



Original Research Article

PATTERNS AND CONTEXTUAL BEHAVIOURS OF SMARTPHONE USE AMONG UNDERGRADUATE MEDICAL STUDENTS: A CROSS-SECTIONAL STUDY

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Received : 10/02/2026
Received in revised form : 08/04/2026
Accepted : 25/04/2026

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DOI: 10.70034/ijmedph.2026.2.251

Source of Support: Nil,
Conflict of Interest: None declared

Int J Med Pub Health
2026; 16 (2); 1504-1508

ABSTRACT

Background: Smartphones are widely integrated into the daily lives of medical students, influencing communication, learning, and lifestyle behaviors. Understanding usage patterns and behavioral contexts is essential to assess their impact on routine activities. **Objectives:** To describe smartphone usage patterns and assess behavioral contexts of smartphone use among undergraduate medical students.

Materials and Methods: A cross-sectional, questionnaire-based study was conducted among 480 undergraduate medical students using a structured, self-administered electronic questionnaire. Data were collected on demographic characteristics, average daily screen time, primary purpose of smartphone use, and behavioral usage contexts such as use before sleep, during meals, and during academic activities. Data were analyzed using descriptive statistics.

Results: Most participants were aged 18–20 years (69.6%) with male predominance (62.5%). A substantial proportion of students reported prolonged smartphone use, with nearly 60% using smartphones for more than 4 hours daily. Social media (66.7%) and educational applications (53.8%) were the most commonly reported primary purposes of smartphone use. Smartphone use was highly integrated into daily routines, with 70.8% reporting use within 30 minutes before sleep, 40.4% during meals, 40.0% immediately after waking, and 26.7% during lectures.

Conclusion: Smartphone use among medical students is extensive and deeply embedded in daily behavioral routines, particularly around sleep and routine activities. These findings highlight the need for awareness regarding responsible smartphone use and its integration into daily life.

Keywords: Smartphone use; Medical students; Screen time; Behavioral patterns; Daily routine.

INTRODUCTION

Smartphones have evolved into indispensable tools within modern academic and social environments, and this is particularly evident among medical students, who depend on them for accessing clinical resources, medical literature, communication with peers and faculty, and recreational purposes. In medical education, smartphones serve a dual purpose

both as an academic resource and as a potential source of distraction with emerging concerns regarding addictive usage patterns among students who are already vulnerable to high academic stress and mental health challenges.^[1] Their compact design and multifunctional nature enable uninterrupted connectivity, rendering smartphones a near-constant presence in students' daily lives and routines. College students have been reported to spend eight to ten

hours daily on their mobile phones, a figure that reportedly rose by 20–30% during the COVID-19 pandemic.^[2]

The progressive embedding of smartphones into everyday life has begun to reshape behavioural patterns across multiple domains, including sleep, eating, and academic engagement. Smartphone use, particularly at night, has been shown to provoke various circadian sleep-wake rhythm disorders such as insomnia and excessive daytime tiredness.^[3] Smartphone addiction has been positively correlated with poor sleep quality, stress, anxiety, depression, and poor general health, and in medical students, inadequate sleep can cause emotional exhaustion, which bears a statistically significant relationship with decreased academic performance.^[4] Beyond sleep, smartphone use has permeated mealtimes as well. Studies have demonstrated that a substantial proportion of young students habitually use their smartphones during meals, and the incidence of body weight gain was found to be significantly higher among those who used a smartphone while eating, suggesting interference with adequate appetite regulation and food intake control.^[5] Excessive smartphone use has further been associated with disrupted eating patterns, fostering unhealthy dietary habits such as reliance on fast food and disordered eating behaviours.^[6] Similarly, in academic settings, smartphones have been associated with lower grade point averages, poor sleep quantity, reduced life satisfaction, and heightened anxiety, loneliness, and depression, with students frequently using their devices during class to check social media, multitask, or contact peers — activities that deflect from instruction and impede learning.^[7]

The broader behavioural contexts in which smartphones are used thus reflect not only the frequency of use but also their role in restructuring lifestyle habits. Among college students, the pre-bedtime period and mealtimes represent the two most concentrated windows of smartphone activity, with heavy users describing bedtime phone browsing as a near-automatic nightly ritual and mealtime use dominated by casual entertainment.⁸ These embedded behavioural patterns extend the significance of smartphone use well beyond the realm of addiction. Research indicates that specific patterns of smartphone usage may evolve into problematic behaviours, which in turn become associated with a spectrum of negative effects spanning cognitive, psychological, physical, social, and academic well-being.^[9] While most existing research has focused on smartphone addiction and its determinants, relatively fewer studies have examined how smartphone use is embedded into routine daily activities and contexts. Digital distraction in educational settings characterised by the interruption of learner concentration during academic tasks has been shown to arise from a convergence of technological, personal, and environmental factors, with consequences spanning personal performance deficits, ineffective classroom instruction, and

broader problematic technology use.^[10] Assessing these contextual and behavioural dimensions provides a more nuanced understanding of how smartphones shape daily functioning and overall well-being, one that transcends conventional addiction frameworks. Therefore, the present study was conducted to describe smartphone usage patterns and evaluate behavioral contexts of smartphone use among undergraduate medical students.

MATERIALS AND METHODS

Study Design, Setting, and Duration: A cross-sectional, questionnaire-based observational study was conducted among undergraduate medical students of a tertiary care teaching medical college in India. Data were collected over a defined study period using an electronic survey platform.

Study Population and Eligibility Criteria: The study population comprised undergraduate medical students from first year MBBS to internship who were active smartphone users. Students aged 18 years or older who provided informed consent and completed the questionnaire in full were included. Students who declined participation, submitted incomplete responses, or provided duplicate entries were excluded from the analysis. Only complete responses were considered for final analysis.

Sample Size and Sampling Technique: The sample size was estimated using the single-proportion formula:

$$n = \frac{Z^2 \times p \times q}{d^2}$$

where $Z = 1.96$ for 95% confidence level, $p =$ assumed prevalence of 50% (to ensure maximum sample size), $q = 1 - p$, and $d =$ absolute precision of 5%. The minimum calculated sample size was 384. To improve precision and account for potential incomplete responses, a larger number of participants were approached. After data cleaning, a total of 480 complete responses were included in the final analysis.

A **convenience sampling technique** was employed. The survey link was disseminated electronically to all eligible students through institutional communication channels, and participation was voluntary.

Study Tools: Data were collected using a structured, self-administered questionnaire designed after a comprehensive review of relevant literature on smartphone usage patterns among students. The questionnaire was developed in English and administered using Google Forms. The tool comprised the following domains:

1. **Sociodemographic characteristics:** age, gender, and academic year
2. **Smartphone usage characteristics:** average daily screen time categorized into predefined intervals
3. **Primary purpose of smartphone use:** categorized into social media, educational

applications, OTT platforms, gaming, web surfing, calls, online shopping, adult content, and business-related use

4. **Behavioral context of smartphone use:** assessed across routine activities such as use before sleep, during meals, immediately after waking, while walking, during lectures, and in the washroom

The questionnaire was reviewed by subject experts to ensure content validity. It was pretested among a small group of students (not included in the final analysis) to assess clarity, comprehension, and face validity, and necessary modifications were made prior to final administration.

Operational Definitions

- **Average daily screen time:** Self-reported total duration of smartphone use per day, categorized into <2 hours, 2–3 hours, 3–4 hours, 4–5 hours, 5–6 hours, and >6 hours
- **Primary smartphone use:** The activity reported as “most used” among the listed domains
- **Frequent smartphone uses in behavioural context:** Use reported as “often” or “always” for specific daily activities
- **Behavioural context of use:** Situational use of smartphones during routine activities including before sleep, meals, waking, walking, lectures, and washroom use

Measurements: All variables were self-reported through the questionnaire. Participants selected the most appropriate response option for each item. No objective measurement tools or device-based tracking were used. Data quality was ensured through mandatory response fields in the electronic form, which minimized missing data.

Data Collection Procedure: The electronic questionnaire link was distributed to eligible participants along with a brief description of the study objectives. Participants were required to provide informed consent before accessing the questionnaire. The survey was completed

anonymously, and no personal identifiers were collected. Each participant was allowed a single response to avoid duplication.

Outcome Measures: The primary outcome was the pattern of smartphone use, including distribution of primary usage purposes and average daily screen time. Secondary outcomes included behavioral contexts of smartphone use, reflecting the extent of integration of smartphone use into daily activities.

Ethical Considerations: The study was conducted following approval from the Institutional Ethics Committee. Participation was voluntary, and informed consent was obtained electronically. Confidentiality and anonymity were maintained throughout the study, and data were used exclusively for research purposes.

Statistical Analysis: Data were exported from Google Forms to Microsoft Excel for cleaning and analysis. Categorical variables were summarized as frequencies and percentages. Descriptive statistics were used to present smartphone usage patterns and behavioral contexts. No inferential statistical comparisons were performed, as the study primarily aimed to describe usage patterns.

RESULTS

The present study describes smartphone usage patterns and behavioral contexts among undergraduate medical students. The findings highlight extensive smartphone use and its integration into daily routine activities.

Table 1 shows that most participants were young medical students, with the majority in the 18–20-year age group and a higher proportion of males. Students were fairly distributed across academic years. A considerable proportion reported prolonged smartphone use, with a large segment using smartphones for more than four hours daily, indicating substantial screen exposure in this population.

Table 1: Demographic Profile and Average Daily Screen Time of Participants (N = 480)

Category	n (%)
Age (years)	
• Below 18	13 (2.71)
• 18–20	334 (69.58)
• 21–22	125 (26.04)
• 23–24	7 (1.46)
• Above 24	1 (0.21)
Gender	
• Male	300 (62.50)
• Female	180 (37.50)
Academic year	
• First year MBBS	176 (36.67)
• Second year MBBS	137 (28.54)
• Third year MBBS	166 (34.58)
• Internship	1 (0.21)
Average daily screen time	
• < 2 hours	13 (2.71)
• 2–3 hours	58 (12.08)
• 3–4 hours	123 (25.63)
• 4–5 hours	120 (25.00)
• 5–6 hours	64 (13.33)

• > 6 hours	102 (21.25)
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Table 2 demonstrates that smartphone use was predominantly driven by social media, followed by educational applications. Entertainment-related activities such as gaming and OTT platform use were also commonly reported. Other purposes, including

web surfing, calls, and online services, were used by a smaller proportion of students, suggesting that smartphones are primarily utilized for communication and academic engagement.

Table 2: Primary Purpose of Smartphone Use among Participants (N = 480)

Purpose of use (Most used)	n (%)
Social media	320 (66.67)
Educational applications	258 (53.75)
Gaming	106 (22.08)
OTT platforms	100 (20.83)
Web surfing	96 (20.00)
Calls	63 (13.13)
Online shopping/food delivery	48 (10.00)
Adult content	21 (4.38)
Business/stock market	13 (2.71)

Table 3 indicates that smartphone use was widely embedded in daily routines. The highest proportion of students reported smartphone use before sleep, followed by use during meals and immediately after waking. A notable number of students also reported

smartphone use while walking and during lectures. These findings suggest that smartphone engagement extends across multiple routine activities throughout the day.

Table 3: Behavioural Context of Smartphone Use in Daily Activities (N = 480)

Behavioural context (Often/Always)	n (%)
Use within 30 minutes before sleep	340 (70.83)
Use while eating	194 (40.42)
Use immediately after waking	192 (40.00)
Use while walking	155 (32.29)
Use during lectures	128 (26.67)
Use in washroom	83 (17.29)

DISCUSSION

The present study demonstrates that smartphone use among undergraduate medical students is extensive and deeply integrated into daily routines. A substantial proportion of students reported prolonged daily screen time, with social media and educational applications emerging as the predominant purposes of use. Behavioral context analysis showed frequent smartphone engagement before sleep, during meals, and immediately after waking, indicating that smartphone use is not limited to specific tasks but is embedded across routine daily activities.

The predominance of social media use observed in the present study (66.7%) is consistent with findings reported by Umarji et al,^[11] who highlighted that smartphones are widely used for communication and entertainment, particularly through social networking platforms among college students. Similarly, Verma et al,^[12] reported that smartphone use among medical students is largely driven by social interaction and online engagement, often extending beyond academic requirements.

Educational use was also reported by more than half of participants in the present study, which aligns with observations by Liu et al,^[13] who noted that medical students frequently utilize smartphones for accessing academic resources, although such use often coexists with non-academic activities.

The high proportion of students reporting prolonged screen time in the present study is comparable to findings by Phukan et al,^[14] where a significant number of students used smartphones for more than five hours daily, indicating increasing dependence on digital devices for both academic and non-academic purposes. Similarly, Gangadharan et al,^[15] observed that extended screen exposure is common among students and is associated with increased engagement in online activities.

Behavioral context findings of the present study, particularly the high prevalence of smartphone use before sleep (70.8%), are consistent with prior research. Verma et al,^[12] reported that excessive smartphone use is associated with poor sleep-related behaviours, including delayed sleep onset and increased nighttime usage. Likewise, Liu et al,^[13] documented frequent nighttime smartphone uses among students, suggesting a shift toward digitally mediated bedtime routines.

Use of smartphones during routine activities such as meals and immediately after waking, as observed in the present study, has also been described in earlier literature. Umarji et al,^[11] noted that smartphones have become an integral part of daily life, influencing behavioural patterns and routine habits. These findings collectively indicate a growing trend of continuous smartphone engagement throughout the day.

Smartphone use in the present study appears to be habit-driven and integrated into daily routines. Social media-based engagement and frequent use before sleep suggest repeated, context-based behavior, which may affect normal activities such as sleep due to cognitive stimulation and screen exposure. Use during meals and immediately after waking further reflects a shift toward continuous digital engagement in routine life.

These findings have important implications for student well-being, highlighting the need for awareness regarding responsible smartphone use, particularly around sleep and daily activities. Interventions promoting digital hygiene may be beneficial. The study is strengthened by its adequate sample size and comprehensive assessment of usage patterns, but is limited by its cross-sectional design, self-reported data, and single-institution setting.

CONCLUSION

Smartphone use among undergraduate medical students is extensive and deeply embedded in daily behavioural routines, particularly around sleep and routine activities. These findings highlight the need for promoting balanced and mindful smartphone use to support healthier lifestyle practices among medical students. Future research should focus on longitudinal designs to better understand the impact of smartphone usage patterns on sleep quality, academic performance, and mental health outcomes among medical students. The incorporation of objective measures, such as digital usage tracking, may provide more accurate and reliable assessment of smartphone behavior. Studies across diverse educational settings are also warranted to enhance external validity.

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