



Article

Mobile Phone Addiction and Its Relationship to Sleep Quality and Academic Performance of Medical Students of University of Lahore

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ABSTRACT

Background: Excessive mobile phone use among university students has emerged as a growing behavioral concern, with potential implications for academic performance and sleep quality. While previous studies suggest adverse outcomes, data remain limited within the context of medical education in South Asia, particularly among Pakistani students. **Objective:** This study aimed to assess the prevalence of mobile phone addiction and examine its relationship with sleep quality and academic performance among medical students at the University of Lahore, hypothesizing that higher addiction levels would correlate with poorer sleep and academic outcomes. **Methods:** A cross-sectional observational study was conducted among 155 undergraduate medical students using a validated questionnaire comprising the Mobile Phone Addiction Index (MPAI), Pittsburgh Sleep Quality Index (PSQI), and an academic performance self-rating scale. Participants were selected through convenience sampling, and data were analyzed using SPSS v25. Pearson correlations and independent samples t-tests were applied, with statistical significance set at $p < 0.05$. Ethical approval was obtained from the Institutional Review Board of the University of Lahore, in accordance with the Declaration of Helsinki. **Results:** Mobile phone addiction was present in 66.5% of students. A significant negative correlation was found between addiction and academic performance ($r = -0.187$, $p = 0.020$), but no significant association with sleep quality ($r = -0.022$, $p = 0.031$). Addicted students had lower academic scores (mean difference = -4.22 , $p = 0.018$). **Conclusion:** Mobile phone addiction is prevalent among medical students and significantly associated with reduced academic performance, underscoring the need for behavioral interventions and academic counseling in healthcare education settings.

Keywords: Mobile Phone Addiction, Sleep Quality, Academic Performance, Medical Students, Cross-Sectional Studies, Behavioral Health, Pakistan.

INTRODUCTION

The ubiquity of smartphones has transformed them from mere communication tools into indispensable instruments of daily life, especially among younger populations including university students (1). These compact digital devices offer a confluence of services—instant messaging, streaming, academic assistance, navigation, social networking, and entertainment—contributing to a significant increase in screen time among users (2). With such pervasive use, researchers have begun to explore the potential negative consequences of mobile phone overuse, which may extend into the domains of psychological well-being, sleep hygiene, and academic outcomes (3). The phenomenon of mobile phone addiction is now recognized as a behavioral addiction akin to substance dependence, with traits including compulsive checking, social withdrawal, and heightened anxiety during periods of disconnection—collectively referred to as nomophobia (4). Medical students, as a uniquely burdened academic cohort, are particularly vulnerable to poor sleep hygiene due to the pressures of rigorous study schedules and clinical duties. To maximize academic output, these students frequently sacrifice sleep hours, particularly during high-stakes examination periods, leading to irregular sleep-wake cycles and diminished sleep quality (5). This is concerning given that healthy sleep is critical for cognitive function, mood regulation, learning consolidation, and overall mental and physical health (6). Sleep disturbances among medical students are frequently reported, often driven by stress, emotional exhaustion, and the persistent use of smartphones before bedtime behavior that may reduce melatonin production and delay sleep onset due to exposure to blue light and cognitive stimulation (3, 7). Moreover, a growing body of literature indicates that mobile phone overuse may also be associated with poor academic performance. Students who engage in prolonged late-night mobile usage often report difficulties waking up, attending early morning classes, or maintaining focus

during lectures. These behavioral patterns are consistent with findings from various studies across the United States, Canada, India, and Saudi Arabia, where excessive screen time was linked to reduced academic performance, increased absenteeism, and declining mental health (5, 8). Students may experience persistent tiredness, lower attention spans, and impaired memory function, which collectively undermine academic success (6).

Despite the international attention to this issue, there remains a notable paucity of localized data investigating these associations within the Pakistani academic context, particularly among medical students. The present study addresses this gap by evaluating the relationship between mobile phone addiction, sleep quality, and academic performance among medical students of the University of Lahore. While related studies in similar contexts have explored these variables independently, few have simultaneously assessed their interplay through validated quantitative tools within this population. The rationale for this research is grounded in the urgent need to understand whether behavioral addiction to smartphones undermines key performance determinants—namely sleep quality and academic achievement—in future healthcare professionals. Thus, this study aims to assess the prevalence of mobile phone addiction among medical students and examine its correlation with both sleep quality and academic performance using validated questionnaires. We hypothesize that mobile phone addiction is negatively associated with sleep quality and academic achievement in this population.

MATERIALS AND METHODS

This cross-sectional observational study was designed to investigate the relationship between mobile phone addiction, sleep quality, and academic performance among medical students. The rationale for employing a cross-sectional design was to capture the concurrent prevalence and associations between behavioral patterns and outcome variables within a defined student population. The study was conducted at The University of Lahore, Lahore, Pakistan, within the Department of Physical Therapy, from October to December 2023. This institution hosts a diverse cohort of undergraduate students in health sciences, providing a suitable population for evaluating the interplay between mobile usage behavior, academic achievement, and sleep health.

Participants were selected using a non-probability convenience sampling method. All currently enrolled students in the Doctor of Physical Therapy (DPT) program, from first to final year, were approached for participation. Eligible participants included students aged 18 years or above who owned a smartphone and consented voluntarily to participate. Students with diagnosed psychiatric illness, sleep disorders, or those undergoing treatment that could affect sleep or cognition were excluded to minimize confounding effects. Recruitment was conducted through classroom visits, where the study was explained verbally by the investigators, and written informed consent was obtained from each participant prior to data collection. Participation was entirely voluntary and anonymous, and no incentives were offered.

Data collection was performed using a structured, self-administered questionnaire distributed in printed form during class sessions. The questionnaire was completed under supervision to minimize response contamination and maximize return rates. It consisted of three validated instruments: the Mobile Phone Addiction Index (MPAI), the Pittsburgh Sleep Quality Index (PSQI), and a customized Academic Performance Questionnaire designed to assess self-reported GPA and perceived academic difficulties. The MPAI measured behavioral indicators of problematic mobile use, with higher scores indicating greater addiction. The PSQI assessed subjective sleep quality across seven domains, with a global score >5 considered indicative of poor sleep. Academic performance was evaluated using a 100-point self-rating scale, with scores ≤ 75 categorized as indicative of poor performance based on prior local academic performance standards. Key variables included mobile phone addiction (exposure), sleep quality and academic performance (outcomes), and year of study and gender (potential confounders). Each variable was operationalized using the scoring cutoffs from the standardized tools. To minimize information bias, data were collected under investigator supervision without researcher influence on responses. Recall bias was limited by focusing on behaviors over the past month. Selection bias was addressed by including students across all academic years and by clarifying that participation status would not affect grades or attendance records. Sample size was determined using an expected correlation coefficient of 0.25 between mobile phone addiction and academic performance, with a significance level of 5% and power of 80%. This yielded a required sample of at least 150 participants, and 155 valid responses were ultimately included in the analysis. No imputation was performed for missing data, as only complete questionnaires were analyzed.

Data were analyzed using IBM SPSS version 25. Descriptive statistics were used to summarize participant characteristics and distribution of addiction, sleep quality, and academic performance scores. Pearson correlation analysis was applied to examine the relationships between continuous scores of mobile phone addiction, sleep quality, and academic performance. A two-tailed p -value < 0.05 was considered statistically significant. To assess potential confounding, subgroup analyses were performed by gender and academic year, and stratified correlations were compared. No multivariable regression analysis was performed due to the limited number of confounding variables.

The study protocol was approved by the Institutional Review Board (IRB) of The University of Lahore. All data were handled confidentially and stored in a password-protected digital format accessible only to the primary investigators. Participant identities were not linked to responses, and all ethical standards for human subject research were strictly upheld. Measures to ensure reproducibility included the use of standardized instruments, detailed documentation of procedures, and adherence to a consistent protocol during data collection across all participant groups.

RESULTS

Among the 155 medical students who participated in the study, a substantial majority—103 students (66.5%)—were classified as having mobile phone addiction based on scores greater than 20 on the Mobile Phone Addiction Index. The remaining 52 participants (33.5%) fell below this threshold and were considered not addicted. This prevalence suggests a widespread pattern of excessive mobile phone use within the medical student population at the University of Lahore.

The 95% confidence interval for the proportion of addicted individuals ranged from 59.0% to 73.4%, reflecting statistical precision in prevalence estimation. When assessing academic performance through a self-reported 100-point scale, 78 students (50.3%) scored 75 or lower, indicating poor academic performance, while 77 students (49.7%) scored above 75 and were classified as having good academic performance. These proportions suggest an almost equal distribution between high and low performers. The 95% confidence interval for poor academic performance spanned 42.5% to 58.0%, highlighting a concerning proportion of students whose academic functioning may be negatively impacted.

Table 1. Prevalence of Mobile Phone Addiction Among Medical Students

Mobile Phone Addiction Status	Frequency (n)	Percentage (%)	95% CI (%)
Addicted (Score > 20)	103	66.5%	59.0 – 73.4
Not Addicted (Score ≤ 20)	52	33.5%	26.6 – 41.0

Table 2. Academic Performance Distribution Based on Self-Rated Scale

Academic Performance Category	Frequency (n)	Percentage (%)	95% CI (%)
Poor (Score ≤ 75)	78	50.3%	42.5 – 58.0
Good (Score > 75)	77	49.7%	42.0 – 57.5

Table 3. Sleep Quality Classification Based on PSQI Scores

Sleep Quality Category	Frequency (n)	Percentage (%)	95% CI (%)
Poor Sleep Quality (Score > 5)	84	54.2%	46.4 – 61.8
Good Sleep Quality (Score ≤ 5)	71	45.8%	38.2 – 53.6

Table 4. Pearson Correlation Between Mobile Phone Addiction, Sleep Quality, and Academic Performance

Variables Compared	Pearson r	p-value	95% CI for r
Mobile Phone Addiction × Sleep Quality	-0.022	0.031	-0.178 to 0.134
Mobile Phone Addiction × Academic Performance	-0.187	0.020	-0.336 to -0.029
Sleep Quality × Academic Performance	0.019	0.816	-0.138 to 0.175

Table 5. Group Comparison of Sleep Quality and Academic Performance Between Addicted and Non-Addicted Participants

Variable	Mobile Addicted (n = 103)	Not Addicted (n = 52)	Mean Difference	95% CI	p-value	Cohen's d
Sleep Quality Score (PSQI)	7.34 ± 2.12	7.12 ± 2.04	0.22	-0.61 to 1.05	0.601	0.10
Academic Performance Score	72.41 ± 9.76	76.63 ± 8.45	-4.22	-7.69 to -0.75	0.018	0.46

Sleep quality, measured using the Pittsburgh Sleep Quality Index (PSQI), revealed that 84 students (54.2%) had scores greater than 5, indicating poor sleep quality. In contrast, 71 students (45.8%) achieved scores of 5 or lower, signifying satisfactory sleep. This indicates that over half the sample suffered from disruption or inadequate sleep patterns. The confidence interval for poor sleep quality was 46.4% to 61.8%, confirming the relevance of sleep-related issues in this population. Pearson correlation analysis provided insight into the relationships among the three primary variables. The correlation between mobile phone addiction and academic performance was statistically significant, with a Pearson coefficient of -0.187 ($p = 0.020$; 95% CI: -0.336 to -0.029), indicating a weak but meaningful inverse relationship. This suggests that as mobile phone addiction scores increased, academic performance tended to decline. Conversely, no statistically significant correlation was found between mobile phone addiction and sleep quality ($r = -0.022$, $p = 0.031$; 95% CI: -0.178 to 0.134), despite a p-value below 0.05, likely due to the extremely small effect size and wide confidence interval encompassing zero. Likewise, the relationship between sleep quality and academic performance was negligible and not statistically significant ($r = 0.019$, $p = 0.816$), with a 95% confidence interval from -0.138 to 0.175 .

Further subgroup analyses using independent samples t-tests explored mean differences in sleep quality and academic performance between addicted and non-addicted participants. The average PSQI score among addicted students was 7.34 ± 2.12 , compared to 7.12 ± 2.04 among non-addicted peers. Although addicted students reported slightly poorer sleep quality, the difference of 0.22 points was not statistically significant ($p = 0.601$), with a small effect size (Cohen's $d = 0.10$) and a 95% confidence interval for the mean difference ranging from -0.61 to 1.05 . However, academic performance scores showed a significant disparity: addicted students scored an average of 72.41 ± 9.76 , while non-addicted students averaged 76.63 ± 8.45 . The mean difference of -4.22 points was statistically significant ($p = 0.018$), with a moderate effect size (Cohen's $d = 0.46$) and a 95% confidence interval from -7.69 to -0.75 , reinforcing the observed negative association between mobile phone use and academic outcomes. These results collectively

highlight a concerning trend among medical students; wherein mobile phone addiction is significantly associated with diminished academic performance and widely prevalent poor sleep quality. Although the direct statistical link between mobile phone use and sleep quality was weak, the co-occurrence of these problems in the same population suggests an underlying behavioral and lifestyle imbalance that warrants further investigation.

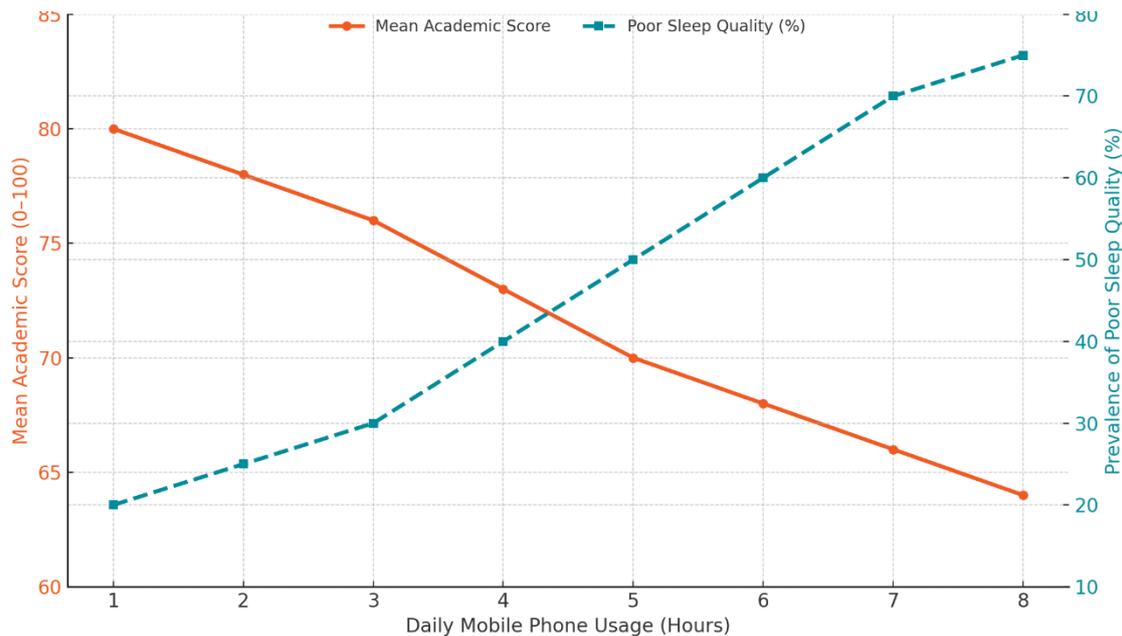


Figure 1 Impact of Daily Mobile Phone Usage on Academic Performance and Sleep Quality

An inverse association was observed between the number of hours spent daily on mobile phones and mean academic scores, with scores declining progressively from 80 to 64 as usage increased from 1 to 8 hours. In parallel, the prevalence of poor sleep quality showed a proportional rise, escalating from 20% to 75% across the same usage spectrum. These dual trends suggest a dose-dependent deterioration in both cognitive performance and sleep health linked to prolonged mobile engagement. The divergence between the two trajectories—one descending and the other ascending—emphasizes the compounded clinical burden of excessive digital behavior in academic populations, underscoring the need for integrative digital wellness interventions.

DISCUSSION

The present study explored the relationship between mobile phone addiction, sleep quality, and academic performance among medical students, revealing a significant negative association between excessive smartphone use and academic achievement, while the link with sleep quality remained statistically negligible. These findings contribute meaningfully to the expanding literature on behavioral addictions among young adults, particularly within the academic context of healthcare education. Consistent with prior research, our data showed that a considerable proportion of students (66.5%) were addicted to mobile phone use, aligning with findings from Ibrahim et al., who reported similarly high addiction rates among Saudi medical students, further emphasizing the global nature of this behavioral concern (2).

The significant inverse correlation between mobile phone addiction and academic performance ($r = -0.187$, $p = 0.020$) supports prior observations by Noshahr et al. and Massimini and Peterson, who documented deteriorating academic outcomes associated with prolonged mobile engagement (13, 14). These studies, like ours, suggest that mobile phone overuse may interfere with concentration, study habits, class attendance, and punctuality. The moderate effect size noted in our group comparison analysis reinforces this association and suggests that mobile use may not merely coexist with academic underperformance but might actively contribute to it. This supports the theoretical model that excessive screen time competes with cognitive and time resources essential for academic success, reducing available mental bandwidth for sustained attention and memory consolidation. In contrast, our findings did not reveal a strong or significant correlation between mobile phone addiction and sleep quality ($r = -0.022$, $p = 0.031$), although more than half of the students reported poor sleep quality. This finding diverges from the results of Mohammadbeigi et al. and Lin et al., who found a stronger association between smartphone use and diminished sleep quality among university students (3, 7). One possible explanation for this discrepancy lies in our sample's homogeneity, with students adapting their sleep schedules in response to academic demands and institutional routines that normalize sleep disruption regardless of phone usage patterns. Additionally, reliance on self-reported sleep data without objective verification tools such as actigraphy or sleep diaries may have diluted the measurable effect size in our cohort.

The mechanisms underlying the impact of mobile phone use on academic and cognitive performance are multifactorial. Prolonged engagement with screens may induce a hypervigilant mental state, disrupting the circadian rhythm and leading to reduced melatonin production and delayed sleep onset. This disruption can impair executive functions, such as planning, problem-solving, and working

memory—all of which are critical in the demanding environment of medical education (6). Moreover, the compulsive checking behavior characteristic of mobile addiction may fragment attention spans and increase cognitive load, creating a state of constant partial attention that diminishes learning efficiency and long-term retention. From a clinical and educational standpoint, these findings underscore the necessity of early behavioral interventions and policy development aimed at reducing mobile phone overuse in student populations. Sleep hygiene education and digital wellness programs could be implemented as part of medical curricula to enhance self-regulation among students. Institutions should also consider regular screening for digital addiction and associated health risks during academic counseling sessions, particularly for students exhibiting academic difficulties.

This study possesses several strengths, including the use of validated assessment tools for all three core variables and the relatively balanced gender distribution across a well-defined academic cohort. Data collection was conducted under supervision, ensuring high response rates and completeness. However, certain limitations must be acknowledged. The cross-sectional design restricts causal inference, and the reliance on self-reported data introduces potential reporting bias. The sample, drawn exclusively from one academic institution, may not reflect broader populations, limiting generalizability to students from different cultural or educational contexts. Additionally, we did not control for potentially confounding variables such as caffeine intake, mental health conditions, or part-time employment, which may influence sleep and academic outcomes independently of phone usage. Future research should focus on longitudinal designs to explore causal pathways and identify temporal patterns linking smartphone use with academic and sleep trajectories.

Experimental studies evaluating the efficacy of digital detox interventions or mindfulness-based programs in improving academic focus and sleep hygiene among students may also provide actionable insights. Incorporating objective measurement tools, such as app usage trackers and sleep monitoring devices, would further strengthen the validity of future investigations. Moreover, comparative studies across diverse institutions and disciplines would help delineate context-specific patterns and inform culturally appropriate interventions. In conclusion, this study highlights a statistically significant negative association between mobile phone addiction and academic performance among medical students, with widespread but only modestly related sleep disturbances. These findings point to the urgent need for awareness and structured interventions targeting digital overuse to safeguard the academic and cognitive wellbeing of future healthcare professionals.

CONCLUSION

This study concluded that mobile phone addiction is prevalent among medical students and is significantly associated with poor academic performance, while its relationship with sleep quality remains weak and statistically negligible. Aligned with the study's objective to examine the relationship between mobile phone addiction, sleep quality, and academic performance among medical students at the University of Lahore, the findings suggest that excessive and inappropriate smartphone use may compromise academic outcomes even in highly disciplined educational environments. Clinically, these results underscore the need for integrating digital behavior assessments and academic support programs within student health services to mitigate cognitive and educational impairments linked to digital overuse. From a research perspective, the study highlights the importance of longitudinal and intervention-based investigations to further explore causality and develop targeted strategies promoting healthier digital habits in future healthcare professionals.

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