

Research Article

Problematic Smartphone Use Among Undergraduate University Students: Severity Patterns and Psychosocial Correlates

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Abstract: Background: Smartphones are widely used by university students for communication, education, entertainment, and social interaction. However, problematic or poorly controlled use may coexist with difficulties in psychological and social functioning. **Aim:** This study aimed to assess the pattern and severity of problematic smartphone use among undergraduate university students and examine its association with psychosocial characteristics, including anxiety and social functioning. It also aimed to identify factors independently associated with smartphone-addiction severity. **Methods:** A cross-sectional analytical study was conducted among 370 undergraduate students over 18 months at a recognized university offering programmes across different academic disciplines. Data on smartphone use, nomophobia, anxiety, and social functioning were collected using standardized assessment measures, alongside historical 10th- and 12th-grade academic percentages. Pearson correlation, one-way ANOVA, and multiple linear regression were used as appropriate. **Results:** Among 370 students, the mean 10th-grade and 12th-grade percentages were $81.31 \pm 6.28\%$ and $78.11 \pm 6.63\%$, respectively. Mean smartphone use was 5.31 ± 1.81 hours/day, MPUST score was 55.18 ± 10.17 , SAS-SV score was 36.73 ± 6.34 , NMP-Q score was 87.26 ± 15.19 , GAD-2 score was 2.94 ± 1.39 , and SFQ score was 7.28 ± 2.59 . Mild, moderate, and addictive smartphone-use categories comprised 35 (9.5%), 274 (74.1%), and 61 (16.5%) participants, respectively. Anxiety and social-functioning scores differed significantly across smartphone-use categories. **Conclusion:** Problematic smartphone use was common in this sample and was significantly associated with greater anxiety symptoms and poorer social functioning. Smartphone-use duration, NMP-Q score, anxiety symptoms, and social-functioning difficulty were independently associated with higher SAS-SV scores. Because the study was cross-sectional, these associations should not be interpreted as causal. Historical 10th- and 12th-grade percentages were reported as background characteristics and were not used as measures of current university academic performance.

Keywords: Problematic Smartphone Use, Smartphone Addiction, Undergraduate Students, Anxiety, Social Functioning, Nomophobia

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INTRODUCTION

Smartphones have become an important part of everyday life for university students, supporting communication, education, information seeking, entertainment, and social interaction. At the same time, increasing dependence on smartphones has raised concerns about problematic smartphone use (PSU), particularly when use becomes excessive, difficult to control, or begins to interfere with daily activities. University students may be particularly vulnerable because smartphones are continuously accessible and are commonly used for both academic and non-academic purposes. A systematic review of university students found substantial variability in PSU prevalence across studies, with consistent associations with psychological difficulties including anxiety and depression. The review also identified longer smartphone-use duration as a potential factor associated with PSU [1].

The academic implications of excessive smartphone use have also received increasing attention. Smartphones can provide useful educational resources, but frequent checking, recreational use, notifications, and multitasking may compete with students' attention and study time. A systematic review and meta-analysis by Paterna et al. found a significant negative association between PSU and academic achievement [2]. Hsieh's meta-analysis of 45 studies involving 84,268 university students reported a small but significant negative association between smartphone-use frequency and academic performance ($r = -0.12$) [3]. Evidence from India has also described associations between smartphone addiction and academic performance among undergraduate medical students [4].

Psychological and social factors also appear to be closely related to problematic smartphone use. Xiao and Huang reported a significant positive relationship between social anxiety and mobile-phone addiction among 680 Chinese college students [5]. Li et al., in a sample of 3,189 Chinese college students, reported relationships among shyness, social anxiety, self-control, and mobile-phone addiction tendency [6].

The aim of the present study was to assess the pattern and severity of problematic smartphone use among undergraduate university students and to examine its association with psychosocial characteristics. The objectives were to assess the pattern and severity of problematic smartphone use; examine the association between smartphone-use severity and anxiety and social functioning, and identify factors independently associated with SAS-SV score.

MATERIAL AND METHODS

- **Study Design:** A cross-sectional analytical study was conducted
- **Study Population:** The study included undergraduate students enrolled in various academic programmes at the selected university. Students from different disciplines were considered to obtain broader representation of the undergraduate student population
- **Sample Size and Sampling:** A total of 370 undergraduate students were included in the study
- **Study Duration:** The study was conducted over a period of 18 months, including participant recruitment, data collection, assessment, and compilation of study findings
- **Study Setting/Location:** The study was carried out at a recognized university offering undergraduate programmes across different academic disciplines. Data were collected from eligible students within the university during the study period

Inclusion Criteria

- Undergraduate students currently enrolled in the selected university
- Students who were willing to participate in the study
- Students who provided informed consent before participation
- Students who were able to understand and complete the study questionnaire

Exclusion Criteria

- Students who were unwilling to participate or did not provide informed consent
- Students who submitted substantially incomplete questionnaires
- Students who were unavailable during the data-collection period
- Students who could not provide reliable information regarding their smartphone use or psychosocial characteristics
- Students who withdrew from the study at any stage

Assessment Tools

Smartphone-use severity was assessed using the MPUST as reported in the original study protocol. Participants were classified into mild, moderate, and addictive smartphone-use categories using the study's prespecified scoring criteria. Smartphone-addiction symptoms were assessed using the 10-item Smartphone Addiction Scale–Short Version (SAS-SV), scored on a 6-point response scale; the total score was analysed as a continuous variable [7].

Nomophobia was assessed using the 20-item Nomophobia Questionnaire (NMP-Q), which evaluates four domains of nomophobia, the total score ranges from 20 to 140, with higher scores indicating greater nomophobia [8].

Anxiety symptoms were assessed using the 2-item Generalized Anxiety Disorder scale (GAD-2), with total scores ranging from 0 to 6 [9].

Social functioning was assessed using the 8-item Social Functioning Questionnaire (SFQ), with a total score range of 0–24; higher scores indicate greater social-functioning difficulty [10].

Ethics Approval

The study protocol was reviewed and approved by the Institutional Ethics Committee (IEC), Teerthanker Mahaveer Medical College and Research Centre, Moradabad, India, prior to the commencement of the study (IEC Approval No: TMU/IEC/2024-25/PG/70; Date: 10/06/2024). Formal approval for this study was granted by IEC after comprehensive review of the statistical analysis. The study was conducted in accordance with the applicable national ethical guidelines for biomedical and health research involving human participants.

Informed Consent

Written informed consent was obtained electronically from all participants before enrollment in the study. Participation was entirely voluntary, and students were informed about the purpose of the study, the confidentiality of their

responses, and their right to decline participation or withdraw from the study at any stage without any academic consequences. No personally identifiable information was collected, and all data were anonymized prior to analysis.

Statistical Analysis

Data were entered, checked for completeness and consistency, and analysed using SPSS version 26.0. Continuous variables were summarized as mean±standard deviation (SD), while categorical variables were presented as frequencies and percentages. The distribution of continuous variables was assessed before selecting statistical tests. Differences in mean GAD-2 and SFQ scores across categories of problematic smartphone use were evaluated using one-way analysis of variance (ANOVA). Pearson's correlation coefficient was used to assess relationships between daily smartphone-use duration, MPUST, SAS-SV, NMP-Q, GAD-2, and SFQ scores. Multiple linear regression was used to identify factors independently associated with SAS-SV score. Historical 10th- and 12th-grade percentages were summarized descriptively as academic-background characteristics and were not entered as outcomes of smartphone-use analyses. A two-sided p-value <0.05 was considered statistically significant.

RESULTS

Participant Characteristics

A total of 370 undergraduate students were included in the study. Participants were aged 18–24 years, with the largest proportion being 21 years old (80, 21.6%), followed by 20 years (74, 20.0%) and 22 years (60, 16.2%). Females accounted for 194 (52.4%) and males for 176 (47.6%). Second-year students constituted the largest group (101, 27.3%), followed by third-year students (94, 25.4%), first-year students (91, 24.6%), and fourth-year students (84, 22.7%). Most participants belonged to the middle socioeconomic group (211, 57.0%) and were from urban areas (266, 71.9%). Mild, moderate, and addictive smartphone-use categories comprised 35 (9.5%), 274 (74.1%), and 61 (16.5%) participants, respectively Table 1.

The mean 10th-grade percentage was 81.31±6.28% and the mean 12th-grade percentage was 78.11±6.63%. Mean smartphone use was 5.31±1.81 hours/day; MPUST score was 55.18±10.17; SAS-SV score was 36.73±6.34; NMP-Q score was 87.26±15.19; GAD-2 score was 2.94±1.39; and SFQ score was 7.28±2.59. The school-level academic percentages are reported as historical background characteristics and were not analysed as current academic outcomes Table 2.

Table 1: Sociodemographic and Smartphone-Use Characteristics of Participants

Variable	Category	n	%
Age (years)	18	46	12.4
	19	50	13.5
	20	74	20.0
	21	80	21.6
	22	60	16.2
	23	39	10.5
	24	21	5.7
Sex	Male	176	47.6
	Female	194	52.4
Year of study	First year	91	24.6
	Second year	101	27.3
	Third year	94	25.4
	Fourth year	84	22.7
Socioeconomic status	Low	73	19.7
	Middle	211	57.0
	High	86	23.3
Residence	Urban	266	71.9
	Rural	104	28.1
MPUST category	Mild smartphone use	35	9.5
	Moderate smartphone use	274	74.1
	Addictive smartphone use	61	16.5

Table 2: Academic Background, Smartphone Use and Psychosocial Characteristics

Variable	Mean±SD
10th-grade percentage	81.31±6.28
12th-grade percentage	78.11±6.63
Smartphone use (hours/day)	5.31±1.81
MPUST total score	55.18±10.17
SAS-SV total score	36.73±6.34
NMP-Q total score	87.26±15.19
GAD-2 score	2.94±1.39
SFQ score	7.28±2.59

Table 3: Anxiety (GAD-2) Scores According to Problematic Smartphone-Use Severity

MPUST category	N	Mean GAD-2 score	SD
Mild smartphone use	35	2.06	1.55
Moderate smartphone use	274	2.88	1.32
Addictive smartphone use	61	3.67	1.23
Between groups	—	F = 17.14	p<0.001

Table 4: Social Functioning According to Problematic Smartphone-Use Severity

MPUST category	N	Mean SFQ score	SD
Mild smartphone use	35	4.63	2.52
Moderate smartphone use	274	7.28	2.44
Addictive smartphone use	61	8.79	2.03
Between groups	—	F = 33.90	p<0.001

Table 5: Multiple Linear Regression: Factors Independently Associated with SAS-SV Score

Predictor	B	SE	t	p-value
Constant	8.74	0.70	12.53	<0.001
Smartphone use (hours/day)	1.52	0.08	18.81	<0.001
NMP-Q total score	0.18	0.01	13.72	<0.001
GAD-2 score	0.51	0.11	4.58	<0.001
SFQ score	0.37	0.07	5.42	<0.001

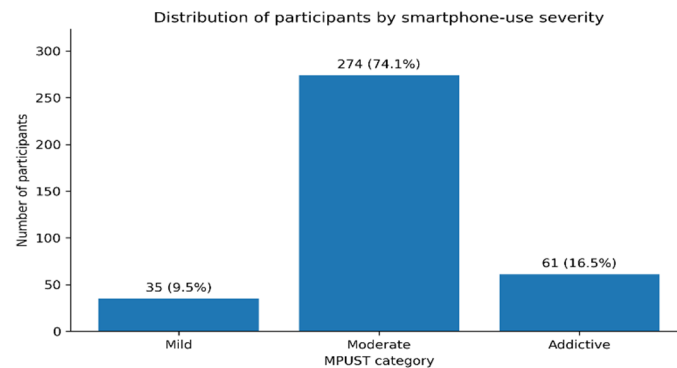


Figure 1: Distribution of Participants by MPUST Category

Anxiety symptoms differed significantly across the three categories of problematic smartphone use. Mean GAD-2 scores were 2.06 ± 1.55 in the mild-use group, 2.88 ± 1.32 in the moderate-use group, and 3.67 ± 1.23 in the addictive-use group ($F = 17.14$, $p < 0.001$). Social functioning also differed significantly, with mean SFQ scores of 4.63 ± 2.52 , 7.28 ± 2.44 , and 8.79 ± 2.03 in the mild-, moderate-, and addictive-use groups, respectively ($F = 33.90$, $p < 0.001$) Table 3-5 and Figure 1.

DISCUSSION

The present study included 370 undergraduate university students aged 18–24 years. Females accounted for 52.4% of participants and males for 47.6%. Most participants belonged to the middle socioeconomic group and were from urban areas. Mild, moderate, and addictive smartphone-use categories comprised 9.5%, 74.1%, and 16.5% of the sample, respectively. Because the study was conducted at a single university, these proportions should be interpreted as sample-specific rather than as population prevalence estimates.

The predominance of moderate and addictive smartphone use is broadly consistent with previous research among university students. Candussi *et al.* reported substantial variability in PSU prevalence across studies, with prevalence estimates ranging from 36.5% to 67% and an approximate mean of 52%. They also identified longer smartphone-use duration as a potential factor associated with PSU and reported associations between PSU and mental-health problems such as anxiety and depression [1]. Differences between studies may reflect differences in measurement instruments, scoring thresholds, population characteristics, and definitions of problematic use.

The participants reported a mean smartphone-use duration of 5.31 ± 1.81 hours/day. The mean MPUST score was 55.18 ± 10.17 , while the mean SAS-SV score was 36.73 ± 6.34 . The mean NMP-Q score was 87.26 ± 15.19 , and the mean GAD-2 and SFQ scores were 2.94 ± 1.39 and 7.28 ± 2.59 , respectively. These findings indicate coexistence of substantial smartphone involvement with measurable anxiety symptoms and social-functioning difficulties.

Although previous systematic reviews and meta-analyses have reported associations between PSU and academic achievement [2-3], current university academic performance was not assessed in the present study. The 10th- and 12th-grade percentages predated the current smartphone-use assessment and are therefore presented only as historical academic-background characteristics. They should not be interpreted as measures of current university performance.

A clear difference in anxiety symptoms was observed across the three smartphone-use categories. Mean GAD-2 scores increased from 2.06 ± 1.55 in the mild-use group to 2.88 ± 1.32 in the moderate-use group and 3.67 ± 1.23 in the addictive-use group ($F = 17.14$, $p < 0.001$). This pattern is consistent with the broader literature linking problematic smartphone use with anxiety-related characteristics [1,5,6]. However, the cross-sectional design does not establish temporal direction or causality.

The study also demonstrated a significant relationship between problematic smartphone-use severity and social functioning. Mean SFQ scores increased from 4.63 ± 2.52 in the mild-use group to 7.28 ± 2.44 in the moderate-use group and 8.79 ± 2.03 in the addictive-use group ($F = 33.90$, $p < 0.001$). Students experiencing social difficulties may use smartphones more frequently as an alternative means of communication, while excessive smartphone use could also reduce opportunities for direct social interaction. Longitudinal studies are required to clarify the temporal direction of this association.

Multiple linear regression showed that smartphone-use duration, NMP-Q score, GAD-2 score, and SFQ score were independently associated with higher SAS-SV scores. Daily smartphone use showed $B = 1.52$ ($SE = 0.08$, $t = 18.81$, $p < 0.001$), NMP-Q score showed $B = 0.18$ ($SE = 0.01$, $t = 13.72$, $p < 0.001$), GAD-2 score showed $B = 0.51$ ($SE = 0.11$, $t = 4.58$, $p < 0.001$), and SFQ score showed $B = 0.37$ ($SE = 0.07$, $t = 5.42$, $p < 0.001$). These findings indicate statistical associations within the study population but do not establish causality.

The findings should therefore be interpreted as evidence of an association between problematic smartphone-use severity and psychosocial characteristics in this particular undergraduate sample. Future longitudinal research should examine whether changes in smartphone-use behaviour precede changes in anxiety or social functioning, or whether the relationships are reciprocal.

Limitations

The present study has several limitations. First, the cross-sectional design does not allow temporal or causal relationships to be established between problematic smartphone use and psychosocial characteristics. Second, smartphone-use patterns, anxiety, and social functioning were assessed using self-reported information, which may be influenced by recall or response bias. Third, the study was conducted at a single university, limiting generalizability. Fourth, current university academic performance was not assessed; only historical 10th- and 12th-grade percentages were available. Other potentially relevant factors such as sleep quality, study habits, family environment, social-media use, and lifestyle characteristics were not comprehensively evaluated. The sampling method, sample-size calculation, ethics approval details, and exact MPUST scoring criteria should be reported explicitly in the final submission.

CONCLUSION

Problematic smartphone use was common in this undergraduate sample and was significantly associated with anxiety symptoms and poorer social functioning across smartphone-use severity categories. Smartphone-use duration, NMP-Q score, anxiety symptoms, and social-functioning difficulty were independently associated with higher SAS-SV scores. The cross-sectional design prevents causal inference. Historical 10th- and 12th-grade percentages should be regarded as background academic characteristics rather than measures of current university academic performance. Future studies should use verified contemporaneous academic outcomes and longitudinal designs to clarify temporal relationships.

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