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Dependence on smartphone: A cross-sectional study among undergraduate medical students in a tertiary care teaching hospital in Bareilly

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Abstract
Background: The ubiquity of smartphones has transformed daily life, especially among students. However, excessive smartphone use has been linked to reduced attention span, academic decline, and psychological disturbances including nomophobia, the fear of being without a mobile phone. This study explores the association between nomophobia and smartphone addiction among undergraduate medical students.

Methods: A cross-sectional study was conducted among 420 undergraduate medical students at a tertiary care institution in Bareilly, India, from February to March 2025. Participants were selected using stratified random sampling. Data was collected via Google Forms using a structured questionnaire comprising socio-demographic data, the Nomophobia Questionnaire (NMP-Q), and the Smartphone Addiction Scale - Short Version (SAS-SV). Statistical analysis was performed using SPSS v26, with significance set at $p<0.05$.

Results: Among participants, 52.4% had moderate nomophobia and 24.0% had severe nomophobia. Regarding smartphone addiction risk, 51.9% had moderate risk and 22.9% had high risk. A strong positive correlation (r = 0.87, $p<0.001$) was observed between NMP-Q and SAS-SV scores. A significant association was also found between longer smartphone usage duration and greater nomophobia severity ($\chi^2 = 38.75$, $p<0.001$).

Conclusion: This study highlights a strong association between smartphone addiction and nomophobia among medical undergraduates. The high prevalence of moderate to severe nomophobia and addiction risk calls for targeted digital wellness and mental health interventions in academic settings. Awareness programs promoting responsible digital use are essential to mitigate the psychological impacts of smartphone dependency in young adults.

Keywords: Smartphone addiction, Nomophobia, medical students, digital wellness, psychological impact

Introduction
Background
Advanced technology is both a boon and a curse to mankind. Though it conveniently provides speedy information, it also decreases the attention span of the people [1]. Lucrative facilities such as real-time Internet access, mobility due to wireless technology with direct communication through social networking applications with other smartphones gradually making people depend and spend longer hours on their smartphones, disrupting their daily lives [2]. Smartphone addiction is a raising concern among the population which corelates with a varied range of social and psychological complications [3]. Distractions due to smartphone usage has caused many Road Traffic Accidents which sums up to 7558 accidents with 3395 causalities in the year 2022 in India [4].

The dependence on smartphone has risen among the undergraduate students as the mode of preparation for varied competitive examinations have become online especially during this post-COVID era [5].

Use of smartphones for purposes other than education or official use, cyberloafing has also surged due to activities such as video logging and content creation which urges the people to stay up-to-date with social media and online networks. The fear and anxiety of losing connectivity, and not having immediate access to information and communication with others and of losing the comfort provided by the smart mobile phones is linked with mental health and personality disorder [6].

The excessive use of such smart gadgets for communication causes a detachment from the

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real world and creating an isolated online world. The dependence causes depression, anxiety, sleep disturbance, sedentary lifestyle, stress and emotional disturbance along with a negative impact on academic performance. The addiction to online games and videos such as shorts and reels that play for less than 60 seconds which decreases the attention span of the people causing psychological and emotional consequences [7].

Hence in this study we aim to find the association between Nomophobia and Smartphone Addiction among Medical Undergraduate using the NMP-Q and SAS-SV Questionnaires [8, 9].

Materials & Methods
This cross-sectional study was conducted among 420 medical undergraduates at a tertiary care medical college in Bareilly, North India from February to March 2025. Participants were selected using stratified random sampling. 420 (calculated using single proportion formula with 10% non-response rate)

$$ n = \frac{Z_{\alpha/2}^2 \, PQ}{d^2} $$

Where
Z =1.96, P= 0.5, Q = 1-P = 0.5, d = 0.05 (absolute precision of 5%),
Therefore, n= 384.16, after adjusting for 10% more for non-response, the final sample size of 427 participants was calculated.
Thus, a total of 420 students were included in the final analysis.

Inclusion criteria
All willing undergraduate medical students aged 18-25 years who gave informed consent to participate in the study.

Exclusion criteria
Incomplete responses, students with known psychiatric disorders

Study tool
Nomophobia Questionnaire (NMP-Q): 20-item scale, with minimum score of 20 and max score of 140, Smartphone Addiction Scale - Short Version (SAS-SV): 10-item scale; max score 60.
Segment A- had questions regarding socio demographic information. *Segment B-* It was modelled on NMP-Q and SAS-SV Questionnaires

Scoring system
The NMP-Q questionnaire consists of 20 items rated on a seven-point Likert scale (1 = strongly disagree, 7 = strongly agree). A score of 20 indicates no nomophobia, while scores between 21 and 59, 60-99, and 100-140 reflect mild, moderate, and severe nomophobia, respectively [10]. The questionnaire includes four subscales: inability to communicate, loss of connectedness, inability to access information, and giving up convenience. Its validity and reliability were confirmed by a Cronbach's alpha coefficient of 0.92.

The Smartphone Addiction Scale- Short Version (SAS-SV) consists of ten items, with each one scored on a six-point Likert scale: 1 represents "strongly disagree", 2 is "disagree", 3 means "somewhat disagree", 4 stands for "somewhat agree", 5 denotes "agree", and 6 indicates "strongly agree". For males, a score of 31 or above, and for females, a score of 33 or greater, is indicative of smartphone addiction. The Cronbach's α coefficient was 0.84 in present sample [10].

Data collection procedure
Google Forms distributed via WhatsApp.

Statistcal analysis
The collected data was entered into an MS Excel (2013) sheet and analysed using the trial version of the SPSS v26. Descriptive statistics was used to summarize data. Pearson's correlation was applied for association and Independent t-test and chi-square for subgroup analysis. A p-value of <0.05 was considered statistically significant.

Results

Table 1: Distribution of study participants on the basis of Socio-demographic Profile of study participants (N=420)

Variable	Category	Frequency	percentage
Gender	Female	244	58.10
	Male	176	41.90
Age Group *(in years)*	18-19	70	16.67
	20-21	190	45.24
	22-23	130	30.95
	≥24	30	7.14
Mean age group	21.30 ± 1.7 years		
Duration of daily mobile use *(hours/day)*	<4	58	13.81
	4-5	89	21.19
	6-7	168	40.00
	>7	105	25.00
Purpose of using smart phone *(multiple response allowed)*	Browsing, Social networking	420	100.00
	Contacting family and friends	420	100.00
	Online preparatory classes	420	100.00
	Watching videos	389	92.62
	Playing games or shopping	210	50.00
	shopping	70	16.67
Occasion of smartphones usage *(multiple response allowed)*	During meal times	373	88.81
	In between class hours	326	77.62
	After class hours	338	80.48
	In the washroom	340	80.95
	While traveling	224	53.33
	Other	82	19.52
Total		420	100

Table 1 depicts the distribution of study participants on the basis of gender and shows that the majority, 244 (58.10%) of study subjects were females and only 176 (41.90%) were males. Majority, 190 (45.24%) of study subjects were within 20-21 years of age, followed by 130 (30.95%) subjects aged between 20-21 years and 70 (16.67%) were aged 18-19 years of age and 30 (7.14%) were > 24 years of age group with the mean age of participants being 21.30 ±1.7 years. Maximum duration of phone usage was 6 to 7 hours seen in 168 (40.00%) participants followed by 105 (25.00%) participants who had a screen time of >7 hours, with 89(21.19%) participants using phone for 4 to 5 hours and only 58 (13.81%) participant had a phone usage time of less than 4 hours per day. Majority, 420 (100.00%) of study subjects used their phones for social networking, contacting family and friends and online preparatory classes followed by 389 (92.62%) subjects who used their phones for watching videos followed by 210 (50.00%) subjects who played games on phone and 70 (16.67%) participants spent time on their phones for online shopping. A total of 373 (88.81%) students spent time on their phone during meal times, 326 (77.62%) used their phones even in between class hours with 340 (80.95%) using their phones while using the washrooms, 338 (80.48%) students spending time on their smartphones after class hours, 224 (53.33%) using their phone while commuting and 82(19.52%) utilizing the phone even during other times in general.

Table 2: Distribution of study participants on the basis of their Level of severity (N=420)

	Level of severity	Frequency (n)	Percentage (%)
Nomophobia levels (NMP-Q)	No	23	5.5%
	Mild	76	18.1%
	Moderate	220	52.4%
	Severe	101	24.0%
	Mean score		105 ± 83.28
	Level of severity	Frequency (n)	Percentage (%)
Smartphone addiction risk (SAS-SV)	Low risk	106	25.24%
	Moderate	218	51.90%
	high	96	22.86%
	Mean score		104 ± 67.74

Table 2 shows the distribution of study participants on the basis of their severity of nomophobia and smartphone addiction. Among the 420 participants, 220 (52.4%) had moderate nomophobia, 101 (24.0%) subjects had severe nomophobia, 76 (18.1%) students had mild phobia and only 23 (5.5%) participants had no nomophobia. In the smartphone addiction risk scale among 420 students, 218 (51.90%) students had moderate risk of smartphone addiction with 106 (25.24%) showed low risk of smartphone phone addiction with 96 (22.86%) had high risk of smartphone addiction.

Table 3: contingency table between duration of daily mobile usage and nomophobia severity scale (n=420)

Variables	Nomophobia severity scale score				
Mobile use (hrs/day)	No	Mild	Moderate	Severe	Total
< 4	10	20	20	8	58
4 - 5	8	25	40	16	89
6 - 7	3	18	100	47	168
>7	2	13	60	39	105
Total	23	76	220	110	420

chi square = 38.75, *p*<0.001

Table 3 demonstrates the association between daily mobile usage duration and the severity of nomophobia among 420 students. A significant trend was observed wherein students who used mobile phones for longer durations exhibited higher levels of nomophobia. Specifically, among those using their mobile phones for more than 7 hours per day, 94.3% showed moderate to severe nomophobia. The chi-square test revealed a statistically significant association between mobile usage and nomophobia levels (χ^2 = 38.75, df = 9, *p*<0.001), indicating that increased smartphone use is significantly associated with higher severity of nomophobia.
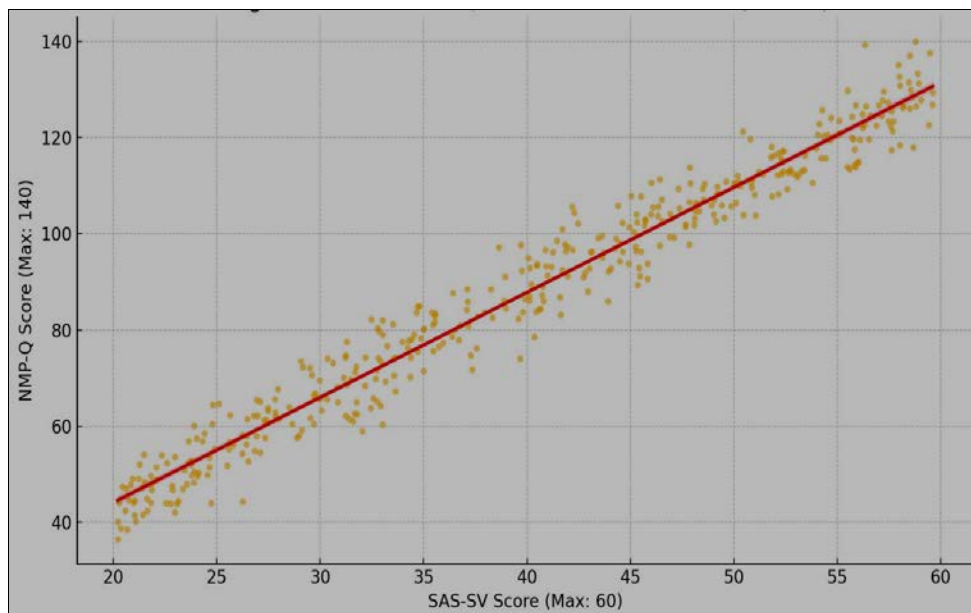
Fig 1: Correlation between NMP-Q and SAS-SV scores (r = 0.87, $p < 0.001$)

Figure 1 illustrates the Correlation between NMP-Q and SAS-SV Scores. This scatter plot illustrates the positive correlation between Nomophobia Questionnaire (NMP-Q) scores and Smartphone Addiction Scale-Short Version (SAS-SV) scores among the study participants (n = 420). Each point represents an individual participant's paired scores on the two scales. The red regression line indicates a strong positive linear relationship, with a correlation coefficient of r = 0.87 and a statistically significant p-value ($p < 0.001$). This suggests that higher levels of smartphone addiction are strongly associated with greater levels of nomophobia

Discussion
The present study highlights a significant association between increased smartphone usage and higher levels of nomophobia and smartphone addiction among undergraduate students. More than half of the participants exhibited moderate levels of nomophobia (52.4%) and moderate risk of smartphone addiction (51.9%). A positive correlation was observed between NMP-Q and SAS-SV scores (r = 0.88, $p < 0.001$), suggesting that nomophobia severity rises with increasing smartphone addiction risk.

These findings are consistent with prior research. Yildirim and Correia first defined nomophobia as the fear of being without a mobile phone, and its psychological effects have since been widely acknowledged [8]. In a study conducted among university students in India, Sharma *et al.* found that 42.6% of students had moderate nomophobia and 24.5% had severe nomophobia, which aligns closely with our findings [10].

The strong correlation between NMP-Q and SAS-SV scores suggests overlapping behavioural and psychological domains between nomophobia and smartphone addiction. Similar trends have been reported in studies from Turkey and Saudi Arabia, where excessive mobile usage has been associated with anxiety, reduced academic performance, and impaired sleep hygiene [11, 12].

Chi-square analysis in our study ($\chi^2 = 38.75$, df = 9, $p < 0.001$) demonstrated a statistically significant relationship between daily smartphone usage and nomophobia severity. A clear gradient was observed: participants using smartphones for more than 7 hours daily were significantly more likely to experience severe nomophobia. These findings support the growing concern that overdependence on smartphones may exacerbate psychological distress in young adults [13, 14].

The scatter plot in Figure 1 reveals a strong positive linear correlation between nomophobia (NMP-Q) and smartphone addiction (SAS-SV) scores among undergraduate students. The correlation coefficient of r = 0.87 ($p < 0.001$) indicates that higher levels of smartphone addiction are significantly associated with greater severity of nomophobia. This finding aligns with previous studies suggesting that excessive reliance on smartphones may contribute to emotional distress related to separation from the device or its services [8, 15].

Similar results were reported in a study by Gezgin *et al.*, which found a significant relationship between problematic smartphone use and nomophobia among adolescents, with both constructs strongly reinforcing each other [11]. The observed correlation is also in line with findings from Sharma *et al.*, who reported moderate to severe nomophobia in students with high levels of mobile usage and addiction symptoms [10].

The strong linear relationship observed in our analysis highlights the overlapping nature of nomophobia and smartphone addiction as behavioral dependencies, likely fueled by compulsive device usage patterns, especially for social networking, entertainment, and communication [12]. Such behaviors reflect the growing psychological integration of smartphones into students' daily functioning, potentially leading to dependency and anxiety when access is restricted.

Given the increasing digitalization of education and social interaction, particularly in the post-pandemic context, these findings emphasize the need for awareness programs and behavioral interventions to mitigate the psychological impact of excessive smartphone use.

Social networking and online learning were among the most common reasons for smartphone use, reflecting the dual nature of technology as both a necessity and a potential source of dependency. Furthermore, the finding that 88.81% of students used phones during breaks and 80.95% even during personal tasks like using the washroom, underlines the pervasiveness of smartphone presence in daily life.

Limitations of this study include its cross-sectional design, which prevents the establishment of causality, and the use of

self-reported questionnaires, which may be subject to recall or social desirability bias.

Conclusion

This study concluded a strong association between smartphone addiction and nomophobia among undergraduate medical students, with a high prevalence of moderate-to-severe levels in both domains. Longer daily smartphone use was significantly linked to higher nomophobia severity, underscoring the psychological risks of excessive device dependence. Given the pervasiveness of smartphone use for academic, social, and entertainment purposes, these findings highlight the urgent need for targeted digital wellness programs, mental health support, and promotion of responsible technology use in academic settings. Educational institutions should incorporate awareness campaigns, behavioral interventions, and time-management strategies to help students maintain a healthy balance between digital engagement and real-world interactions. Further longitudinal studies are warranted to explore causality and evaluate the effectiveness of such interventions in reducing smartphone-related psychological distress.

Conflict of Interest

Not available

Financial Support

Not available

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