

Original Article

# Correlation Between Smartphone Addiction and Academic Performance Among Nursing Students of Private Institutes at Peshawar

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## ARTICLE INFORMATION

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## ABSTRACT

**Background:** Problematic smartphone use is increasingly recognized among university students and may interfere with learning and academic activities; however, evidence regarding its relationship with academic performance among nursing students remains inconsistent. **Objective:** To assess the relationship between smartphone addiction and academic performance among nursing students enrolled in selected private institutions in Peshawar. **Methods:** An analytical cross-sectional study included 103 sixth- and eighth-semester nursing students from Al Shahama Medical Institute and Rehman College of Nursing. Data were collected using a structured questionnaire covering sociodemographic characteristics, smartphone-related behaviours, and self-reported grade point average (GPA). Smartphone addiction levels and GPA categories were summarized using frequencies and percentages. Pearson's correlation was used to assess the relationship between total smartphone-addiction score and GPA, with  $p < 0.05$  considered statistically significant. **Results:** Of 103 participants, 83.5% were male, 72.8% were younger than 25 years, and 71.8% were single. High smartphone addiction was reported in 56.3%, while 39.8% had moderate addiction. Good academic performance was observed in 47.6% of participants. Smartphone addiction showed a negligible negative correlation with GPA ( $r = -0.032$ , 95% CI  $-0.224$  to  $0.163$ ;  $p = 0.752$ ). **Conclusion:** Smartphone addiction was common among the participating nursing students, but no statistically significant relationship with academic performance was demonstrated. **Keywords:** Smartphone addiction; Academic performance; Nursing students; Grade point average; Peshawar.

## INTRODUCTION

Smartphones have become an integral component of contemporary higher education, providing rapid access to learning resources, digital communication, educational applications, and clinical information. Their widespread

availability has substantially changed how university students communicate, study, and access academic material. However, increasing dependence on smartphones has also raised concerns regarding problematic or uncontrolled use. Smartphone addiction is generally characterized by excessive smartphone engagement, impaired control over use, withdrawal-like experiences, and continued use despite interference with everyday functioning (1). University students may be particularly vulnerable because smartphones are simultaneously used for academic work, entertainment, social networking, and interpersonal communication. Previous research has associated problematic smartphone use with psychological distress, reduced self-regulation, distraction, and difficulties in maintaining effective academic behaviours (2,3).

Academic performance represents an important outcome in university education because it reflects students' ability to acquire, retain, and apply knowledge throughout their training. Excessive smartphone use may interfere with these processes by diverting attention from academic activities, encouraging frequent task switching, and reducing uninterrupted study time. Research involving university students has demonstrated associations between smartphone addiction, stress, academic performance, and satisfaction with life, suggesting that problematic use may influence both educational and psychosocial outcomes (4). Evidence from Pakistan has similarly raised concerns that excessive smartphone use may be associated with poorer concentration, reduced study productivity, and lower academic achievement among university students (5). Nevertheless, the relationship is not necessarily uniform across populations because smartphones may also provide educational benefits when they are used for learning, accessing academic material, and communicating with teachers and peers.

The issue may be particularly relevant among nursing students. Nursing education requires students to manage demanding theoretical coursework alongside clinical learning, practical training, and professional responsibilities. Smartphones can facilitate this process by providing access to electronic textbooks, clinical guidelines, educational videos, calculators, communication platforms, and online learning resources. At the same time, frequent non-academic use may contribute to distraction, reduced concentration, procrastination, and disruption of study routines. Studies involving nursing and health-professions students have therefore increasingly examined problematic smartphone use as a potential educational concern. Research among nursing students has reported associations between smartphone-related behaviours and academic performance, social anxiety, well-being, and other educational outcomes (6,7). Evidence from Pakistani nursing populations has also suggested that smartphone dependency and digital distraction warrant attention because nursing students must maintain sustained concentration and develop competencies that directly influence future clinical practice (8,9).

Several psychological and behavioural mechanisms may explain why excessive smartphone use could be related to academic performance. Problematic smartphone use has been associated with sleep disturbance, anxiety, depression, and other psychological difficulties among university students (10). These factors may indirectly compromise academic functioning by reducing concentration, cognitive efficiency, motivation, and effective study time. From a theoretical perspective, the Uses and Gratifications Theory proposes that individuals actively use media to satisfy informational, social, and entertainment needs (11). When gratification-seeking through smartphones becomes repetitive or difficult to regulate, the device may increasingly compete with academic responsibilities. Cognitive Load Theory provides an additional explanation by proposing that learning effectiveness is reduced when working-memory capacity is occupied by unnecessary or competing information (12). Frequent notifications, social-media activity, and smartphone multitasking may therefore increase extraneous cognitive load and interfere with sustained academic attention.

Empirical findings regarding the relationship between smartphone addiction and academic performance remain inconsistent. Some studies have reported negative relationships between problematic smartphone use and indicators of academic achievement, while others suggest that the magnitude of this relationship may depend on how smartphones are used, the educational setting, students' self-regulatory behaviours, and other psychological or behavioural factors. Research among university students has demonstrated that smartphone addiction may be associated with poorer academic outcomes, although the direction and strength of the relationship vary across settings (13). Studies involving health-sciences students have similarly suggested that excessive smartphone use may be associated with academic achievement, but the relationship is not consistently significant across populations (14). These inconsistent findings indicate that smartphone addiction should not automatically be assumed to predict poor academic performance and that its relationship with educational outcomes requires investigation within specific student populations.

The Pakistani context is particularly important because smartphone access and internet connectivity have expanded substantially, increasing students' dependence on mobile technology for both academic and non-academic activities. National telecommunications data demonstrate continuing expansion of digital connectivity in Pakistan (15). Within nursing education, smartphones have become increasingly relevant for accessing academic resources and communicating during theoretical and clinical training. Existing Pakistani studies have explored smartphone use and dependency among university and nursing students, but the evidence remains limited regarding its relationship with objectively interpretable academic indicators in specific regional nursing populations (5,8,9). Furthermore, findings from one geographical or institutional setting may not be directly generalizable to nursing students in another because academic workload, institutional regulations, patterns of smartphone use, socioeconomic characteristics, and educational environments can differ considerably.

This evidence gap is especially relevant in Peshawar, where nursing students enrolled in private institutions are exposed to both intensive academic requirements and increasing digital engagement. Although regional and national studies indicate that excessive smartphone use is common among students, limited evidence is available regarding whether smartphone addiction is significantly related to academic performance among nursing students studying in private institutions in Peshawar. Establishing this relationship is important because a significant association could support targeted educational strategies, whereas the absence of an association would suggest that academic performance may depend more strongly on other academic, behavioural, psychological, or contextual factors.

Therefore, the present analytical cross-sectional study aimed to assess the relationship between smartphone addiction and academic performance, represented by grade point average, among nursing students enrolled in selected private institutions in Peshawar. The study addressed the research question of whether smartphone addiction is significantly associated with academic performance in this population. The null hypothesis proposed that there is no statistically significant relationship between smartphone addiction and academic performance, whereas the alternative hypothesis proposed that a statistically significant relationship exists.

## MATERIAL AND METHODS

An analytical cross-sectional study was conducted to examine the relationship between smartphone addiction and academic performance among undergraduate nursing students enrolled in selected private nursing institutions in Peshawar, Pakistan. The study was carried out at Al Shahama Medical Institute and Rehman College of Nursing. The target population comprised approximately 400 nursing students enrolled across the two institutions. Eligible participants were undergraduate nursing students studying in the sixth or eighth semester who owned and regularly used a smartphone and voluntarily agreed to participate. Students with a major psychiatric disorder reported to substantially impair cognition or academic participation, students on extended leave or suspension during the study period, those who declined participation, and respondents with incomplete data were excluded.

The required sample size was calculated for the reported source population of 400 students using a 95% confidence level and a 5% margin of error, resulting in a target sample of 103 participants. A total of 103 eligible nursing students from the two participating institutions were included in the final analysis. Of these, 41 were enrolled at Al Shahama Medical Institute and 62 at Rehman College of Nursing. Participation was voluntary, and written informed consent was obtained before questionnaire administration. Participants were informed about the purpose of the study, their right to decline or discontinue participation, and the confidentiality of their responses. Data were collected without identifying participants in the analytical dataset, and study information was handled confidentially using coded records and secure storage procedures.

Data were collected using a structured self-administered questionnaire comprising sociodemographic characteristics, academic performance, and smartphone-related behavioural items. The smartphone-use component was described in the study as an adaptation of the questionnaire attributed to Kwon et al. (16). The administered version contained 15 statements assessing behaviours associated with problematic smartphone use. Responses were recorded on a four-point Likert-type scale comprising Rarely, Sometimes, Often, and All the Time. The items addressed several aspects of problematic smartphone behaviour, including interference with planned work and concentration, sleep-related disturbance, emotional dependence, difficulty tolerating smartphone unavailability, persistent thoughts about smartphone use, social attachment, habitual checking, prolonged use, and unsuccessful attempts to reduce use. Higher aggregate scores represented greater problematic smartphone-use

behaviour. Smartphone addiction was subsequently summarized into low, moderate, and high levels for descriptive reporting.

Academic performance was assessed using the participant's self-reported grade point average from the most recent semester. GPA was classified into four predefined categories: 3.50–4.00 as excellent, 3.00–3.49 as good, 2.50–2.99 as moderate, and 2.00–2.49 as poor academic performance. Sociodemographic information included age, sex, marital status, and institution. Age was grouped as younger than 25 years or 25 years and older, while marital status was recorded as single or married. Institution was recorded as Al Shahama Medical Institute or Rehman College of Nursing.

Questionnaires were administered to eligible students after obtaining informed consent. Standardized questionnaire items and response options were used for all participants to maintain consistency in data collection. Completed questionnaires were reviewed for completeness before inclusion in the analytical dataset, and records with incomplete information were excluded in accordance with the prespecified eligibility criteria. The final dataset therefore consisted of 103 participants, and the reported primary correlation analysis included all 103 observations.

Data were entered and analysed using IBM SPSS Statistics version 25.0. Categorical variables were summarized using frequencies and percentages, including sex, age category, marital status, institution, GPA category, and level of smartphone addiction. The primary analysis assessed the relationship between the total smartphone-addiction score and academic performance using Pearson's correlation coefficient. The strength and direction of the correlation were expressed using Pearson's  $r$ , and statistical significance was evaluated using a two-sided  $p$ -value, with  $p < 0.05$  considered statistically significant. The primary analysis was unadjusted, and no multivariable, subgroup, mediation, or confounder-adjusted analyses were reported.

Ethical approval was obtained from the relevant institutional ethics committee before data collection. Ethical principles relating to voluntary participation, informed consent, privacy, confidentiality, and the right to withdraw were maintained throughout the study. Participants were informed that participation would not affect their academic standing and that the information they provided would be used solely for research purposes.

## RESULTS

A total of 103 nursing students were included in the analysis. As shown in Table 1, most participants were male (83.5%,  $n=86$ ), younger than 25 years (72.8%,  $n=75$ ), and single (71.8%,  $n=74$ ). Rehman College of Nursing contributed 60.2% ( $n=62$ ) of the participants, while 39.8% ( $n=41$ ) were from Al Shahama Medical Institute. Regarding academic performance (Table 2), the largest proportion of participants had a good GPA (47.6%,  $n=49$ ), followed by moderate (27.2%,  $n=28$ ), poor (15.5%,  $n=16$ ), and excellent (9.7%,  $n=10$ ) academic performance.

As presented in Table 3, high smartphone addiction was observed in 56.3% ( $n=58$ ) of participants, while 39.8% ( $n=41$ ) had moderate and 3.9% ( $n=4$ ) had low smartphone addiction. Thus, most participants were classified within the moderate or high smartphone-addiction categories.

**Table 1. Sociodemographic Characteristics of the Participants (N = 103)**

| Variable       | Category                     | n (%)     |
|----------------|------------------------------|-----------|
| Sex            | Male                         | 86 (83.5) |
|                | Female                       | 17 (16.5) |
| Age            | <25 years                    | 75 (72.8) |
|                | ≥25 years                    | 28 (27.2) |
| Marital status | Single                       | 74 (71.8) |
|                | Married                      | 29 (28.2) |
| Institution    | Al Shahama Medical Institute | 41 (39.8) |
|                | Rehman College of Nursing    | 62 (60.2) |

Values are presented as n (%). Percentages are based on N=103.

**Table 2. Academic Performance of the Participants (N = 103)**

| GPA category | GPA range | n (%)     |
|--------------|-----------|-----------|
| Excellent    | 3.50–4.00 | 10 (9.7)  |
| Good         | 3.00–3.49 | 49 (47.6) |
| Moderate     | 2.50–2.99 | 28 (27.2) |

| GPA category | GPA range | n (%)       |
|--------------|-----------|-------------|
| Poor         | 2.00–2.49 | 16 (15.5)   |
| Total        | —         | 103 (100.0) |

Abbreviation: GPA, grade point average.

The counts and percentages sum correctly in terms of the total sample of 103 participants. The category terminology has been standardized to Excellent, Good, Moderate, and Poor in accordance with the revised Methods. Pasted text

**Table 3. Distribution of Smartphone Addiction Levels (N = 103)**

| Smartphone addiction level | n (%)       |
|----------------------------|-------------|
| Low                        | 4 (3.9)     |
| Moderate                   | 41 (39.8)   |
| High                       | 58 (56.3)   |
| Total                      | 103 (100.0) |

Values are presented as n (%).

The three reported categories total 103 participants and 100.0%. Pasted text

**Table 4. Correlation Between Smartphone Addiction and Academic Performance (N = 103)**

| Association                             | N   | Pearson r | 95% CI for r    | p-value | R <sup>2</sup> |
|-----------------------------------------|-----|-----------|-----------------|---------|----------------|
| Total smartphone addiction score vs GPA | 103 | −0.032    | −0.224 to 0.163 | 0.752   | 0.001          |

Abbreviations: CI, confidence interval; GPA, grade point average. The 95% CI for Pearson's r was derived using Fisher's z transformation from the reported r and N. R<sup>2</sup> was calculated as r<sup>2</sup>. Statistical significance was assessed at p<0.05.

The reported correlation was r = −0.032, p = 0.752, with all 103 participants included in the analysis. Pasted text

The primary correlation analysis (Table 4) showed a negligible negative relationship between total smartphone addiction score and GPA (r=−0.032, p=0.752). The derived 95% confidence interval for the correlation ranged from −0.224 to 0.163, encompassing the null value. The corresponding R<sup>2</sup> was 0.001, indicating approximately 0.1% shared variance between smartphone addiction score and GPA. Overall, the analysis did not demonstrate a statistically significant linear association between smartphone addiction and academic performance among the participating nursing students.

## DISCUSSION

The present study examined the relationship between smartphone addiction and academic performance among nursing students enrolled in selected private institutions in Peshawar. Although a substantial proportion of participants were classified as having high smartphone addiction, the observed relationship between total smartphone addiction score and GPA was negligible and statistically non-significant. This finding indicates that, within this sample, greater smartphone addiction scores were not demonstrably associated with poorer academic performance. The wide compatibility of the correlation estimate with values on either side of the null further suggests that the data do not support a meaningful linear relationship between the two variables.

The present finding differs from a study conducted among nursing students in private nursing colleges in Swat, Pakistan, which reported a strong negative correlation between smartphone addiction and academic performance (17). Geographic proximity makes this comparison particularly relevant; however, differences in participant characteristics, institutional environments, measurement procedures, patterns of smartphone use, and assessment of academic performance could contribute to the markedly different findings. Conversely, the absence of a significant association in the present study is consistent with evidence from some nursing populations in which extensive smartphone use was not significantly associated with academic achievement. A study among undergraduate nursing students reported substantial smartphone overuse without demonstrating a significant relationship with academic achievement, suggesting that the academic consequences of smartphone use may depend partly on the purpose and context of use (18). These contrasting findings reinforce the possibility that the amount or intensity of smartphone use alone may not adequately explain academic performance.

The high proportion of participants classified as having moderate or high smartphone addiction nevertheless indicates that problematic smartphone-use behaviours were common within the study population. Similar concerns have been reported internationally among nursing students. Research among nursing students has linked smartphone addiction with insomnia, loneliness, and lower self-esteem (19), while a study among nursing students in Morocco reported an association between smartphone addiction and poor sleep quality (20). Such findings are relevant because problematic smartphone use may influence aspects of student well-being even when a direct relationship with GPA is not demonstrated. An integrative review of smartphone use among nursing students similarly identified distraction, inappropriate use in educational and clinical environments, and potential adverse effects on learning and well-being as recurring concerns (21). Therefore, the absence of a statistically significant relationship with GPA in the present study should not be interpreted as evidence that excessive smartphone use has no relevance to nursing students' broader academic or psychosocial functioning.

Several mechanisms may help explain why smartphone addiction could theoretically influence learning without producing a detectable direct correlation with GPA. Cognitive Load Theory proposes that learning becomes less efficient when limited working-memory resources are occupied by extraneous information or competing activities (12). Frequent notifications, repeated smartphone checking, social-media engagement, and multitasking could therefore interfere with sustained attention during studying. Uses and Gratifications Theory further suggests that individuals use media to satisfy informational, social, and entertainment needs (11). Consequently, the educational implications of smartphone use may depend not simply on frequency of use but on whether the device is primarily used for academic activities, communication, entertainment, or habitual checking. This distinction is particularly relevant to nursing students, for whom smartphones can simultaneously function as potential distractions and as useful tools for accessing educational and clinical information.

The weak association observed in this study may also reflect the complex and potentially indirect relationship between problematic smartphone use and academic achievement. Previous evidence suggests that factors such as sleep disturbance, self-regulation, academic motivation, and bedtime procrastination may influence the pathway between smartphone use and educational outcomes. A meta-analysis examining mobile-phone addiction and cognitive functioning reported adverse associations with cognitive processes, although the magnitude and nature of these relationships varied across studies (22). Research from Pakistan has additionally suggested that bedtime procrastination may mediate the relationship between smartphone addiction and academic performance (23). Because these potential mediating variables were not assessed in the present study, the current analysis cannot determine whether smartphone-related behaviours might be associated with academic performance indirectly rather than through a simple bivariate relationship with GPA.

Another possible explanation is that GPA is influenced by numerous factors beyond smartphone behaviour, including study habits, academic motivation, prior achievement, learning environment, course difficulty, attendance, psychological well-being, and access to educational resources. Moreover, smartphones can support rather than hinder academic activities when used to access electronic learning materials, communicate with instructors and peers, or obtain clinical information. Previous research has shown that the relationship between smartphone use and academic achievement is not uniformly negative (13), and studies among health-sciences students similarly indicate that the strength of this association may vary according to population and educational context (14). Accordingly, distinguishing problematic non-academic smartphone use from purposeful educational use may provide greater insight than evaluating overall smartphone-related behaviour alone.

The findings have implications for nursing education but should be interpreted cautiously. The high frequency of participants classified with elevated smartphone addiction suggests that digital-use behaviours warrant attention within nursing education; however, the present findings do not establish that these behaviours reduce GPA. Educational initiatives concerning responsible digital engagement, concentration, sleep hygiene, and time management may have broader student-well-being value, but improvement in academic achievement cannot be inferred from the current data. Future investigations could examine patterns and purposes of smartphone use alongside potential mediating variables and academic outcomes to better characterize how digital behaviours interact with nursing education.

The study has several strengths, including its focus on nursing students from two private institutions and the inclusion of both behavioural smartphone-use information and academic performance within the same study

population. The complete reported analytical sample of 103 participants also allowed the primary relationship to be estimated without a discrepancy between the descriptive and correlation denominators. Nevertheless, important limitations should be considered. The cross-sectional design prevents determination of temporal direction or causality. Both smartphone-related behaviour and GPA were obtained through self-report, introducing potential recall, reporting, and social-desirability bias. The sample was restricted to two private nursing institutions in Peshawar and was predominantly male, limiting generalizability to other nursing populations and educational settings. The analysis was unadjusted and therefore did not account for potential confounding factors that might influence both smartphone behaviour and academic performance.

Measurement limitations also warrant consideration. The administered smartphone questionnaire contained 15 items, whereas the cited Smartphone Addiction Scale–Short Version developed by Kwon et al. contains a different item structure (16). Consequently, interpretation of the low, moderate, and high smartphone-addiction classifications depends on the validity and scoring properties of the instrument actually administered. In addition, academic performance was represented through GPA categories in the study questionnaire, while the reported primary analysis used Pearson's correlation. These measurement and analytical considerations should be taken into account when interpreting the magnitude and precision of the observed association. Finally, potentially important explanatory factors—including sleep quality, anxiety, study habits, time management, academic motivation, and patterns of academic versus non-academic smartphone use—were not incorporated into the reported analysis. These limitations may partly explain why a direct relationship with academic performance was not demonstrated and restrict the extent to which the findings can be generalized beyond the study population.

## CONCLUSION

Among nursing students from the selected private institutions in Peshawar, smartphone addiction was commonly reported; however, the relationship between smartphone addiction and academic performance was weak and statistically non-significant. Thus, the findings do not demonstrate that greater smartphone addiction was associated with poorer GPA within this study population. The results suggest that smartphone-related behaviour and academic performance may represent a more complex relationship than can be explained by a simple direct correlation, and the findings should be interpreted within the methodological and measurement limitations of this cross-sectional study.

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