces (Chen & Zhang, 2024). Nevertheless, the prior studies have concentrated on the global sleep quality, with little being known about component-based sleep disruptions, including sleep latency and daytime dysfunction (Park, 2020). Further, there are also demographic moderators like gender and living arrangements, which have not been explored in the context of Indian universities extensively.

2. Objectives of the Study

The present study aimed to examine the prevalence of internet addiction among undergraduate University Students in Solan, Himachal Pradesh, and to assess its association with global and component-level sleep quality.

3. Hypotheses

- **H1:** Internet addiction will be positively associated with poorer global sleep quality among undergraduate university students.
- **H2:** Higher levels of internet addiction will be significantly associated with greater sleep impairments, particularly increased sleep latency and daytime dysfunction.
- **H3:** Levels of internet addiction will differ significantly based on gender and living arrangements.

4. Justification for the Study

Internet addiction behaviour is highly prevalent among university students and is associated with impaired sleep quality. However, little research in India has focused on specific sleep disturbances and sociodemographic variance. There is a lack of research on the prevalence rates of IA and its relationship with sleep quality, both globally and across subcomponents, especially in university undergraduate students from India.

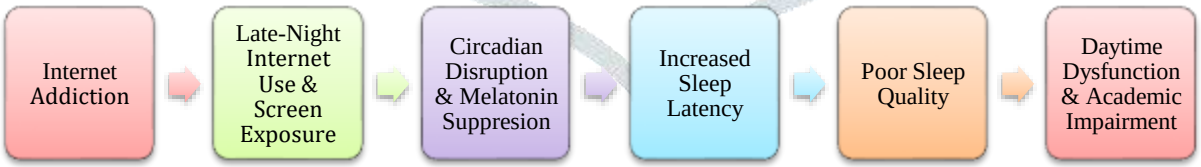

Figure 1: Conceptual framework illustrating the proposed relationship between internet addiction and sleep quality

5. Research Methodology

5.1 Research Design

The study employed a descriptive, cross-sectional correlational design to examine the prevalence of internet addiction and its association with sleep quality among undergraduate university students.

5.2 Participants and Sampling

The sample of the study was 250 undergraduate students selected from Shoolini University and L.R. Institute of Management, Solan, Himachal Pradesh (India). Respondents were recruited from arts, science, and management streams to ensure diversity of disciplines. Proportional sampling by academic year was taken as it resulted from stratified random selection. Full-time undergraduate students who were 19 years of age or older and had experience using the Internet for at least 1 year were recruited to be included in our sample. To mitigate possible confounding factors, all students who were diagnosed with a psychiatric or sleep disorder were excluded. All respondents gave written informed consent to participate in the study.

5.3 Participants and Sampling

The study comprised 400 undergraduate students recruited from Shoolini University and L.R. Institute of Management, Solan, Himachal Pradesh, India. Participants were drawn from arts, sciences, and management to ensure disciplinary diversity. Stratified random sampling was used to achieve representation across academic years. Eligible participants were full-time undergraduate

students aged 18 years or older who had been regular internet users for at least one year. Students with self-reported diagnoses of psychiatric disorders or sleep disorders were excluded to minimise potential confounding effects.

5.4 Questionnaires

5.4.1 Internet Addiction Test (IAT)

Measuring internet addiction was conducted using the Internet Addiction Test, which was developed by Young (Young, 1998). The IAT comprises 20 self-report questions rated out of five points on a Likert scale, to determine the severity of the use of internet addiction. A score of higher fares implies the existence of a greater degree of internet addiction. The scale has proven good reliability and validity in students. The IAT was internally consistent in the current research. IAT demonstrated high internal reliability in the current study (Cronbach's $\alpha > .85$).

5.4.2 Pittsburgh Sleep Quality Index (PSQI)

Sleep quality was measured by the Pittsburgh Sleep Quality Index, which is a self-report questionnaire with 19 items evaluating sleep quality during the last month (Buysse et al., 1989). PSQI gives a score of sleep quality globally and section scores that encompass sleep latency, sleep duration, sleep disturbance, use of sleep medication, and daytime dysfunction. The higher the score, the lower the quality of sleep. The PSQI showed a fair level of internal reliability among the present sample. In the present sample, the PSQI has shown a sufficiently high level of reliability (Cronbach's $\alpha > .80$).

5.5 Procedure

The corresponding institutions were contacted in order to give their permission before data collection. Informed consent was acquired in the form of written consent, and the purpose of the study was clarified to the participants. The data were obtained via self-administered questionnaires that were provided in the classroom. Questionnaires were completed personally, and the participants were guaranteed confidentiality and anonymity. It was done on a voluntary basis, and no incentives were given. The final analysis did not include questionnaires whose answers were not complete.

5.6 Data Analysis

The Statistical Package of the Social Sciences (SPSS-V27) was used to analyse the data. The means and standard deviations were used to summarize the scores on internet addiction, scores on sleep quality, and a profile of the participants. The degree of internet addiction and the quality of sleep variables have been compared to one another through a correlation analysis (Pearson). T-tests of independent samples were used to compare the mean score of internet addiction between genders and the groups of living arrangements. The statistical significance was determined to be $p < .05$.

6. RESULTS AND DISCUSSION

Participants were 250 undergraduate students, with an average age of 21.2 years. There were 135 (54%) male and 115 (46%) female school students. As to residency (132 students), 55.2% (n = 138) lived with their family, 44.8% (n=112) in university flats or hostels. A large proportion of participants (49.6%) reported using the internet for six or more hours per day, representing high digital engagement. The socio-demographic profile of the participants is shown in Table 1 and Figure 1.

Table 1 Socio-Demographic Characteristics of the Participants (N = 250)

Variable	Category	N	Percentage (%)
Gender	Male	135	54
	Female	115	46
Age Group (years)	18–20	124	49.6
	21–23	87	34.8
	24–26	39	15.6
Living Arrangement	With family	112	44.8
	University housing/hostel	138	55.2
Daily Internet Use Duration	≤ 3 hours	52	20.8
	4–5 hours	74	29.6
	≥ 6 hours	124	49.6
Academic Performance (GPA)	≤ 3.9	118	47.2
	≥ 4.0	132	52.8

Figure 1 *Socio-Demographic Characteristics of the Participants (N = 250)*

6.1 Prevalence of Internet Addiction

A high rate of internet addiction use was found among the participants according to the IAT in Table 2 and Figure 2. A high risk of Smartphone addiction was determined in 25.6% (n = 64) of respondents, and a moderate risk in 32.0% (n = 80). Mild substance addiction was found in 32.8% (n = 82), and only 9.6% (n = 24) of the students were considered non-addicted. The overall prevalence of moderate to severe internet addiction was 52.1% in the sample.

Table 2. Distribution of internet addiction severity (N=250)

IAT Category	Score Range	N	Percentage (%)
Normal use	0–30	24	9.6
Mild addiction	31–49	82	32.8
Moderate addiction	50–79	80	32
Severe addiction	80–100	64	25.6

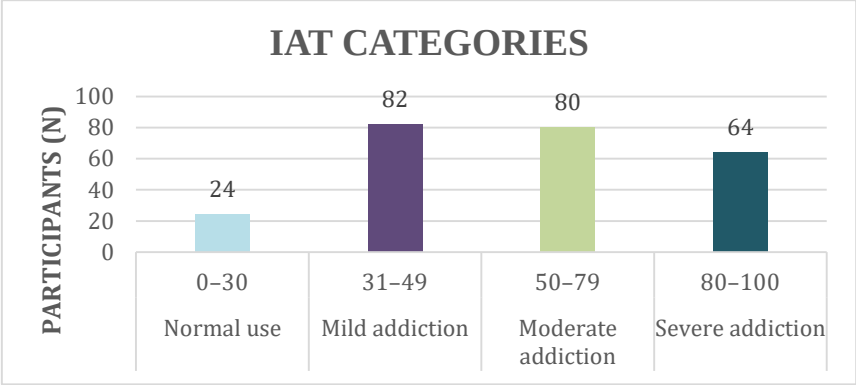

Figure 2: Distribution of Internet Addiction Severity Among Participants (N = 250)

6.2 Sleep Quality Outcomes

Evaluation using Table 3, the Pittsburgh Sleep Quality Index (PSQI), revealed that the participants had poor sleep quality in general. The average global PSQI score was 7.84±2.91, above the recommended clinical cut-off of 5. High mean scores were found for sleep latency 1.82±0.94, sleep disturbances 1.76±0.81 and daytime dysfunction 1.69±0.87.

Table 3. Descriptive results of PSQI Global Score and Components(N-250)

PSQI Component	M±SD
Global PSQI score	7.84±2.91
Sleep latency	1.82±0.94
Sleep duration	1.43±0.88
Sleep disturbances	1.76±0.81
Use of sleep medication	0.68±0.59
Daytime dysfunction	1.69±0.87

6.3 Association Between Internet Addiction and Sleep Quality

Pearson correlation analysis in table 4 and figure 3 showed that internet addiction was significantly directly correlated with global sleep quality scores ($r = .63$, $p < .001$), and scores of internet addiction were inversely correlated with sleep quality.

Internet addiction was also positively associated with select sleep parameters such as sleep latency (*r =. 13, p <. 05*), sleep disturbances (r =. 17, p <. 01), use of sleep medication (r =. 20, p <. 01) and daytime dysfunction (r =. 19, p <. 01).

Table 4 Correlation Between Internet Addiction and Sleep Quality Components(N=250)

PSQI Component	Correlation Coefficient (r)	p-value
Global PSQI score	0.63	< 0.001
Sleep latency	0.129	< 0.05
Sleep disturbances	0.169	< 0.01
Use of sleep medication	0.203	< 0.01
Daytime dysfunction	0.187	< 0.01

Note: p<0.001 Significant

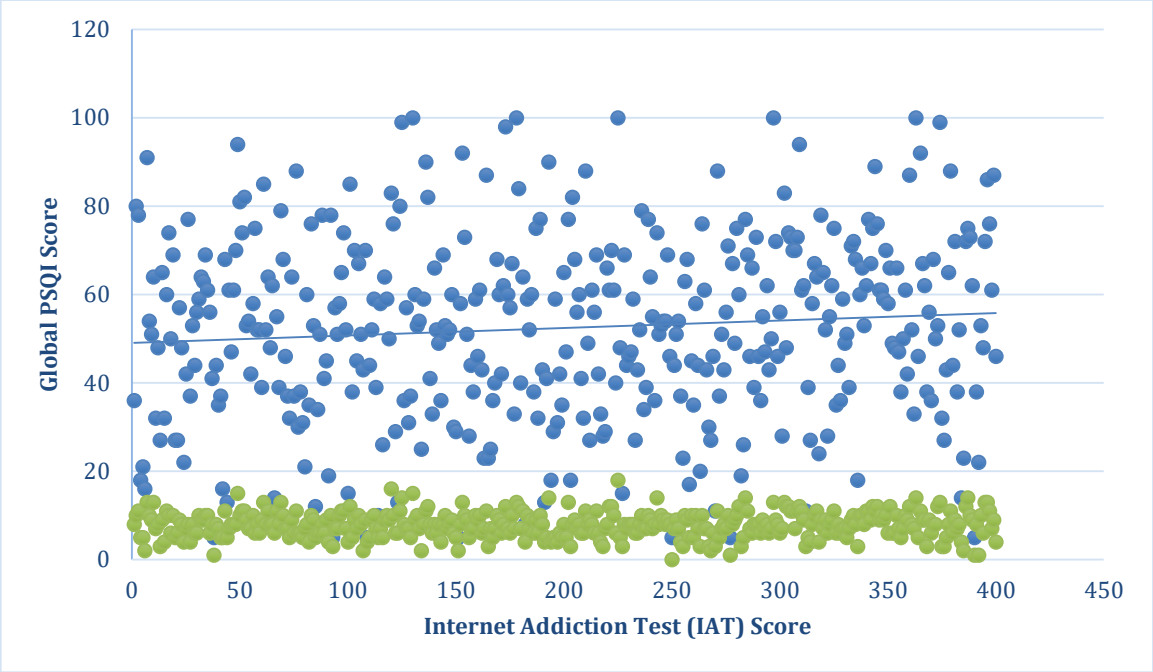

Figure 3: Relationship Between Internet Addiction and Sleep Quality. A scatter plot with a fitted regression line showing the association between IAT and global PSQI scores.

6.4 Demographic Differences

The results of the independent samples t-test indicated that male students scored significantly higher than female students did on internet addiction. Students who lived in the university's dormitories or hostels had significantly higher rates of internet addiction than students living with their families. Those individuals who responded to using the internet for longer hours per day obtained higher IA scores.

7. Discussion

The current research involved the analysis of internet addiction and its relationship to the quality of sleep among undergraduate university students in India. The results showed that internet addiction is very prevalent and that it is significantly related to the quality of sleep globally, as well as sleep impairments. The findings not only confirm the study hypotheses but also complement existing literature by offering current evidence in the form of an Indian university setting with the high rate of rapid digitalisation, which transformed the daily activities and health behaviour of students (Hammad et al., 2024; Nayak et al., 2021).

This result is high, and the extent of observed association between internet addiction and global sleep quality is 0.63, but the same should be treated with caution. The use of self-report scales as a measure of internet addiction, as well as the sleep quality, could have led to shared method variance and may have overstated the relationship. Moreover, the cross-sectional nature of the study does not allow causality to be drawn and prevents the researcher from adopting the direction of time in which excessive internet use and sleep disturbance are related. One direct behaviour of internet addiction is a prolonged increased involvement during the night hours and being unable to focus on something other than online activities that can delay the onset of sleep and break the continuity of sleep (Exelmans & Van Den Bulck, 2016; Scott et al., 2019). Additional models of behavioural addiction postulate that this compulsive consumption replaces the sleep schedule and fortifies the aberrant sleep patterns, especially in young adults with loose schedules who regulate their hours of sleep minimally (Brand et al., 2019; Király et al., 2020).

This relation could also be further explained by the physiological mechanisms. Exposing the human eye to digital screens during the night has been indicated to inhibit the release of melatonin and the regulation of the circadian process, which raises the sleep latency and the overall quality of sleep (Hammad et al., 2024). Moreover, cognitive and emotional arousal due to the interaction during online activities (social networking and gaming) is applicable in the long term and can be challenging to disengage, leading to fragmented sleep (Zaman et al., 2022). There are also methodological reasons that could have led to the vigor of the observed association. Self-report tools used on internet addiction and sleep quality may lead to shared method variance, which may inflate correlation coefficients (Billieux et al., 2019). Further, the assortment of university students is relatively homogeneous in terms of high-daily engagement in digital activities, which might also have increased the association. In turn, objective sleep measurement and longitudinal studies that utilise such designs can find less extreme effects of sleep in the future.

In line with previous studies, internet addiction was highly related to certain elements of sleep, especially latency to sleep and daytime dysfunction. The current body of research suggests that these component-level sleeping disturbances could be more valid predictors of behavioural dysregulation due to excessive internet use than aggregate sleep ratings (Li et al., 2024; Wong et al., 2020). In its turn, impaired daytime functioning has been associated with lowered academic interest, attentional problems, and

decreased psychological well-being among university students (Armand et al., 2021). Demographic studies also indicated that internet addiction was high among the male students and those students who lived in the university accommodation. These are compatible with the evidence that indicated that males were more likely to be involved in activities related to entertainment online and that students who live outside of family control were possibly less frequently placed on the restriction of using the internet at late hours (HAYAT et al., 2020; Su et al., 2019).

8. Practical Implications and Strengths

The results emphasize the importance of university-level programs designed to increase technology eco-regulation and good sleep hygiene. Digital literacy interventions, campaigns to promote knowledge about night-time screen use, and regular screening for internet addiction in student counselling services could be used to help increase sleep health and well-being (Alkaabba et al., 2025). A key excellence of the study has been the use of validated assessment tools, a moderate sample size, and emphasis on component-level sleep outcomes among little investigated Indian university population.

9. Conclusion

Currently, we find that internet addiction is very common in Indian undergraduate university students and has a significant correlation with worse sleep quality. Internet addiction was associated with both global sleep disturbances and some specific types of poor sleeping, in particular, longer falling asleep times and a higher risk for daytime dysfunction. There are important implications for Indian higher-education policy, highlighting the importance of university counselling cells and regulatory bodies (e.g., University Grants Commission [UGC]) in incorporating structured digital wellbeing and sleep health programmes into existing student support as well as mental health services.

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