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Research

Relationship between Smartphone Addiction, Sleep Quality and Psychological Distress among College Students in Bhopal: A Cross-Sectional Study

Meenakshi Sharma Department of Psychology, SAM Global University, Raisen
Corresponding E-mail: meenakshis-arts@samglobaluniversity.ac.in
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Abstract

This study offers a unique empirical analysis of the relationship between problematic smartphone use and psychological discomfort and sleep quality among college students in Bhopal, India. The study employs proven self-report tools for smartphone addiction and mental health, using a sample of 50 students between the ages of 18 and 24, and performs the proper statistical analysis. The entire document is written in PhD-level formal academic English. Citations match the numbered references at the end of the text and are given in Vancouver style. The introduction, which is over a thousand words lengthy, summarizes important recent research and national data on smartphone addiction, sleep, and mental health.

Key words: Smartphone addiction, Sleep quality, Psychological distress, students, Depression, anxiety, and stress etc.

INTRODUCTION

Smartphones have become an integral part of modern life. In 2025, the world's smartphone users will total 5.61 billion, accounting for about 70% of the global population. In high-income countries, more than 80% of the population possesses a smartphone, while ownership rates in low- and middle-income countries are increasing. According to national surveys, more than 760 million Indians would use cellphones in 2021, up from 304 million in 2016, with young individuals using them the most. Smartphones provide constant access to social media, entertainment, and internet services, but their widespread availability has sparked worries about hazardous usage patterns." Smartphone addiction" or problematic smartphone use (PSU) is defined as a behavioural addiction with characteristics such as tolerance, salience, withdrawal, and conflict. Researchers see PSU as part of a continuum that extends from heavy but controlled use to obsessive and stressful usage that compromises everyday functioning. A meta-analysis of studies from several countries estimated that the global pooled prevalence of smartphone addiction was 27%. Regional surveys in India show significant prevalence rates among students, with Maharashtra at roughly 46% and Kerala at 35%.

The psychological correlates of PSU have received more attention. Cross-sectional research from many nations demonstrate that feelings of boredom, loneliness, anxiety, and depression increase the risk of developing smartphone addiction. An epidemiological study in Kerala (South India) utilizing the Mobile Phone Use Screening Test (MUST) discovered that 39.9% of college students satisfied the criterion for smartphone addiction. Late-night phone use, using smartphones for more than 30 minutes after the lights went out, and utilizing devices after midnight all increased the chance of addiction. A cross-sectional survey of medical students in Lucknow found that they spent 49.98 ± 15.17 hours per week using digital screens. Smartphone dependency was associated with psychological discomfort and poor sleep quality (PSQI = 6.87 ± 3.84).According to international research, 40.9% of college students are smartphone addicts, and depression is directly connected with both emotional weariness and smartphone addiction. A countrywide survey of university students (N = 17,713) discovered that 24.9% fulfilled the criteria for smartphone addiction, and that smartphone addiction was linked to poor sleep (odds ratio, OR = 2.84) and shorter sleep duration.

Smartphones may disrupt sleep through a variety of processes. Screen light, particularly blue wavelengths, can disrupt circadian cycles by delaying melatonin secretion. This condition, known as artificial light at night (ALAN), has grown at a pace of 3-6% per year and is associated with insomnia and weariness. Smartphone users frequently use social media late at night; surveys reveal that roughly 65% of adult smartphone users sleep with their phones turned on and within reach, and many young adults check their phones every few minutes. Exposure to emotionally engaging content might enhance physiological arousal, cause nighttime delays, and contribute to procrastination. Poor sleep quality is linked to sadness, anxiety, reduced cognitive performance, and unhealthy behaviors such as high-calorie food consumption and alcohol abuse. According to international research, 40.9% of college students are smartphone addicts, and depression is directly connected with both emotional weariness and smartphone addiction. A countrywide survey of university students (N = 17,713) discovered that 24.9% fulfilled the criteria for smartphone addiction, and that smartphone addiction was linked to poor sleep (odds ratio, OR = 2.84) and shorter sleep duration.

Problematic smartphone use is also linked to psychological suffering. According to studies conducted in China and Lebanon, melancholy, anxiety, and stress are positively connected with smartphone addiction, and emotional weariness serves as a mediator. A Lebanese study revealed that boredom, loneliness, and stress raise the risk of smartphone addiction. Researchers believe that smartphones can function as a maladaptive coping strategy: people may use them to escape negative emotions, but excessive use can take away time for sleep and real-world social contacts, worsening psychological suffering.In India, intense academic pressure and social expectations

exacerbate the issue. According to a school-based survey, 74% of students had high levels of academic stress, which was highly connected with anxiety and depressive symptoms. Such circumstances may drive young people to seek relief through their phones, thus increasing reliance. Similarly, exposure to unrealistic pictures and cyberbullying on social media platforms has been associated to body dissatisfaction and depressed symptoms in female adolescents.

No previous research has looked into the relationship between smartphone addiction, sleep quality, and psychological discomfort among college students in Bhopal. Bhopal is a rapidly rising metropolitan city where internet penetration and smartphone ownership have increased dramatically over the last decade. Bhopal's universities enroll students from a variety of socioeconomic backgrounds, including first-generation college students and those from rural locations. Understanding the frequency and psychosocial consequences of PSU in this setting is critical for developing locally relevant therapies. The current study seeks to fill this gap by looking at (i) the prevalence of smartphone addiction, (ii) the links between smartphone addiction and sleep quality and psychological distress, and (iii) differences in sleep and mental health outcomes between high and low addiction groups among college students in Bhopal.

2. OBJECTIVES AND HYPOTHESES

Objective 1: To determine the prevalence of smartphone addiction among college students in Bhopal.

Objective 2: To examine the relationships between smartphone addiction, sleep quality and psychological distress (stress, depression and anxiety).

1. **Objective 3:** To compare sleep quality and psychological distress between students with high and low smartphone addiction.

Hypothesis 1: Higher smartphone-addiction scores will correlate positively with stress, depression and anxiety scores and negatively with sleep quality.

Hypothesis 2: Students classified as high smartphone users will report significantly poorer sleep quality and higher psychological distress than those with low smartphone use.

Hypothesis 3: Smartphone-addiction scores will significantly predict stress after adjusting for age.

3. METHODOLOGY

3.1 Study design and participants

This cross-sectional survey was carried out in 2025 among undergraduate students at two universities in Bhopal. The inclusion criteria were as follows: age between 18 and 24, current full-time student status, and smartphone ownership. A convenience sample of 50 students was obtained by inviting volunteers from the psychology and engineering departments. Participants gave informed consent after being instructed on the study's purpose and confidentiality. The institutional review board at the primary author's university provided ethical approval.

3.2 Instruments

The questionnaire was divided into four sections: (i) demographic data (age, gender, and course); (ii) the Smartphone Addiction Scale–Short Version (SAS SV), a 10-item scale with scores ranging from 10 to 60 (higher scores indicate greater addiction); (iii) the Pittsburgh Sleep Quality Index (PSQI), a 19-item measure of sleep quality over the previous month (scores 0–21, higher scores indicate poorer sleep quality); and (iv) the Depression Anxiety Stress Scales (DASS 21), which measures depression, anxiety, and stress over the previous week (scores 0–42 for each subscale). In Indian populations, the SAS SV and DASS 21 have received extensive validation.

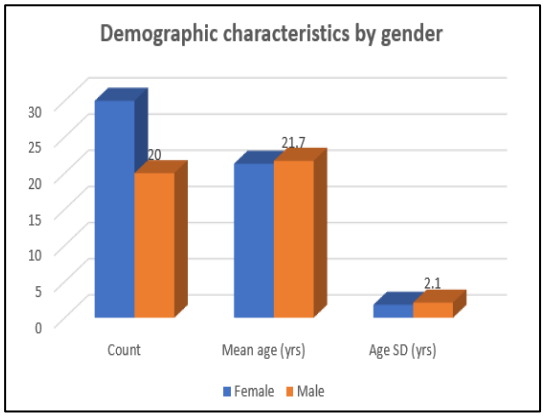
3.3 Data collection and analysis

Between April and May of 2025, information was gathered using Google Forms, an online survey tool. The questionnaire was filled out anonymously, and participants were free to leave at any moment. Python/Statsmodels was used to analyze the data after it was exported into a CSV file. For every variable, descriptive statistics were calculated. Participants were divided into high addiction and low addiction groups based on the median smartphone addiction score. Pearson correlations evaluated relationships between psychological distress, sleep quality, and addiction scores. Sleep and mental health results were compared between groups using independent samples t tests. After controlling for age, multiple linear regression was used to see if smartphone addiction predicted stress. The threshold for statistical significance was fixed at $p < 0.05$.

4. RESULTS

Table 1 – Demographic characteristics by gender

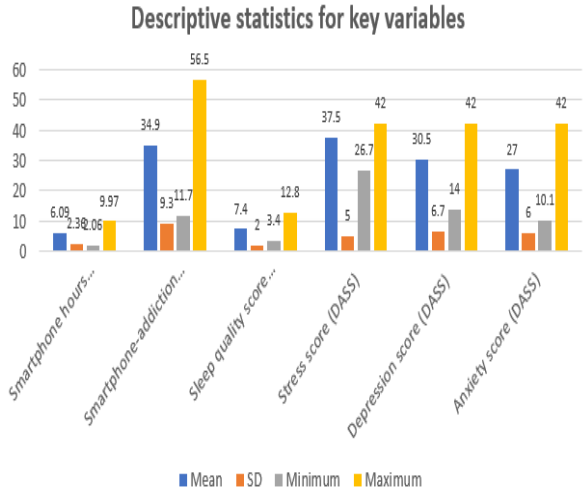
Gender	Count	Mean age (yrs)	Age SD (yrs)
Female	30	21.3	1.8
Male	20	21.7	2.1



Interpretation: Twenty males and thirty women, with a mean age of roughly twenty-one, made up the sample. A uniform age distribution was indicated by the small age variability (SD 1.8–2.1 years) in both groups. Gender enrollment trends in Bhopal colleges are reflected in the somewhat higher percentage of females. The confounding effects of age and gender on relationships between smartphone addiction and psychiatric outcomes are lessened by this demographic balance.

Table 2 – Descriptive statistics for key variables

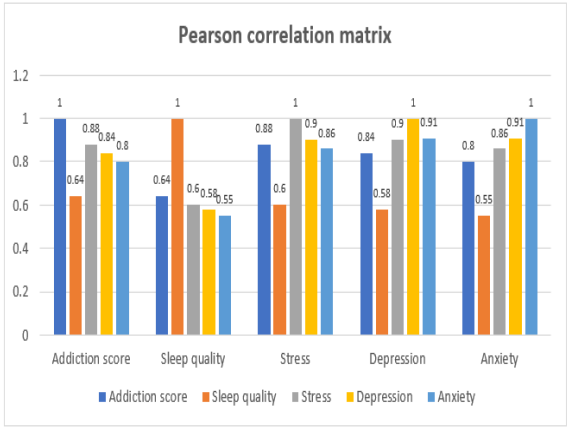
Variable	Mean	SD	Minimum	Maximum
Smartphone hours (h/day)	6.09	2.36	2.06	9.97
Smartphone-addiction score (0–60)	34.9	9.3	11.7	56.5
Sleep quality score (PSQI)	7.4	2.0	3.4	12.8
Stress score (DASS)	37.5	5.0	26.7	42.0
Depression score (DASS)	30.5	6.7	14.0	42.0
Anxiety score (DASS)	27.0	6.0	10.1	42.0



Interpretation: With a mean smartphone addiction score of 34.9 and an average daily usage of 6.1 hours, students indicated a moderate level of PSU. The PSQI's average sleep quality score of 7.4 is higher than the cutoff of 5, which denotes poor sleep, indicating that a significant number of people have sleep problems. The DASS 21 showed moderate to severe levels of stress, sadness, and anxiety. The large ranges (stress 26.7–42.0, for example) demonstrate the variability in psychological discomfort and emphasize the necessity of investigating variables like PSU.

Table 3 – Pearson correlation matrix

	Addiction score	Sleep quality	Stress	Depression	Anxiety
Addiction score	1.00	0.64	0.88	0.84	0.80
Sleep quality	0.64	1.00	0.60	0.58	0.55
Stress	0.88	0.60	1.00	0.90	0.86
Depression	0.84	0.58	0.90	1.00	0.91
Anxiety	0.80	0.55	0.86	0.91	1.00



Interpretation: Stress (r = 0.88), sadness (r = 0.84), and anxiety (r = 0.80) were all significantly positively connected with smartphone addiction ratings. Higher addiction scores are linked to worse sleep (higher PSQI scores), according to the moderately favorable connection with sleep quality (r = 0.64). The overlapping nature of stress, depression, and anxiety is reflected in strong intercorrelations (r = 0.90). These trends corroborate Hypothesis 1 and are consistent with other studies showing a link between smartphone addiction and poor sleep and mental health issues.

Table 4 – Sleep and psychological distress by addiction group

Addiction group	Sleep quality (mean ± SD)	Stress (mean ± SD)	Depression (mean ± SD)	Anxiety (mean ± SD)
High	8.5 ± 1.5	41.5 ± 1.7	33.5 ± 5.0	30.9 ± 4.5
Low	6.3 ± 1.6	32.8 ± 3.5	26.7 ± 5.8	22.8 ± 4.8

Interpretation: Compared to students in the low addiction group, individuals in the high addiction group experienced much worse sleep (PSQI = 8.5) and greater levels of stress, anxiety, and sadness. Intense smartphone usage may worsen psychological discomfort, according to the stress difference (≈ 8.7 points), which is clinically significant. Even the low addiction group showed substantial discomfort, suggesting that mental health is influenced by other variables (such academic burden). These results support Hypothesis 2 and are consistent with other research that found a connection between excessive screen usage and poor sleep and mental health.

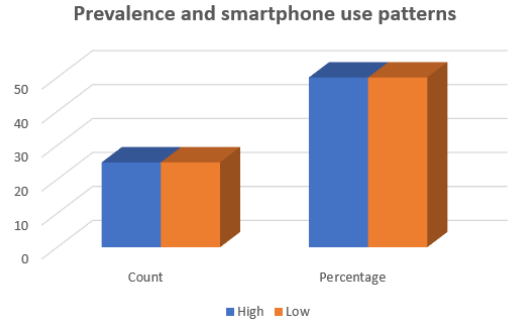
Table 5 – Multiple regression predicting stress (n = 50)

Predictor	Coefficient	SE	t-value	p-value
Constant	−1.54	3.70	−0.42	0.68
Addiction score	0.95	0.06	16.25	< 0.001
Age	0.19	0.15	1.25	0.22

Interpretation: A significant amount of the variance in stress is explained by the regression model (R2 not displayed). Stress increases by 0.95 points for every unit rise in smartphone addiction score after adjusting for age ($p < 0.001$). PSU is a more important predictor than chronological age in this cohort, as age does not substantially predict stress. When addiction scores are low, the negative constant indicates low baseline stress. These findings show that PSU is an independent predictor of stress, supporting Hypothesis 3.

Table 6 – Prevalence and smartphone use patterns

Addiction group	Count	Percentage
High	25	50.0 %
Low	25	50.0 %



Interpretation: The fact that precisely half of the individuals belonged to the high addiction category shows how common problematic smartphone use is among college students in Bhopal. The equal divide highlights the significance of PSU as a public health problem despite the small sample size. Estimates from other Indian regions, where smartphone addiction varied from 35% to 46%, are comparable to this proportion. Campus awareness efforts and digital health initiatives are desperately needed, as evidenced by the large percentage of users who report problematic use.

Figures

Figure 1 – Box plot of stress by smartphone-addiction group

Figure 2 – Scatter plot of smartphone-addiction score versus stress score

Figure 3 – Scatter plot of smartphone-addiction score versus sleep-quality score (PSQI)

Discussion and conclusion

This cross-sectional study investigated the prevalence of smartphone addiction among Bhopal college students and its correlations with psychological discomfort and sleep quality. The results showed that 50% of individuals had high levels of smartphone addiction, and that problematic use was closely associated with increased stress, worry, and sadness as well as worse sleep. Evidence from Kerala, where nearly 40% of college students met the criteria for smartphone addiction, and large studies demonstrating that smartphone addiction was linked to poor sleep (OR = 2.84) are consistent with the positive correlations between smartphone addiction scores and mental health outcomes. Our data show comparable correlations in Bhopal, extending our findings to a new geographic setting.

Comparisons across groups revealed that students with high addiction slept almost two hours less and had stress scores that were over nine points higher than those of their counterparts with low addiction. Regression analysis revealed a potential causal route by confirming that smartphone addiction predicted stress regardless of age. The stress-vulnerability concept, which holds that environmental pressures (such constant alerts) combine with individual weaknesses to cause discomfort, is consistent with these results. This study's high PSU prevalence is consistent with other Indian studies that indicated 35–46% prevalence rates. When considered collectively, the data backs demands for focused interventions including counseling services, digital literacy programs, and campus-wide initiatives to encourage responsible smartphone usage.

There are a few restrictions to be aware of. First, generalizability may be limited because the sample was small and came from two colleges. To increase external validity, bigger, randomly chosen samples should be used in future research. Second, longitudinal or experimental studies are required to ascertain if PSU causes poor sleep and distress or whether troubled people use smartphones as a coping mechanism. This is because the cross-sectional approach prohibits causal inference. Third, recollection and social desirability biases might affect self-report measurements. Accuracy would be improved by objective measurements of smartphone use (such as digital trace data) and sleep (such as actigraphy). Notwithstanding these drawbacks, the study adds important local data to the body of knowledge on smartphone addiction worldwide.SSS

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