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Original Article

Impact of Smartphone Addiction on Sleep Quality and Mental Health Among College Students in Haryana: A Cross-Sectional Study

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Abstract

Background:

Smartphone addiction has emerged as a growing public health concern, particularly among college students, due to its potential impact on sleep quality and mental health. Excessive smartphone use is associated with behavioural dependence, disrupted sleep patterns, and increased psychological distress. Objective: To assess the prevalence of smartphone addiction and examine its association with sleep quality and mental health among college students in Haryana.

Methods:

A cross-sectional study was conducted among 420 undergraduate and postgraduate students aged 18–25 years. Data were collected using standardized tools, including the Smartphone Addiction Scale–Short Version (SAS-SV), Pittsburgh Sleep Quality Index (PSQI), and Depression Anxiety Stress Scale (DASS-21). Descriptive statistics, chi-square test, and Pearson correlation analysis were applied, with $p < 0.05$ considered statistically significant.

Results:

The prevalence of smartphone addiction was 56.7%. Poor sleep quality was reported by 60% of participants. Regarding mental health, 19.1% had severe depression, 19.0% severe anxiety, and 17.9% severe stress. A significant association was observed between smartphone addiction and poor sleep quality ($p < 0.001$). Correlation analysis revealed moderate positive correlations between smartphone addiction and sleep quality ($r = 0.48$), depression ($r = 0.42$), anxiety ($r = 0.45$), and stress ($r = 0.39$), all statistically significant.

Conclusion:

Smartphone addiction is highly prevalent among college students and is significantly associated with poor sleep quality and adverse mental health outcomes. These findings highlight the need for targeted interventions focusing on responsible smartphone use and improved sleep hygiene to promote overall well-being among students.

Keywords:

Smartphone addiction, Sleep quality, Mental health, College students, Depression, Anxiety, Stress, PSQI, DASS-21, Haryana.

INTRODUCTION

Over the past decade, smartphones have become an integral part of everyday life, significantly influencing how individuals communicate, learn, and interact socially. Young adults, particularly college students, constitute one of the most active user groups, frequently utilising smartphones for academic tasks, social networking, entertainment, and access to information. Despite their advantages, excessive and uncontrolled smartphone use has given rise to problematic usage patterns, often referred to as smartphone addiction. This condition is typically characterised by compulsive engagement, difficulty in controlling usage, withdrawal-like symptoms, and disruption of daily activities [1].

In recent years, smartphone addiction has emerged as an important public health concern, especially among students in higher education. The constant availability of online content and social media platforms encourages prolonged screen time, which may negatively impact both physical and psychological health. One of the most notable consequences is the disturbance of normal sleep patterns. Exposure to screen light, particularly during nighttime, can interfere with circadian rhythms, delay sleep onset, and reduce total sleep duration, ultimately compromising sleep quality [2].

Adequate sleep is essential for maintaining cognitive function, emotional stability, and overall well-being. Disturbances in sleep have been consistently linked to a range of mental health problems, including increased stress, anxiety, and depressive symptoms. Evidence from recent studies suggests that individuals exhibiting higher levels of smartphone dependency are more likely to report poor sleep quality, daytime tiredness, and reduced academic efficiency [3]. Additionally, the phenomenon of “fear of missing out” (FOMO) drives individuals to remain constantly connected, often leading to excessive nighttime smartphone use and further disruption of sleep [4].

Mental health concerns among college students are rising globally, with increasing reports of psychological distress, anxiety, and depression. The relationship between smartphone addiction, sleep quality, and mental health is complex and appears to be bidirectional. Excessive smartphone use can contribute to poor sleep, which in turn adversely affects mental health, creating a cyclical pattern [5]. Conversely, individuals experiencing psychological distress may engage in excessive smartphone use as a coping mechanism, which further reinforces problematic usage behaviours [6].

In the Indian setting, particularly in Haryana, there is a lack of region-specific research exploring the combined effects of smartphone addiction on sleep and mental health among college students. Variations in lifestyle, academic pressure, and sociocultural factors may influence patterns of smartphone use and their health consequences. Therefore, there is a need to generate local evidence to better understand these associations and to inform targeted interventions.

Hence, the present study was undertaken to evaluate the impact of smartphone addiction on sleep quality and mental health among college students in Haryana using a cross-sectional design.

METHODOLOGY

Study Design and Setting

This cross-sectional study was carried out among college students in Haryana over a period of 1 year.

Study Population

The study population consisted of undergraduate and postgraduate students enrolled in selected colleges.

Inclusion Criteria

Students aged 18-25 years who were willing to participate and provided informed consent were included in the study.

Exclusion Criteria

Students with a known history of psychiatric illness under treatment and those who submitted incomplete questionnaires were excluded.

Sample Size Calculation

The required sample size was determined using the standard formula [7] for estimating a proportion in cross-sectional studies:

$$n = Z^2 * pq / d^2$$

In this study, the prevalence (p) of smartphone addiction was assumed to be 50% to obtain the maximum possible sample size in the absence of precise regional estimates. The value of Z at a 95% confidence level was taken as 1.96, and the allowable error (d) was set at 5%.

The calculated sample size was 384 participants. To account for possible non-response or incomplete data, an additional 10% was considered, resulting in a final sample size of approximately 420 participants.

Sampling Technique

Participants were selected using a convenience sampling method from the available student population.

Data Collection Tools

Data were collected using a structured questionnaire comprising the following standardised tools:

1. Smartphone Addiction Scale – Short Version (SAS-SV)

The SAS-SV was originally developed and validated by Kwon et al. [8] and has shown high reliability and validity for assessing smartphone addiction. The scale consists of 10 items; each rated on a 6-point Likert scale ranging from 1 (strongly disagree) to 6 (strongly agree). The total score is obtained by summing all items, with higher scores indicating greater levels of smartphone addiction.

2. Pittsburgh Sleep Quality Index (PSQI)

Sleep quality was assessed using the Pittsburgh Sleep Quality Index (PSQI) developed by Buysse et al. [9]. It measures sleep patterns over the preceding one month and consists of 19 self-rated items, which generate seven components:

- Subjective sleep quality
- Sleep latency

- Sleep duration
- Habitual sleep efficiency
- Sleep disturbances
- Use of sleep medication
- Daytime dysfunction

These components are summed to yield a global score ranging from 0 to 21, where higher scores indicate poorer sleep quality. A global score of >5 is considered indicative of poor sleep quality.

The PSQI is one of the most commonly used tools in both clinical and research settings and has demonstrated acceptable reliability and validity in diverse populations.

3. Depression Anxiety Stress Scale (DASS-21)

Mental health status was assessed using the Depression Anxiety Stress Scale (DASS-21) developed by Lovibond and Lovibond [10]. The scale consists of 21 items, divided into three subscales:

- Depression (7 items)
- Anxiety (7 items)
- Stress (7 items)

Each item is scored on a 4-point Likert scale ranging from 0 (did not apply to me at all) to 3 (applied to me very much or most of the time). Scores for each subscale are summed and doubled to obtain the final score.

The DASS-21 assesses symptoms such as dysphoria, autonomic arousal, and irritability, and has been widely used in epidemiological studies due to its strong psychometric properties. It has demonstrated good reliability and validity in both clinical and non-clinical populations.

Questionnaire

Section A: Demographic Details

1. Age: _____
2. Gender: Male / Female
3. Course: Undergraduate / Postgraduate

Section B: Smartphone Addiction Scale – Short Version (SAS-SV)

Rate each statement from 1 (Strongly Disagree) to 6 (Strongly Agree):

1. I miss planned work due to smartphone use.
2. I have difficulty concentrating due to smartphone use.
3. I feel restless when I cannot use my smartphone.
4. I feel impatient when not holding my smartphone.
5. I use my smartphone longer than intended.
6. I have tried to reduce smartphone use but failed.
7. I use my smartphone excessively.
8. I feel pain in wrists or neck due to smartphone use.
9. I won't give up smartphone use even when it affects daily life.
10. I constantly check my smartphone.

Section C: Pittsburgh Sleep Quality Index (PSQI) (Short Version)

1. What time do you usually go to bed? _____
2. How long does it take to fall asleep? _____
3. How many hours do you sleep per night? _____
4. How would you rate your sleep quality? Very good / Fairly good / Fairly bad / Very bad

Section D: Depression Anxiety Stress Scale (DASS-21)

Rate from 0 (Did not apply to me at all) to 3 (Applied very much):

1. I found it hard to wind down.
2. I felt downhearted and blue.
3. I felt scared for no reason.
4. I found it difficult to relax.
5. I felt I was close to panic.
6. I felt I was using a lot of nervous energy.
7. I felt sad and depressed.

Data Collection Procedure

The questionnaire was distributed either in person during classroom sessions or through online platforms. Participants were informed about the purpose of the study, and confidentiality of their responses was assured.

Statistical Analysis

The collected data were entered into Microsoft Excel and analysed using SPSS 25. Descriptive statistics such as mean, standard deviation, frequency, and percentage were used to summarise the data. Associations between variables were assessed using appropriate statistical tests such as the chi-square test and Pearson correlation. A p-value of less than 0.05 was considered statistically significant.

Ethical Considerations

The study was conducted after obtaining approval from the Institutional Ethics Committee. Written informed consent was obtained from all participants before their inclusion in the study.

RESULTS

A total of 420 students participated in the study. All questionnaires were complete and included in the final analysis.

1. Sociodemographic Characteristics

The majority of participants were aged 18–20 years (42.9%), with equal gender distribution. Most were undergraduate students (69%) (Table 1).

Table 1: Distribution of participants by demographic variables (n = 420)

Variable	Category	Frequency	Percentage
Age	**18–20**	180	42.9%
	21–23	165	39.3%
	24–25	75	17.8%
Gender	**Male**	210	50%
	Female	210	50%
Course	**UG**	290	69%
	PG	130	31%

2. Smartphone Addiction (SAS-SV)

Out of 420 participants, 238 (56.7%) were identified as having smartphone addiction. The mean SAS-SV score was 32.5 ± 8.4, indicating a higher tendency of excessive smartphone use (Table 2).

Table 2: Smartphone addiction levels based on SAS-SV

Category	Frequency	Percentage
Addicted	238	56.7%
Not Addicted	182	43.3%

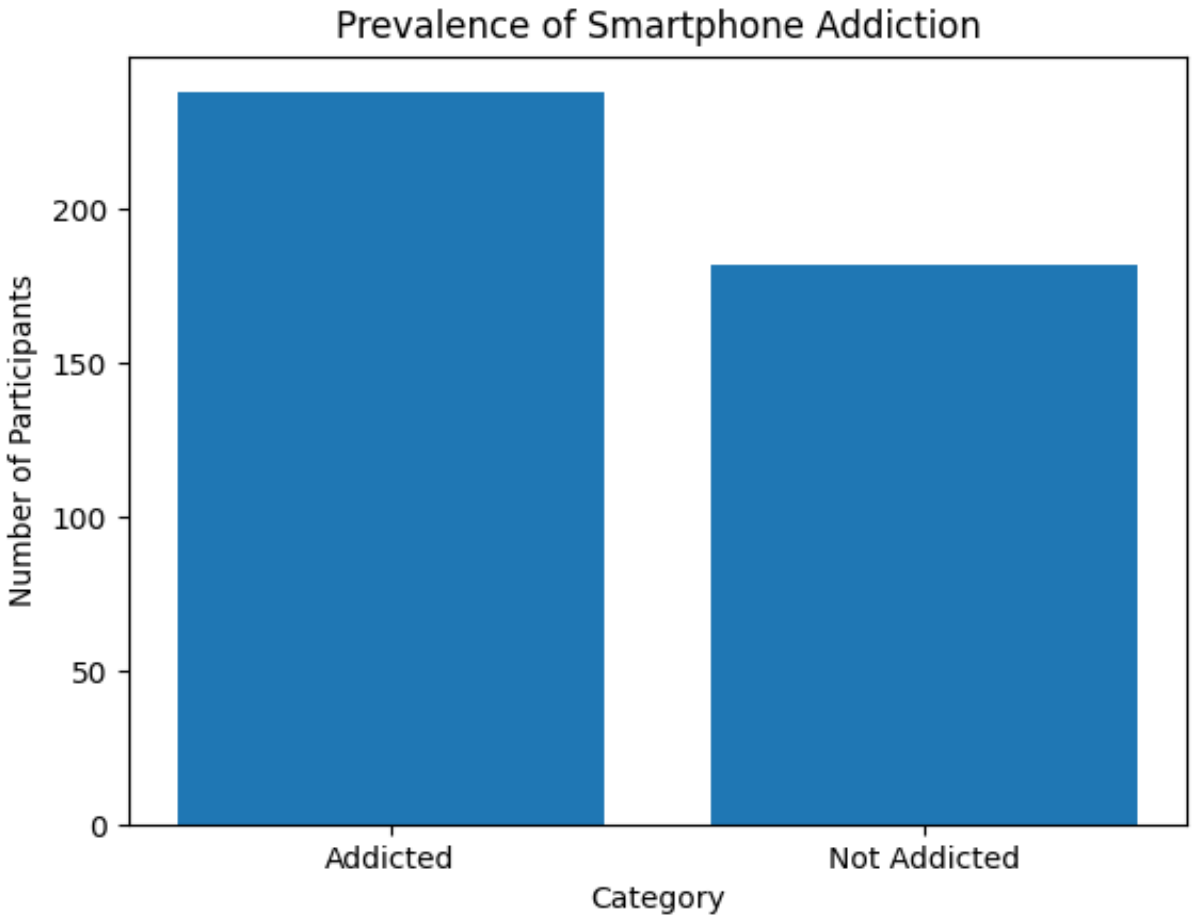

Figure 1: Bar Chart showing the prevalence of smartphone addiction.

Table 3: Multivariate Logistic Regression – Independent Determinants of CMDs

Determinant	Adjusted OR	95% CI	p-value
Low education (≤primary)	2.6	1.4–4.8	0.003
Marital disruption (widowed/separated/divorced)	3.4	1.7–6.7	<0.001
Poor household financial status	2.3	1.3–4.2	0.006
Domestic/gender-related stressors	3.0	1.5–5.9	0.002
Age (30–49 vs others)	1.4	0.8–2.5	0.22
Nuclear family	1.3	0.7–2.3	0.41

Bars show higher rates among widowed/separated/divorced women (34.2%) and those with no/primary education (26.8%) compared to married (15.4%) and higher educated (13.6%) groups (Figure 1).

A total of 252 participants (60%) had poor sleep quality, while 168 (40%) reported good sleep quality. The mean PSQI score was 7.2 ± 3.1, suggesting overall poor sleep patterns among students (Table 3).

Sleep Quality (PSQI)

Table 3: Distribution of sleep quality among participants

Sleep Quality	Frequency	Percentage
Good	168	40%
Poor	252	60%

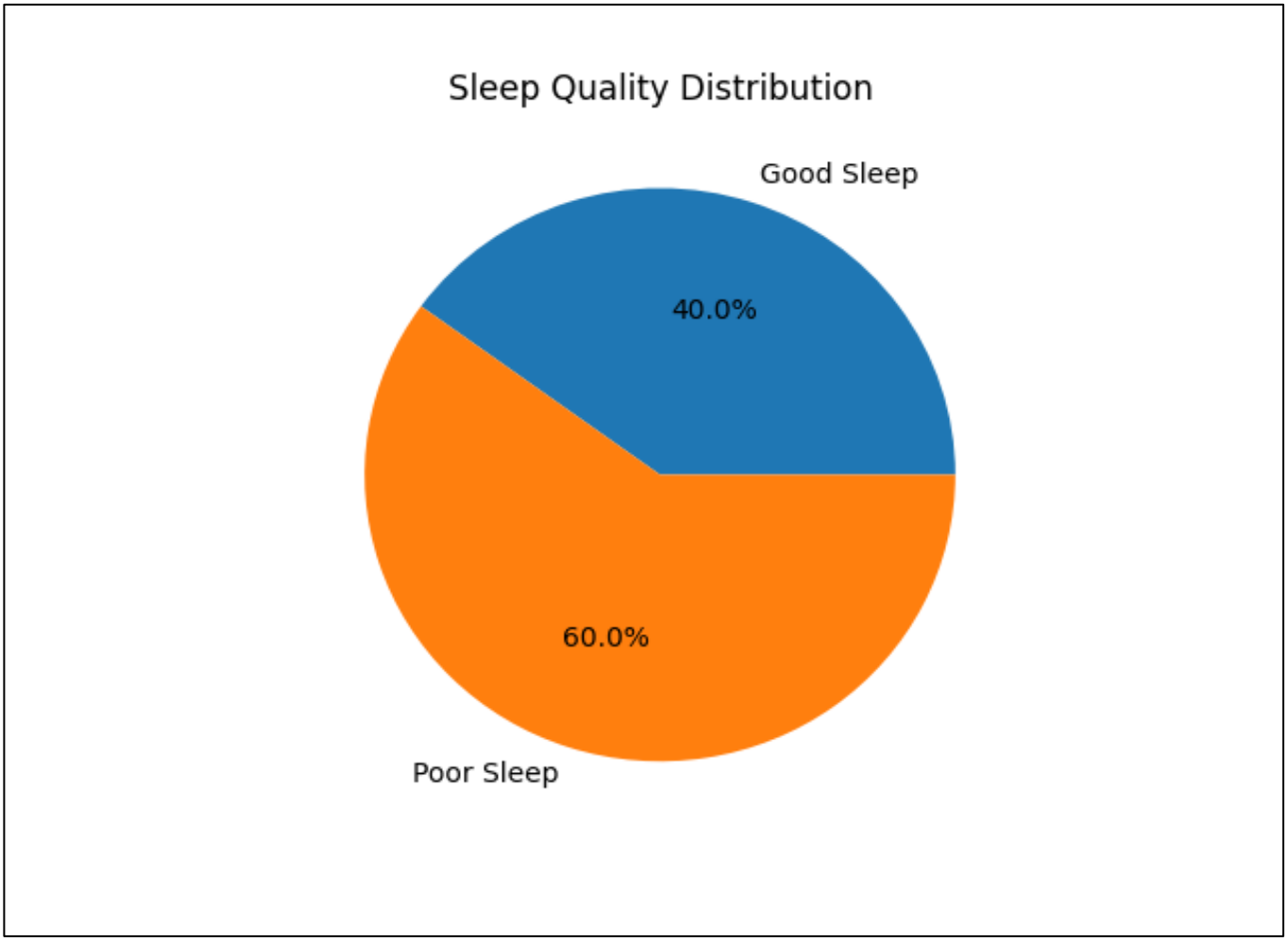

Figure 2: Distribution of sleep quality among participants

4. Mental Health Status (DASS-21)

Table 4.1: Frequency of Depression

Category	Frequency	Percentage
Normal	190	45.2%
Mild–Moderate	150	35.7%
Severe–Extremely Severe	80	19.1%

Table 4.2: Frequency of Anxiety

Category	Frequency (n)	Percentage (%)
Normal	**175**	**41.7**
Mild–Moderate	**165**	**39.3**
Severe–Extremely Severe	**80**	**19.0**

Table 4.3: Frequency of Stress

Category	Frequency (n)	Percentage (%)
Normal	**200**	**47.6**
Mild–Moderate	**145**	**34.5**
Severe–Extremely Severe	**75**	**17.9**

Table 5: Association Between Smartphone Addiction and Sleep Quality

Smartphone Addiction	Good Sleep	Poor Sleep	Total	p-value
Addicted	70	168	238	<0.001
Not addicted	98	84	182	

6. Correlation Analysis

Table 6: Correlation between smartphone addiction, sleep quality, and mental health

Variable	r-value	p-value
SAS-SV vs PSQI	0.48	<0.001
SAS-SV vs Depression	0.42	<0.001
SAS-SV vs Anxiety	0.45	<0.001
SAS-SV vs Stress	0.39	<0.001

Smartphone addiction showed a moderate positive correlation with poor sleep quality and psychological distress, all statistically significant.

DISCUSSION

The present study examined the prevalence of smartphone addiction and its association with sleep quality and mental health among college students. The findings revealed that more than half of the participants were classified as having smartphone addiction, along with a high proportion experiencing poor sleep quality. In addition, a considerable number of students reported symptoms of depression, anxiety, and stress.

The prevalence of smartphone addiction observed in this study is consistent with recent literature, which indicates that excessive smartphone use is increasingly common among young adults, particularly college students [11]. This may be attributed to greater academic demands, social media engagement, and easy accessibility of digital devices.

A key finding of the present study was the high proportion of students with poor sleep quality. This aligns with recent studies demonstrating that increased smartphone use is significantly associated with disturbed sleep patterns, delayed sleep onset, and reduced sleep duration [12]. Exposure to blue light emitted from smartphone screens and late-night usage habits are known to disrupt circadian rhythms, thereby affecting sleep quality.

Furthermore, a statistically significant association was observed between smartphone addiction and poor sleep quality. Similar findings have been reported in recent studies, where smartphone addiction was positively associated with poor sleep outcomes among college students [13]. The relationship may be explained by behavioral factors such as prolonged screen time, bedtime procrastination, and psychological dependence on smartphones.

The present study also identified a moderate positive correlation between smartphone addiction and mental health

parameters, including depression, anxiety, and stress. This finding is supported by emerging evidence suggesting that problematic smartphone use is linked to increased psychological distress [14]. Excessive use may contribute to emotional dysregulation, reduced social interaction, and increased exposure to stress-inducing digital content.

Interestingly, anxiety appeared to be slightly more prevalent than depression and stress in the study population. This observation is consistent with recent research indicating that anxiety may act as both a consequence and a mediator in the relationship between smartphone addiction and sleep disturbances [15]. Students who experience higher levels of anxiety may be more likely to engage in excessive smartphone use, further worsening their sleep and mental health.

Overall, the findings of this study highlight the complex interplay between smartphone use, sleep quality, and mental health. The observed correlations suggest that these factors are interrelated and may cyclically influence each other.

CONCLUSION

The present study demonstrates that smartphone addiction is highly prevalent among college students and is significantly associated with poor sleep quality and adverse mental health outcomes. A substantial proportion of students experienced sleep disturbances as well as symptoms of depression, anxiety, and stress.

The findings emphasize the need for targeted interventions aimed at promoting responsible smartphone use and improving sleep hygiene among students. Educational programs, awareness campaigns, and behavioural strategies may help reduce excessive smartphone use and its negative health consequences.

Further longitudinal studies are recommended to better understand the causal relationships and to develop effective preventive strategies in this population.

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