

Screen Addiction, Sleep Quality and Prevalence of Anxiety Symptoms among Undergraduate University Students of Pakistan: A Cross-Sectional Study.

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Abstract

Background: Nowadays, using a smartphone is a daily routine in students' academic and social life at universities. But spending too much time with one's smartphone can negatively impact their sleep quality and mental health. Very few studies have been conducted or we are aware of studies which have been conducted but there is very limited information regarding relationship between smartphone addiction, sleep quality and anxiety symptoms among undergraduate university students in Pakistan.

Methodology: This study was of quantitative nature with analytical approach and Cross-sectional design, the researcher conducted the study using 300 students of undergraduate university of public and private universities of Pakistan age ranged from 18-25 years. The non-probability convenience sampling technique was used to select the participants. A socio-demographic information section, the Smartphone Addiction Scale-Short version (SAS-SV), the Pittsburgh Sleep Quality Index (PSQI), and the Generalized Anxiety Disorder-7 (GAD-7) were used to gather data. IBM SPSS 27.0 was used to analyze data. The descriptive statistics, Chi square, Spearman correlation and multiple linear regression was conducted.

Results: High smartphone addiction was correlated with 33.0% of respondents and poor sleep quality among 71.7% of respondents. The percentage of participants who exhibited moderate and mild anxiety symptoms were 24.0% and 19.3% respectively. Better sleep quality was positively correlated with symptoms of anxiety ($p = 0.171$; $p = 0.003$), and smartphone addiction was positively associated with anxiety symptoms ($p = 0.300$; $p < 0.001$). The highest independent predictor of the anxiety symptoms was daily screen time.

Conclusions: The results conclude that with the strive for social networking and smart phones, there is a high prevalence of smartphone addiction, poor sleep quality and anxiety symptomatology among under-graduate university students in Pakistan. The results of this study emphasize the adverse effects of poor digital habits, lack of sleep hygiene and inadequate mental health services at universities and call for healthier digital practices, better sleep habits, and better mental health support at universities.

Keywords: Smartphone addiction, Screen addiction, Sleep quality, Indulgence, Anxiety, Undergraduate students, Pakistan.

Introduction

The digital revolution has revolutionized how people learn, communicate, and interface with their environment all over the world. Digital devices like smartphones, tablets, computers, and laptops are an essential tool in many undergraduate university students' classes and their studies, as well to receive information about the program, to learn online, to communicate, and for entertainment and social networking (Hsieh, 2025; Thapa et al., 2025). Use of digital technology can provide many advantages to learning and social development, yet, uncontrolled and excess use of screens has become a public health issue worldwide (Devi & Singh, 2023; Eddy Ives et al., 2025). Screen addiction is a problematic excessive and compulsive use of digital devices, which causes problems in daily functioning, hinders studying and learning, negatively affects sleep quality, and contributes to bad mental health (Gazale et al., 2025). People who are screen addicted have reported problems with self-control, engage in screen behavior even when it causes problems, and have a lack of self-control around what screen time they spend in a day (Jo et al., 2020; Xu et al., 2023).

Sleeping is one of the most basic of biological processes and is thought to enable a person's physical health, mental function, emotional state, immune system, and general well-being (Troynikov et al., 2018). University students should pay special attention to good sleep habits as they play a critical role in a student's learning, consolidation, concentration, and academic performance (Hassan et al., 2025). But more and more studies indicate that overuse of screens is linked to substantial sleep disturbances. While digital screens emit blue light, this illumination affects how quickly people get to sleep, the amount of sleep duty they receive, and sleep quality (Alam et al., 2024; Silvani et al., 2022). Expect that problematic screen use relates to harmful sleep habits that include poor sleep quality, signs of insomnia, irregular sleep routine and excessive daytime sleepiness among college students, various studies have reported (Arshad et al., 2021; L. Cemei et al., 2024). Furthermore, there are indicators that poor sleep is prevalent among university students, suggesting it is a public health problem; this has been confirmed through systematic reviews (L. Cemei et al., 2024).

There is also strong association between poor sleep quality with adverse psychological outcomes especially anxiety symptoms. According to (Auerbach et al., 2018), and according to the World Health Organization (WHO) (Year), among university students, one of the most prevalent mental health issues is anxiety with a negative impact on academic performance, relations with others, emotional health, and quality of life. While any anxiety symptoms that are mild may go away, the ongoing psychological distress can lead to more serious mental health illnesses if left unchecked (Cuijpers et al., 2016). The findings of the study indicate that screen addiction and sleep disturbances can both independently be associated with anxiety symptomatology in young adults. While an overly digital lifestyle can lead to increased emotional arousal, social comparison and information overload, lack of sleep can negatively affect emotional regulation and decrease resiliency to the stressors of daily life making anxiety more likely to occur (Berryman et al., 2018; Hyndych et al., 2025). There is also emerging support that the link between screen addiction and anxiety symptoms is mediated, in part, by poor sleep quality, suggesting that there are complex interactions between these factors (Song et al., 2022).

Technological changes, the improvement of information technology and increasing access to the internet have significantly impacted the lifestyle of university students in Pakistan (Hussain et al., 2025; Saba et al., 2022). The wide variety of ways in which digital devices are used for online learning, academic research, communications, entertainment, and social networking, means that everyday use can be extended over periods of many hours. Meanwhile, Pakistani

university students encounter several academic and psychosocial problems such as examination stress, competitive education, and insecurity, financial constraints, lifestyle changes etc. which can nudge them toward sleep abnormalities and psychological distress (Shabbir et al., 2026). These conditions may raise the risk for problematic screen addiction, insomnia, and anxiety among college students.

Though these were becoming topics of increasing concern, there is little evidence found in Pakistan. Most local studies have focused on the link between screen time and other individual outcomes measured (e.g., sleep, anxiety) and/or measured combinations of screen time and a single other outcome (Alhalawany et al., 2025). Furthermore, most studies record commonly quantifies a person's screen time but do not account for pathological screen addiction; therefore, there is little evidence of the burden of Pathological Digital Behavior (PDB) among university students (Kahraman & Elbay, 2026). Few studies have linked the notions of screen addiction, sleep problems, and anxiety symptoms within standardized measurement instruments in one sample of college students. Hence, there is inadequate evidence available on the prevalence of these conditions and the interrelationships between them among Pakistani university students, preventing the development of evidence-based health promotion programmes and health promotion interventions for students.

Therefore, the present cross-sectional study aims to assess the prevalence of screen addiction, poor sleep quality, and anxiety symptoms among undergraduate university students in Pakistan. The study also aims to examine the associations between screen addiction, sleep quality, and anxiety symptoms and to explore the influence of selected socio-demographic characteristics on these outcomes. The findings are expected to provide evidence to support educational institutions, healthcare professionals, and policymakers in developing interventions that promote healthy digital habits, improve sleep hygiene, and enhance the mental well-being of undergraduate university students in Pakistan.

Research Methodology

Research Design

A cross-sectional survey design was used for the purpose of achieving the present study, statistically quantitative analysis has been used to assess the prevalence of screen addiction, poor sleep quality and symptoms of anxiety among Under Graduate University students in Pakistan. This study design was suitable as it allowed the data to be obtained at a single time point to estimate the prevalence of the study variables as well as test the relationships between screen addiction, sleep quality and anxiety symptoms.

Study Setting

The study was carried out with undergraduate students at various public and private universities in Pakistan recognized by Higher Education Commission (HEC). The data were gathered using a structured online self-administered questionnaire that was disseminated through university social media groups, email and through WhatsApp and Facebook.

Study Population

The study was conducted among the undergraduate students of university students (aged 18-25 years) of the recognized public and private universities of the state of Pakistan.

Inclusion Criteria

They were included if they:

- Had attended a recognized public or private university in Pakistan as undergraduate students.
- Were in the age range of 18 to 25 years old.
- Were able to read and comprehend in English or Urdu.

Gave informed consent to join the study.

Exclusion Criteria

Anyone who was part of the study who:

- Had completed post-graduate studies (MPhil, PhD).
- Were under 18 years or over 25 years of age.
- Failed to give informed consent.
- Made incomplete or repeated answers on the questionnaire.

Sample Size

The sample size was determined at the 95% confidence level using a p_0 (hypothesized) population proportion of 50%, and with a 5% margin of error.

$$\frac{z^2 \times p(1 - p)}{d^2}$$

$$n = \frac{1.96^2 \times 0.5(1-0.5)}{0.05^2}$$

$$n = \frac{3.84 \times 0.25}{.0025}$$

$$n = 384$$

The size of the sample required was obtained from the single population proportion formula using 95%, level of confidence, 5% margin of error, and 50% estimated proportion which yielded 384 participants. Thirty-eight-four undergraduate students were called for participation. Of those, 300 responded and returned a full questionnaire fit for analysis which yielded a 78.1% response rate.

Sampling Technique

Non-probability convenience sampling technique was used. The students from various public and private universities of Pakistan were invited by universities' networks, social media platforms and online communication mediums. It was attempted to include participants from all school levels, university directorates, and fields of study in order to secure a wide cross section of participants. Since it was a non-probability sampling technique, the results of this study should be considered carefully for generalizations purposes to all under graduate students of Pakistan.

Study Duration

The research period lasted for about three months from preparing the questionnaires, pilot tests, data collection, data cleaning, statistical analysis, interpretation of the findings to writing up the report.

Data Collection Instruments

A structured self-administered questionnaire containing four sections was used to collect data.

This relates to socio-demographic characteristics.

This section gathered data on:

- Age
- Gender
- Province
- Private or public university
- Academic year
- Field of study
- Place of residence (Urban or Rural)
- Monthly family income

Daily viewing time (Average time spent per day on screens)

Section II: Screen Addiction

The Smartphone Addiction Scale – Short Version (SAS-SV) of (Kwon et al., 2013) was used to assess the level of screen addiction. Items of the SAS-SV use a Likert scale from 1 (Strongly disagree) to 6 (Strongly agree) ($n = 10$). The high the score, the more severe was the smartphone addiction. This study used a proxy indicator for the phenomenon of “screen addiction” by measuring “smartphone addiction” because students in undergraduate university use smartphones as the main screen device for academic, social, and recreational activities.

Section 3: Sleep Quality

The Pittsburgh Sleep Quality Index (PSQI) derived by (Buysse et al., 1989) was used to assess the quality of sleep. PSQI includes 17 items, 19 subscale items that are self-rated to assess sleep quality over the past month related to seven components: subjective sleep quality, sleep latency, sleep duration, sleep efficiency with a typical pattern (habitual sleep efficiency), sleep disturbances, sleep medication, and daytime dysfunction. Poor sleep quality was defined as a PSQI score above 5, a metrics used as a global score.

Section IV describes the symptoms of anxiety.

The Generalized Anxiety Disorder-7 (GAD-7) questionnaire created by (Spitzer et al., 2006) was used to measure fear symptoms. The instrument has been divided into 7 items with a four-point Likert scale of 0 (Not at all) to 3 (Nearly every day). Possible total scores were from 0 to 21, and the higher these scores indicated the more severe the symptom severity of the anxiety symptoms.

Validity and Reliability

It used internationally validated scales, which have been validated in previous studies, namely the SAS-SV, PSQI, GAD-7 scales. The contents of the questionnaire were assessed as content validity by experts in nursing and public health. The questionnaire was piloted with about 30 undergraduate university students to assess the clarity, comprehensibility, and feasibility. Information gathered as part of the pilot was not analyzed. An instrument's internal consistency reliability for the instruments was determined by the coefficient Cronbach's alpha, and the value of 0.7 or over was considered acceptable. The Smartphone Addiction Scale–Short Version demonstrated excellent reliability, with a Cronbach's alpha value of 0.900. The Generalized Anxiety Disorder-7 also showed excellent reliability, with a Cronbach's alpha value of 0.902. The sleep-quality questionnaire had a Cronbach's alpha value of 0.645, indicating moderate internal consistency. Therefore, the smartphone-addiction and anxiety instruments were highly reliable, while the sleep-quality findings should be interpreted with some caution.

Data Collection Procedure

The questionnaires were created using Google Forms, after meeting with everyone and getting consent to collect the data. The survey link was sent out round electronic cohorts of the university departments including social media groups, email, WhatsApp, and Facebook. Participants were provided with comprehensive information about the study before completion of the questionnaire, including detail information about the educational research, confidentiality of the information to be gathered, willingness of the participants to undergo the study and their right to withdraw from the study at any time without penalty. Informed written consent was registered for all participants, prior to completing the questionnaire. The total time having to assess the questionnaire was estimated at 10–15 minutes.

Data Analysis

The collected data were entered, cleaned, and analyzed using the **Statistical Package for the Social Sciences (SPSS) version 27.0**. Descriptive statistics, including frequencies, percentages, means, and standard deviations, were used to summarize the socio-demographic characteristics

and study variables. The internal consistency of the study instruments was assessed using **Cronbach's alpha coefficient**. Data normality was evaluated using the **Kolmogorov–Smirnov and Shapiro–Wilk tests**. Since the study variables were not normally distributed, **Spearman's rank correlation** was used to determine the relationships among smartphone addiction, sleep quality, and anxiety symptoms.

The **Chi-square test** was performed to examine the associations between categorical variables, including gender, daily screen time, smartphone addiction, sleep quality, and anxiety symptoms. **Multiple linear regression analysis** was conducted to identify factors associated with anxiety symptoms while controlling for potential confounding variables, including age group, gender, field of study, average daily screen time, smartphone addiction, and sleep quality. A **p-value of less than 0.05** was considered statistically significant for all analyses.

Ethical Considerations

Since this study could have been conducted independently, not a formal Institutional Review Board (IRB) approval was acquired, however voluntary participation, confidentiality and anonymity were observed in the study. All participants gave informed consent electronically prior to data collection. No pressure was put on anyone to take part in the study and anyone could drop out at any time without consequences. Names, email addresses or contact information were not collected. Participants' confidentiality and anonymity was adhered to throughout the study. There was no pay for involvement. All data collected was for research only placed in a secure environment and only accessed by the research staff.

Results

Table 1. Socio-Demographic Characteristics of Participants (n = 300)

Variable	Category	Frequency	Percentage
Age group	18–20 years	140	46.7
	21–23 years	152	50.7
	24–25 years	8	2.7
Gender	Male	191	63.7
	Female	109	36.3
Province	Punjab	191	63.7
	Sindh	109	36.3
University type	Public	202	67.3
	Private	98	32.7
Academic year	First year	59	19.7
	Second year	94	31.3

Variable	Category	Frequency	Percentage
	Third year	94	31.3
	Fourth year	53	17.7
Field of study	Health sciences	208	69.3
	Engineering	92	30.7
Place of residence	Urban	208	69.3
	Rural	92	30.7
Monthly family income	Below PKR 30,000	88	29.3
	PKR 30,000–60,000	71	23.7
	PKR 60,001–100,000	81	27.0
	Above PKR 100,000	60	20.0
Average daily screen time	Less than 3 hours	88	29.3
	3–5 hours	71	23.7
	5–8 hours	81	27.0
	More than 8 hours	60	20.0

Table 1 shows the socio-demographic characteristics of the participants. Half of the participants, 152 (50.7%), were aged 21–23 years, while 140 (46.7%) were aged 18–20 years. Only 8 (2.7%) participants were aged 24–25 years. Most participants were male, 191 (63.7%), while 109 (36.3%) were female. A total of 191 (63.7%) participants were from Punjab, while 109 (36.3%) were from Sindh. Most participants were enrolled in public-sector universities, 202 (67.3%), whereas 98 (32.7%) were enrolled in private-sector universities.

Regarding academic year, 94 (31.3%) participants were in the second year and another 94 (31.3%) were in the third year. Health-sciences students represented 208 (69.3%) of the sample, while 92 (30.7%) were engineering students. Most participants, 208 (69.3%), lived in urban areas. Regarding screen exposure, 88 (29.3%) participants reported less than three hours of daily screen time, while 60 (20.0%) reported more than eight hours per day.

Table 2. Prevalence of Smartphone Addiction, Sleep Quality, and Anxiety Symp. (n = 300)

Study Variable	Category	Frequency	Percentage
Smartphone addiction	Low	100	33.3

Study Variable	Category	Frequency	Percentage
	Moderate	101	33.7
	High	99	33.0
Sleep quality	Good sleep quality	85	28.3
	Poor sleep quality	215	71.7
Anxiety symptoms	Minimal	170	56.7
	Mild	72	24.0
	Moderate	58	19.3

Table 2 presents the prevalence of smartphone addiction, poor sleep quality, and anxiety symptoms among the participants. Low smartphone addiction was identified among 100 (33.3%) participants, moderate smartphone addiction among 101 (33.7%), and high smartphone addiction among 99 (33.0%). Poor sleep quality was reported by 215 (71.7%) participants, while 85 (28.3%) had good sleep quality. Regarding anxiety symptoms, 170 (56.7%) participants had minimal anxiety, 72 (24.0%) had mild anxiety, and 58 (19.3%) had moderate anxiety symptoms. These findings show that nearly one-third of the participants had high smartphone addiction, while more than two-thirds experienced poor sleep quality.

Table 3. Descriptive Statistics of Categorized Study Variables (n = 300)

Variable	Minimum	Maximum	Mean	Standard Deviation
Smartphone-addiction category	1.00	3.00	2.00	0.82
Anxiety-symptom category	1.00	3.00	1.63	0.79
Sleep-quality category	0.00	1.00	0.72	0.45

Table 3 shows the descriptive statistics of the categorized study variables. The mean smartphone-addiction category score was 2.00 ± 0.82 . The mean anxiety-category score was 1.63 ± 0.79 , while the mean sleep-quality category score was 0.72 ± 0.45 . These values represent coded categories rather than original continuous questionnaire totals.

Table 4. Tests of Normality for the Study Variables (n = 300)

Variable	Kolmogorov–Smirnov Statistic	p-value	Shapiro–Wilk Statistic	p-value	Interpretation
Smartphone addiction	0.222	<0.001	0.794	<0.001	Non-normal

Variable	Kolmogorov–Smirnov Statistic	p-value	Shapiro–Wilk Statistic	p-value	Interpretation
Anxiety symptoms	0.353	<0.001	0.718	<0.001	Non-normal
Sleep quality	0.452	<0.001	0.564	<0.001	Non-normal

Table 4 shows that the Kolmogorov–Smirnov and Shapiro–Wilk tests were statistically significant for all three study variables. Smartphone addiction, anxiety symptoms, and sleep quality each had p-values below 0.05, indicating that the data were not normally distributed. Therefore, Spearman’s rank correlation was used to assess relationships among the study variables.

Table 5. Spearman’s Rank Correlation Between Smartphone Addiction, Sleep Quality, and Anxiety Symptoms (n = 300)

Variables	Smartphone Addiction	Anxiety Symptoms	Sleep Quality
Smartphone addiction	1.000	0.300**	0.061
Anxiety symptoms	0.300**	1.000	0.171**
Sleep quality	0.061	0.171**	1.000

Note: $p < 0.01$, two-tailed.

Table 5 presents the Spearman’s rank correlation analysis among smartphone addiction, sleep quality, and anxiety symptoms. A statistically significant positive correlation was found between smartphone addiction and anxiety symptoms ($\rho = 0.300$, $p < 0.001$). This indicates that higher smartphone-addiction levels were associated with greater anxiety-symptom severity.

A weak but statistically significant positive correlation was also found between poor sleep quality and anxiety symptoms ($\rho = 0.171$, $p = 0.003$). This suggests that participants with poorer sleep quality tended to report higher anxiety symptoms. However, the relationship between smartphone addiction and sleep quality was not statistically significant ($\rho = 0.061$, $p = 0.292$).

Table 6. Association Between Gender and Study Outcomes (n = 300)

Outcome	Male n (%)	Female n (%)	χ^2	df	p-value
Smartphone addiction			1.651	2	0.438
Low	66 (34.6)	34 (31.2)			
Moderate	67 (35.1)	34 (31.2)			
High	58 (30.4)	41 (37.6)			
Anxiety symptoms			0.383	2	0.826

Outcome	Male n (%)	Female n (%)	χ^2	df	p-value
Minimal	107 (56.0)	63 (57.8)			
Mild	48 (25.1)	24 (22.0)			
Moderate	36 (18.8)	22 (20.2)			
Sleep quality			1.203	1	0.273
Good	50 (26.2)	35 (32.1)			
Poor	141 (73.8)	74 (67.9)			

Table 6 shows that gender was not significantly associated with smartphone addiction, anxiety symptoms, or sleep quality. The association between gender and smartphone addiction was not statistically significant ($\chi^2 = 1.651$, $df = 2$, $p = 0.438$). Similarly, no significant association was observed between gender and anxiety symptoms ($\chi^2 = 0.383$, $df = 2$, $p = 0.826$). The association between gender and sleep quality was also not statistically significant ($\chi^2 = 1.203$, $df = 1$, $p = 0.273$).

Table 7. Association Between Daily Screen Time and Smartphone Addiction (n = 300)

Daily Screen Time	Low n (%)	Moderate n (%)	High n (%)	Total
Less than 3 hours	64 (72.7)	20 (22.7)	4 (4.5)	88
3–5 hours	28 (39.4)	33 (46.5)	10 (14.1)	71
5–8 hours	7 (8.6)	36 (44.4)	38 (46.9)	81
More than 8 hours	1 (1.7)	12 (20.0)	47 (78.3)	60
Total	100	101	99	300

Pearson $\chi^2 = 158.748$, $df = 6$, $p < 0.001$.

Table 7 shows a statistically significant association between average daily screen time and smartphone-addiction level. Among participants using screens for less than three hours daily, 64 (72.7%) had low smartphone addiction and only 4 (4.5%) had high smartphone addiction. In contrast, among participants using screens for more than eight hours daily, 47 (78.3%) had high smartphone addiction and only 1 (1.7%) had low smartphone addiction. These findings indicate that longer daily screen time was strongly associated with higher levels of smartphone addiction.

Table 8. Association Between Daily Screen Time and Anxiety Symptoms (n = 300)

Daily Screen Time	Minimal n (%)	Mild n (%)	Moderate n (%)	Total
Less than 3 hours	67 (76.1)	16 (18.2)	5 (5.7)	88

Daily Screen Time	Minimal n (%)	Mild n (%)	Moderate n (%)	Total
3–5 hours	40 (56.3)	19 (26.8)	12 (16.9)	71
5–8 hours	42 (51.9)	19 (23.5)	20 (24.7)	81
More than 8 hours	21 (35.0)	18 (30.0)	21 (35.0)	60
Total	170	72	58	300

Pearson $\chi^2 = 31.087$, $df = 6$, $p < 0.001$.

Table 8 shows a statistically significant association between average daily screen time and anxiety symptoms. Among participants reporting less than three hours of daily screen time, 67 (76.1%) had minimal anxiety symptoms, while only 5 (5.7%) had moderate anxiety symptoms. In comparison, among those reporting more than eight hours of screen time, 21 (35.0%) had minimal anxiety and 21 (35.0%) had moderate anxiety symptoms. These findings suggest that longer daily screen time was associated with greater anxiety-symptom severity.

Table 9. Association Between Daily Screen Time and Sleep Quality (n = 300)

Daily Screen Time	Good Sleep n (%)	Poor Sleep n (%)	Total
Less than 3 hours	27 (30.7)	61 (69.3)	88
3–5 hours	19 (26.8)	52 (73.2)	71
5–8 hours	27 (33.3)	54 (66.7)	81
More than 8 hours	12 (20.0)	48 (80.0)	60
Total	85	215	300

Pearson $\chi^2 = 3.375$, $df = 3$, $p = 0.337$.

Table 9 shows that poor sleep quality was common across all screen-time categories. Among participants using screens for more than eight hours per day, 48 (80.0%) had poor sleep quality. However, the association between daily screen time and sleep quality was not statistically significant ($\chi^2 = 3.375$, $df = 3$, $p = 0.337$).

Table 10. Multiple Regression Analysis of Factors Associated with Anxiety Symptom- (n = 300)

Predictor	B	Standard Error	Standardized β	t	p-value
Constant	0.968	0.248	—	3.909	<0.001
Age group	0.033	0.079	0.023	0.423	0.673

Predictor	B	Standard Error	Standardized β	t	p-value
Gender	-0.022	0.090	-0.013	-0.246	0.806
Average daily screen time	0.144	0.053	0.202	2.718	0.007
Smartphone addiction	0.142	0.072	0.147	1.981	0.049
Sleep quality	0.238	0.096	0.136	2.495	0.013
Field of study	-0.122	0.094	-0.072	-1.304	0.193

Table 11. Regression Model Summary

R	R ²	Adjusted R ²	Standard Error of Estimate	F	df	p-value
0.371	0.137	0.120	0.740	7.781	6, 293	<0.001

Tables 10 and 11 show that the overall regression model was statistically significant, $F(6, 293) = 7.781$, $p < 0.001$. The model explained 13.7% of the variance in anxiety symptoms, with an adjusted R^2 of 0.120. Average daily screen time was significantly and positively associated with anxiety symptoms ($B = 0.144$, $\beta = 0.202$, $p = 0.007$). Smartphone addiction was also significantly associated with anxiety symptoms ($B = 0.142$, $\beta = 0.147$, $p = 0.049$). Poor sleep quality was another significant factor associated with anxiety symptoms ($B = 0.238$, $\beta = 0.136$, $p = 0.013$). Age group, gender, and field of study were not statistically significant factors associated with anxiety symptoms. Among the significant predictors, average daily screen time had the strongest standardized association with anxiety symptoms.

Discussion

The current study focused on understanding the level of smartphone addiction among undergraduate university students in Pakistan, quality of sleep and level of anxiety that exist, and the relationship between these variables. The results indicated that the rate of Smartphone Addiction and Sleep Quality were high; and a significant portion of participants had shown symptoms of anxiety. The size of the association between smartphone addiction and anxiety was remarkable when compared with that between sleep quality and any of the variables, while the association between sleep quality and smartphone addiction was not significant. Another daily factor that was significantly correlated with both smartphone addiction and anxiety was daily screen time, which was the most independent predictor found of anxiety. To summaries, the results suggest that digital technology has a significant impact on the psychological well-being of students in higher education and the call for increased attention on unhealing digital behaviors in higher education is growing.

According to the present study, about one-third of the participants were high smartphone addicted, and another one-third were moderately addicted to their smartphones. The results suggest that under-graduate university student's problematic smartphone use has been prevalent in Pakistan. Paralleling this, the prevalence of moderate to high levels of smartphone addiction has been reported in many countries around the world, ranging from 30% to 50% of the university student body (Anwar et al., 2025). Similar studies have been conducted in Pakistan, where the

addiction to smart phones for online education, communication, entertainment, and social activities has resulted in problematic smartphone use among university students (Safdar Bajwa et al., 2023). These similarities with the results of Demian's study might be attributed to the general diffusion of mobile telephones in educational and social activities. Smartphones are no longer just for communication but are one of the all-important instruments for accessing education resources, virtual lessons, and forums, doing assignments, and enjoying social interactions. As a result, for most students, overuse and dysregulation of the smartphone can gradually become compulsion and destructive patterns affecting school-related tasks, relationships with others and mental health.

A secondary finding was the high rate of poor sleep quality, with sleep quality rating as “poor” for more than two thirds of all participants. Such high prevalence has been observed among university students in other countries of the world, which consistently have been one of the most important concerns regarding poor health outcomes (Gunasekar et al., 2025). The same has been found across Pakistan also mainly among university students, who constitute a group with heavy workload for studies and examinations (Shabbir et al., 2026). Several factors could possibly account for the high prevalence reported in the present study including academic load and lifestyle factors like prolonged evening use of a smartphone, irregular sleep patterns, caffeine consumption, living in a hostel or experiencing psychological stress. All these can be combined and contribute to poor sleep patterns, late bedtimes, and decreased sleep duration. Genuinely, university students are much more independent in their daily life than school students, potentially giving rise to any more eccentric sleeping patterns. Thus, poor sleep quality is emerging as a typical lifestyle disorder among the undergraduate students and again it is an important public health problem.

While anxiety symptoms were reported at minimal level, over quarter of the participants suffered minor to moderate anxiety, there is high prevalence of psychological distress among young people pursuing their undergraduate studies at universities. This result is in line with the previous study that indicated anxiety is one of the most common mental health issues to be experienced by the university students globally (Auerbach et al., 2018). A parallel can be drawn from the other findings that were reported in Pakistan which were associated with the rising psychological distress of the university students due to high level of academic competitiveness of the students, exam stress, financial problems, insecurity of employment, and new demands of social atmosphere (Zada et al., 2021). Going from adolescence to adulthood is a time of many academic, social, and personal stressors that can make one more susceptible to anxiety. Internet usage, social-fixation, and FOMO are possible contributing factors to raised psychological stress. The data presented herein thus further support previous research indicating that anxiety is a mental health issue that continues to be a problem among college students and deserves more attention in college environments.

There was a strong positive connection between the two variables of smartphone addiction and symptoms of anxiety. The number of anxiety symptoms was correlated with higher levels of smartphone addiction; this finding held. These results align with those of previous studies, which have shown the relationship between problematic smartphone use and psychological unhealthiness or anxiety amongst university students (Candussi et al., 2023). There may be several subtle behavioral mechanisms that can account for the observed relationship. Excessive use of the mobile phone is causing students to be inundated with constant notifications, peer comparison, too much information, and online interactions that can stress the emotions. This amount of smartphone use could also lead to less engagement in positive coping strategies like physical activity, sleep, and in-person social connections. On the other hand, students with anxiety might turn to technology more and more as a distraction or emotional outlet, specifically smartphones. The current findings indicate that smartphone addiction could be reinforcing or inducing anxiety, but due to the cross-sectional nature of the study, it is unclear which is causing which.

In the current study, it was also confirmed that there was a significantly positive correlation between poor sleep quality and anxiety symptoms. There was a moderately low correlation between the two, but high anxiety scores tended to correspond with low sleep scores. It aligns with the previous work that found sleep disturbance to be an important factor associated with psychological distress in the university students (Jabeen, 2025). Sleep is a key component in emotional regulation, cognition, and stress management. Children who have poor sleep or sleep disturbances are likely to wake up feeling tired or moody, be unable to concentrate, find it difficult to perform academically, and be more susceptible to anxiety. Similarly, anxiety can disrupt both the initiation and maintenance of sleep due to increased levels of those cognitive factors, cognitive arousal, and worry. These findings do confirm the reciprocal relationship between sleep and anxiety, and imply that sleep disturbances can play a role in impairing anxiety issues.

None of the other comparisons revealed any significant correlation between smartphone addiction and sleep quality, however. This discovery contradicts some previous works which revealed strong relationship between the use of smartphones with the quality of sleep among students at university (Dhamija et al., 2021). This difference could result for various reasons. The quality of sleep was influenced by several behavioral and environmental factors that may have played a greater role than smartphone addiction within this study sample. Furthermore, the constructs of smartphone addiction and smartphone total screen time are different constructs. Some pupils can use digital devices for learning for extended periods without exhibiting addictive smartphone-use behaviors while others might show addictive behavior, even though they are on a digital device for shorter periods. Some indication of a lack of internal consistency in the sleep-quality questionnaire also might have weakened the association observed. Absence of a significant relationship should not, therefore, be taken as a sign that there is no relationship between smartphone use and sleep, but rather that several behavioral and contextual factors have an impact on this relationship.

The chi-square analysis also indicated that the mean number of minutes spent on screens was significantly correlated with both SFQ, smartphone addiction and the symptoms of anxiety. Those who reported higher daily screen time experiences were significantly more likely to report high smartphone addiction and moderate anxiety symptoms as compared to those reporting shorter screen time. The results are consistent with those reported in previous studies that longer screen time was an important behavioral risk factor for problematic smartphone use and psychological distress in university students (Li Cemei et al., 2024). Extended amounts of screen time can lead to higher cognitive overload, limited time with physical activity and in-person social interaction, and ongoing exposure to digital stimulation, which can cause psychological stress for students. A significant correlation between daily screen time with sleep quality was not detected in this data though, due to the large number of poor-quality sleepers among the students who used screens for long periods. One possible reason is that there was low variability between the screen time groups in sleep quality ratings, which runs off the possibility of finding a statistically significant difference. The results indicate that, besides the amount of time spent on screens, university students' sleeping quality may depend upon several lifestyle and environmental factors.

Additional evidence about factors associated with anxiety symptoms was obtained by regression analysis. Overall model was statistically significant, accounting for 13.7% of the variance in anxiety symptoms. While this percentage of explained variance was modest, these variables do not explain the whole of anxiety and there are other psychological, social, and environmental factors that were not measured in the current study that could explain the remaining variance. Overall, average daily screen time was the most significant independent risk factor for anxiety and smartphone addiction was the next highest risk factor, followed by poor sleep quality. The results indicate that, in addition to compulsive smartphone-use behavior, prolonged digital exposure could be a factor that ignites anxiety. However, smartphone addiction also surpassed

demographic variables to remain a major predictor, suggesting that problematic smartphone use as a behavioral risk factor for anxiety is independent of and beyond those demographic risk factors. Limited sleep quality continued to be a big predictor, as sleep health was strongly connected with psychological well-being. However, age group, gender and field of study did not show a significant relationship with anxiety after the adjustment, indicating that the more salient factors of associate's behavioral characteristics those related to digital technology may have a greater impact on anxiety than its demographic characteristics in this sample.

The overall results of the present study are congruent with rising evidence of the close relationship between smartphone addiction and metaphorical side-effects, such as prolonged exposure to screens, sleep problems, and anxiety, among undergraduate university students. While smartphone addiction was not a significant predictor of sleep quality, both were significant predictors of anxiety symptoms, suggesting that digital behavior and sleep health could be related in distinct but intertwined ways in impacting students' psychological health. The researcher thus strives to add in the growing evidences of the effect of digital technologies on students' mental wellbeing and provide contributed information to the sparse literature of Pakistan.

Limitations and Recommendations

This study has some restrictions. Due to the cross-sectional design, it is not possible to draw causal inferences; also, the questions of the impact of potential recall and social desirability biases could not be ruled out in these self-reported questionnaires. Moreover, the data may not be representative of the entire population due to the small sample size and high concentration in Punjab and Sindh. The findings of the study can help shed light on smartphone addiction, sleep quality and anxiety among university students, although with these constraints. There is a need to introduce responsible smart phone use, alarming sleep routines and mental health awareness at universities, and future studies should focus on longitudinal research, larger and representative samples and other psychological and behavioral factors related to these findings.

Conclusion

The present study showed that students from the undergraduate level university are at risk of being smartphone addicted, poor sleep quality and anxiety symptoms were extensively prevalent among those students in Pakistan. The level of smartphone addiction was high and the quality of sleep was poor and considerable proportion of students had symptoms of anxiety. Smartphone addiction showed the significant relationship with anxiety and low sleep quality appeared as the strongest predictor of anxiety symptoms. There were no significant relationships for smartphone addiction and sleep quality, but both contributed significantly about anxiety. The results indicate the need for promoting the healthy use of digital technology, proper sleep hygiene and mental wellness in under-graduate students of universities of Pakistan.

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