

Prevalence of Smartphone Addiction and Its Relationship with Stress, Anxiety, and Depression in Healthy Adult Population

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ABSTRACT

Background: Excessive smartphone use is increasingly recognised as a behavioural health concern, particularly among young adults, and has been associated with depression, anxiety, and stress. The present study estimated the prevalence of smartphone addiction and examined its relationship with these psychological parameters.

Objectives: To determine the prevalence of smartphone addiction, describe depression, anxiety, and stress separately, and evaluate their associations with smartphone addiction among apparently healthy adults.

Methods: A cross-sectional analytical study was conducted among 74 apparently healthy adults aged 18-30 years at Hind Institute of Medical Sciences, Safedabad, Barabanki, Uttar Pradesh. Participants were recruited by convenience sampling. Smartphone addiction was assessed using the study Smartphone Addiction Scale (SAS) classification, while depression, anxiety, and stress were assessed using the DASS-21. Data were analysed in IBM SPSS Statistics version 26.1 using descriptive statistics, correlation analysis, and multiple linear regression. A two-sided p-value <0.05 was considered statistically significant.

Results: The mean age of participants was 23.4 ± 3.2 years; 40 (54.05%) were male and 34 (45.95%) were female. Smartphone addiction was present in 50/74 participants (67.56%). Depression, anxiety, and stress were present in 56 (75.68%), 38 (51.35%), and 43 (58.11%) participants, respectively. Mean raw DASS-21 scores were 4.62 ± 3.24 for depression, 4.14 ± 3.98 for anxiety, and 6.46 ± 3.83 for stress. Smartphone addiction showed a positive correlation with depression ($r=0.42$, $p=0.00020$) and anxiety ($r=0.29$, $p=0.01220$), whereas the correlation with stress was not statistically significant ($r=0.12$, $p=0.30849$). In multiple linear regression, depression remained independently associated with smartphone addiction score ($B=0.68$, 95% CI 0.30-1.06, $\beta=0.28$, $p=0.004$); anxiety ($B=0.38$, 95% CI -0.20 to 0.96, $p=0.227$) and stress ($B=0.23$, 95% CI -0.13 to 0.59, $p=0.393$) were not independently

associated. The model explained 32% of variance ($R^2=0.32$; adjusted $R^2=0.29$; $F(3,70)=10.45$; $p=0.000009$).

Conclusion: Smartphone addiction was common in this young adult sample and was associated with depression and anxiety in bivariate analysis. Depression remained independently associated after simultaneous adjustment for anxiety and stress. Because the study was cross-sectional, these findings represent associations and do not establish the direction of effect or causality.

Keywords: smartphone addiction; depression; anxiety; stress; young adults; DASS-21

INTRODUCTION

Rapid expansion of smartphone use has changed communication, education, recreation, and social interaction. Alongside these benefits, problematic smartphone use has become an important behavioural health concern. In a cross-sectional study of Chinese college students, smartphone addiction was associated with eating-related and lifestyle variables, illustrating that excessive use may cluster with broader health behaviours [1].

Psychological correlates have been repeatedly reported. A 2025 cross-sectional study among Moroccan nursing students found an association between smartphone addiction and anxiety [2]. Meta-analytic evidence has also linked smartphone addiction with alexithymia, insecure attachment patterns, negative emotions, and lower subjective well-being [3]. Post-pandemic research has similarly reported relationships between higher smartphone-addiction scores and adverse emotional states or lower life satisfaction [4].

Among university students, smartphone addiction has been associated with depression, anxiety, loneliness, poor sleep, and lower physical activity [5]. Related digital-use research has identified co-occurrence between internet addiction and depressive symptoms [6] and between gaming addiction and perceived stress [7]. During COVID-19-related social isolation, problematic internet and gaming use also co-occurred with psychological distress [8], while nomophobia has been associated with psychological symptoms and insomnia [9]. Prevalence estimates vary substantially according to population, screening

instrument, cut-off, and setting. Evidence from young adults in North Indian medical-campus settings remains limited. The present study therefore examined smartphone addiction and the separate psychological domains of depression, anxiety, and stress among apparently healthy adults aged 18-30 years. As a cross-sectional study, it was designed to identify associations rather than causal relationships.

Objectives

1. To determine the prevalence of smartphone addiction among apparently healthy adults using the Smartphone Addiction Scale (SAS) classification recorded in the study.
2. To assess depression, anxiety, and stress separately among participants using the Depression Anxiety Stress Scales-21 (DASS-21).
3. To evaluate the associations between smartphone addiction score and depression, anxiety, and stress scores.

MATERIALS & METHODS

Study Design and Setting

This cross-sectional analytical study was conducted at Hind Institute of Medical Sciences (HIMS), Safedabad, Barabanki, Uttar Pradesh, India, over an 18-month period after prior approval from the Institutional Human Ethics Committee (IHEC-HIMS).

Study Population and Sampling

The study population comprised apparently healthy adults of both sexes aged 18-30 years attending the HIMS college campus. Eligible participants available during the

study period were recruited using convenience sampling.

Sample Size Calculation

The sample size was calculated using the single-proportion formula $n = Z^2 p(1-p)/d^2$. A pooled global prevalence of smartphone addiction of 26.99% has been reported [10]; for study planning this was approximated to $p=0.30$. At a 95% confidence level ($Z=1.96$) and an absolute allowable error of $d=0.10$, the initial sample size was 80.67, rounded to 81. Because the accessible campus population was approximately 100, finite population correction yielded a minimum sample of approximately 45 participants: $n = 81 / [1+(80/100)] = 45$. A total of 74 eligible participants were ultimately included, exceeding the adjusted minimum.

Eligibility Criteria

Inclusion criteria were apparently healthy individuals aged 18-30 years, irrespective of sex. Exclusion criteria included age below 18 years or above 30 years; history or symptoms of thyroid illness; diagnosed panic disorder without comorbid generalized anxiety disorder; psychoactive drug or substance abuse; systemic illness; a major recent stressful or life-changing event; and pregnancy or lactation.

Study Instruments

Smartphone Addiction Scale (SAS): The study used a study-adapted Smartphone Addiction Scale questionnaire containing 33 smartphone-use items covering disruption of daily activities, withdrawal-like experiences, overuse, tolerance, and smartphone-oriented social behaviour. Higher scores represented greater problematic use. Smartphone addiction status was analysed using the pre-specified addicted/non-addicted classification retained in the study dataset (50 addicted and 24 non-addicted). A reproducible numeric cut-off for this dichotomous classification was not retained in the study records; therefore, no new post-hoc threshold was introduced. The original SAS development paper is

cited for the construct and scale framework [11].

Depression Anxiety Stress Scales-21 (DASS-21): DASS-21 contains three seven-item subscales assessing depression, anxiety, and stress. Each item is rated from 0 to 3 and raw subscale scores range from 0 to 21. The instrument has established construct validity in non-clinical samples [12]. The retained study dataset contained separate domain presence/absence indicators, while the analysis records contained the domain means and standard deviations. Five-level severity counts (normal, mild, moderate, severe, and extremely severe) were not retained at participant level and therefore were not reconstructed.

Data Collection Procedure

Participants were informed about the purpose of the study and written informed consent was obtained before data collection. Sociodemographic information and questionnaire responses were recorded using the structured study form. Confidentiality and anonymity were maintained throughout data collection and analysis.

Statistical Analysis

Data were entered in Microsoft Excel and analysed using IBM SPSS Statistics version 26.1. Categorical variables were summarised using frequencies and percentages, while continuous questionnaire scores were summarised using mean $\pm$ standard deviation and range where available. Correlation analysis was used to assess the relationship of smartphone addiction score with depression, anxiety, and stress. Multiple linear regression was used to assess the independent associations of depression, anxiety, and stress scores with smartphone addiction score when entered simultaneously. The regression table reports unstandardized coefficient (B), standard error (SE), standardized coefficient (β), t-statistic, two-sided p-value, and 95% confidence interval (CI), together with R^2 , adjusted R^2 , and the overall F-statistic.

Pearson correlation coefficients (r) were reported; their exact two-sided p -values were calculated from the reported r values with $N=74$. The regression 95% CIs and exact coefficient p -values were calculated from the reported B , SE , and t -statistics using the model residual degrees of freedom ($df=70$), and the exact overall-model p -value was calculated from the reported $F(3,70)=10.45$. Statistical significance was set at $p<0.05$.

Ethical Considerations

Ethical approval was obtained from the Institutional Human Ethics Committee, Hind Institute of Medical Sciences. The study records identify the approval as

HIMS/IHEC/2024-25/Faculty/Dr. Adeeba Khan. Participation was voluntary, written informed consent was obtained, and participant confidentiality was protected.

RESULTS

A total of 74 participants were included. Their mean age was 23.4 ± 3.2 years. Forty participants (54.05%) were male and 34 (45.95%) were female. The largest age group was 21-25 years (44.59%), 47 (63.51%) were students, 58 (78.38%) were single, and 65 (87.84%) had college/university education. Smartphone addiction was recorded in 50 participants (67.56%).

Table 1. Baseline characteristics of participants (N=74)

Characteristic	Value
Age, years, mean $\pm$ SD	23.4 $\pm$ 3.2
Age 18-20 years	27 (36.49%)
Age 21-25 years	33 (44.59%)
Age 26-30 years	14 (18.92%)
Male	40 (54.05%)
Female	34 (45.95%)
Student	47 (63.51%)
Employed	13 (17.57%)
Unemployed	14 (18.92%)
Monthly family income (₹) <5,000	11 (14.86%)
Monthly family income (₹) 5,000-10,000	8 (10.81%)
Monthly family income (₹) 10,001-20,000	19 (25.68%)
Monthly family income (₹) >20,000	36 (48.65%)
Single	58 (78.38%)
Married	15 (20.27%)
Other marital status	1 (1.35%)
Family size <4	34 (45.95%)
Family size 5-7	38 (51.35%)
Family size ≥ 8	2 (2.70%)
Primary/secondary education	9 (12.16%)
College/university education	65 (87.84%)
Smartphone addiction: present	50 (67.56%)

Characteristic	Value
Smartphone addiction: absent	24 (32.43%)
DASS-21 depression raw score, mean $\pm$ SD (range)	4.62 $\pm$ 3.24 (0-21)
DASS-21 anxiety raw score, mean $\pm$ SD (range)	4.14 $\pm$ 3.98 (0-20)
DASS-21 stress raw score, mean $\pm$ SD (range)	6.46 $\pm$ 3.83 (0-21)

Table 2. Separate prevalence of depression, anxiety, and stress with DASS-21 scores

DASS-21 domain	Raw score, mean $\pm$ SD	Range	Normal/absent, n (%)	Present, n (%)
Depression	4.62 $\pm$ 3.24	0-21	18 (24.32%)	56 (75.68%)
Anxiety	4.14 $\pm$ 3.98	0-20	36 (48.65%)	38 (51.35%)
Stress	6.46 $\pm$ 3.83	0-21	31 (41.89%)	43 (58.11%)

Note: The retained study dataset preserved domain-level presence/absence and the analysis records preserved mean $\pm$ SD values. Participant-level mild/moderate/severe/extremely-severe counts were not retained and were not imputed.

Depression was the most frequently recorded DASS-21 domain, affecting 56 participants (75.68%). Anxiety was present in 38 (51.35%) and stress in 43 (58.11%). The corresponding mean raw scores were 4.62 $\pm$ 3.24, 4.14 $\pm$ 3.98, and 6.46 $\pm$ 3.83, respectively.

Table 3. Prevalence of smartphone addiction

Category	Frequency	Percentage
Addicted	50	67.56%
Non-addicted	24	32.43%

Smartphone addiction was recorded in 50 of 74 participants (67.56%), whereas 24 (32.43%) were classified as non-addicted.

Table 4. Correlation of smartphone addiction with psychological variables

Variable	Correlation coefficient (r)	p-value
Depression	0.42	0.00020
Anxiety	0.29	0.01220
Stress	0.12	0.30849

Depression and anxiety showed statistically significant positive correlations with smartphone addiction, while the correlation with stress was positive but not statistically significant.

Table 5. Multiple linear regression of depression, anxiety, and stress with smartphone addiction score

Variable	B	SE	β	t	p-value	95% CI for B
Depression	0.68	0.19	0.28	2.96	0.004	0.30 to 1.06
Anxiety	0.38	0.29	0.19	1.22	0.227	-0.20 to 0.96
Stress	0.23	0.18	0.11	0.86	0.393	-0.13 to 0.59

Model summary: $R^2=0.32$; adjusted $R^2=0.29$; $F(3,70)=10.45$; $p=0.000009$.

After depression, anxiety, and stress were entered simultaneously, depression remained independently associated with smartphone addiction score ($B=0.68$, 95% CI 0.30-1.06, $p=0.004$). Anxiety and stress were not statistically significant independent correlates. The model accounted for 32% of the observed variance in smartphone addiction score.

DISCUSSION

The present cross-sectional study found smartphone addiction in 67.56% of 74 apparently healthy young adults. This proportion is higher than the pooled global estimate of 26.99% reported in a large meta-analysis, although direct comparison is limited by differences in population, age distribution, instruments, cut-offs, and sampling methods [10]. High rates of problematic smartphone use have also been reported in university populations where it clusters with psychosocial and lifestyle factors [1,5].

A key revision in the present manuscript is the separate reporting of depression, anxiety, and stress rather than treating DASS-21 as a single combined outcome. Depression was recorded in 75.68% of participants, anxiety in 51.35%, and stress in 58.11%. Mean raw DASS-21 scores also differed across domains. These findings indicate that the psychological dimensions were not equally distributed and should be interpreted separately.

Smartphone addiction was positively correlated with depression ($r=0.42$, $p=0.00020$) and anxiety ($r=0.29$, $p=0.01220$). This is broadly consistent with Archou et al., who reported a relationship between smartphone addiction and anxiety among nursing students [2], and with meta-analytic evidence linking smartphone addiction to negative emotions and reduced subjective well-being [3]. Zhu et al. also described associations between smartphone addiction, mental health outcomes, and life satisfaction [4], while Alhassan et al. reported associations with several psychosocial indicators among university students [5].

The bivariate relationship between smartphone addiction and stress was comparatively weak and did not reach statistical significance in this study ($r=0.12$, $p=0.30849$). Other forms of problematic digital engagement have nevertheless been associated with perceived stress, including gaming addiction [7], and pandemic-related studies have shown co-occurrence between

psychological distress and problematic internet or gaming use [8]. Nomophobia has also been associated with psychological symptoms and insomnia [9]. Differences between studies may reflect population characteristics, measurement tools, patterns of digital use, and unmeasured contextual factors.

In the multivariable analysis, depression remained independently associated with smartphone addiction score after simultaneous inclusion of anxiety and stress. Anxiety and stress did not retain statistically significant independent associations. This finding should not be interpreted to mean that depression causes smartphone addiction, or that smartphone use causes depression. Cross-sectional measurement cannot establish temporal sequence, and the observed relationship may reflect reverse directionality, bidirectional effects, shared vulnerability, or residual confounding. Research on internet addiction and depressive symptoms similarly supports complex symptom relationships rather than a simple one-way causal pathway [6].

This study has several limitations. The cross-sectional design prevents causal inference. Convenience sampling at a single medical-college campus and the modest sample size limit generalisability. Smartphone addiction and DASS-21 variables were based on self-report rather than clinical diagnosis. The study records did not retain a reproducible numeric cut-off for the addicted/non-addicted classification; consequently, the pre-specified study classification was retained without introducing a post-hoc threshold. In addition, the retained participant-level dataset did not contain the five DASS-21 severity strata, so separate domain prevalence and continuous scores could be reported, but mild/moderate/severe/extremely-severe counts could not be reconstructed reliably from the retained data. Larger studies using prospectively specified adult cut-offs and fully retained participant-level scale data are warranted.

CONCLUSION

Smartphone addiction was common among the apparently healthy young adults included in this study. Depression and anxiety showed significant positive bivariate associations with smartphone addiction, whereas stress did not show a statistically significant bivariate relationship. In the adjusted model, depression remained independently associated with smartphone addiction score, while anxiety and stress did not. These findings are limited to statistical associations. The cross-sectional design does not establish whether psychological symptoms precede problematic smartphone use, follow it, or arise from common underlying factors. Longitudinal studies with clearly defined adult smartphone-addiction thresholds and complete domain-specific psychological severity data are needed.

Declaration

Ethical Approval: Approved by the Institutional Human Ethics Committee, Hind Institute of Medical Sciences; approval identifier reported in the study records as HIMS/IHEC/2024-25/Faculty/Dr. Adeeba Khan.

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