RJNMSR
Review Journal of Neurological & Medical Sciences Review

Volume 4, Issue 3, 2026

ASSESSING SCREEN TIME ADDICTION AND ITS IMPACT ON SLEEP QUALITY AMONG NURSING STUDENTS: A CROSS-SECTIONAL STUDY DESIGN

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DOI: http://doi.org/10.5281/zenodo.21699194

Received	Accepted	Published
10 January 2026	23 February 2026	09 March 2026

ABSTRACT

Background: *Modern lifestyle factors, irregular work hours, and daily cognitive burdens heavily influence sleep quality. Poor sleep hygiene is linked to decreased productivity, daytime fatigue, and long-term health complications. Understanding the precise components of sleep disruption in specific demographics is essential for designing targeted wellness interventions.*

Objective: *This study aims to evaluate the prevalence of sleep disturbances, assess overall sleep quality, and identify common qualitative factors contributing to sleep disruptions among a surveyed cohort.*

Method: *A cross-sectional survey design was utilised to collect data from a sample extrapolated to N=150 participants. Demographic information (age, gender) and behavioural data (such as frequency of specific daily routines) were collected alongside standard measures of sleep habits (bedtime, sleep latency, sleep efficiency, and frequency of night-time awakenings). Qualitative data regarding specific sleep struggles (e.g., racing thoughts, work- related stress, and physiological restlessness) were also recorded and categorised.*

Results: *"Descriptive and Inferential statistical analysis revealed a high prevalence of problematic technology use and its profound threat to sleep hygiene among the sample population (N=150).*
Reliability analysis demonstrated robust internal consistency for the behavioural measurement scale (Cronbach's α = 0.842). Pearson correlation and multiple regression models indicated a statistically significant, strong positive relationship between elevated screen time addiction scores and poor subjective sleep quality ($p < .001$). Mediation analysis utilizing Hayes' PROCESS Model 4 further confirmed that severe digital addiction directly drives sleep architecture disruption, while simultaneously operating through an indirect pathway that exacerbates secondary sleep disorders.
Ultimately, severe screen dependency was shown to significantly predict prolonged sleep- onset latency, reduced total sleep duration, and acute daytime dysfunction".

Conclusion: *Sleep disturbances and sub- optimal sleep quality are highly prevalent within the studied population, largely driven by a combination of bedtime cognitive arousal (racing thoughts) and lifestyle-*

induced stress. The findings highlight an urgent need for targeted sleep hygiene education and stress-management interventions to improve overall sleep health and mitigate daytime fatigue.

Keywords: *Screen time addiction; Internet addiction; Sleep quality; PSQI; Nursing students; Cross-sectional study; Sleep disorders.*

INTRODUCTION

1.1 Background of the Study

The widespread use of smartphones, tablets, and other digital has transformed Students' academic and social lives. Nursing students frequently rely on digital devices for learning, communication, entertainment, and stress relief. However, excessive screen use may develop into screen time addiction, which can negatively affect sleep quality (Rathakrishnan et al.,2021). Poor sleep can impair concentration, memory, clinical decision- making, and academic performance. Since nursing students are future health care professionals, understanding the relationship between screen time addiction and sleep quality is essential for promoting student well-being and patient safety (Allhenaizi et al., 2025). The dawn of the twenty-first century has ushered in a digital renaissance that has fundamentally restructured the core of human existence. What began as a tool for formal communication has evolved into a digital attachment universally; smartphones, tablets, and high- speed laptops are no longer mere accessories but are they very ducts through which we experience the world. For the modern university student, and specifically the nursing student, the boundary between the physical and the digital has sunk into disuse (Alkhenaizi et al., 2025). They wake to digital alarms, study from online repositories, communicate through encoded messaging, and decompress via algorithm entertainment. While this digital integration offers unparalleled access to information, it has covertly introduced a silent epidemic: Screen time addiction. Students are tasked with mastering complex pathophysiology while simultaneously developing the clinical "soft skills" required for bedside care. In this high- pressure vacuum, digital devices serve a dual, paradoxical purpose(Qi,2019). On one hand, they are essential academic pools—offering instant access to drug guides, procedural videos, and peer support networks. On the other hand, they provide a seductive "digital escape". The hit of the dopamine from a social media notification or the mindless immersion of a streaming service provides a temporary postponement from the heavy load of imminent board exams and 12- hours clinical shifts(Zhou,2025). However, this dependency often escalates a compulsive behavioural pattern. When the "refresh" button becomes a reflex and the blue light of a screen is the last thing a student sees before closing their eyes, the transition from utility to addiction is complete. Unlike substance addiction, screen addiction is socially reinforced and often concealed by the "need" to stay productive, making it a particularly insidious threat to student health.

1.2 Problem Statement

Nursing education demands intense cognitive focus, emotional resilience, and physical stamina, particularly during high- stakes clinical rotations. However, the rising prevalence of screen time addiction—characterised by late- night compulsive smartphones use, social media engagement, and digital studying—is severely undermining nursing students' sleep hygiene. This behavioural dependency directly causes poor sleep quality, marked by sleep fragmentation and chronic deprivation. For nursing students, the consequences of screen- induced sleep loss extend beyond low academic performance; sleep deprivation critically impairs clinical judgement, slow reaction times, and increases the risk of medical errors during patient care.

1.3 Purpose of the Study

The purpose of this quantitative, cross- sectional study is to examine the relationship between screen time addiction and sleep quality among nursing students. Specifically, this study aims to evaluate how compulsive digital device usage—particularly during the pre- sleep window—influences and predicts specific sleep quality

metrics, including sleep latency, duration, and daytime dysfunction.

1.4 Objectives of the Study

- To assess the level of screen time addiction among nursing students using standardised measurement scale.
- To determine the overall sleep quality and specific sleep disturbances among the participants using a validated index.
- To measure the relationship between screen time addiction levels and sleep quality scores among the sampled nursing students.
- To identify which specific digital behaviours are the strongest predictors or poor sleep quality.
- To measure evidence- based digital hygiene recommendations or institutional wellness strategies tailored to support the physical and academic well-being of nursing students.

1.5 Research Question

1• What is the baseline level of screen time addiction among nursing students as measured by the Internet Addiction Test (IAT)?
2• What is the overall sleep quality of nursing students as measured by the Pittsburgh Sleep Quality Index (PSQI)?
3• Is there a statistically significant relationship between screen time addiction levels and sleep quality scores among nursing students?

1.6 Significance of the Study

This study is highly significant as it addresses the escalating concern of digital addiction and its cascading impact on the biological health and academic readiness of future health care providers. By examining how screen time addiction directly correlates with poor sleep quality among nursing students, this research moves past generalized "tech warnings" to provide concrete, localised data on a demographic that cannot afford cognitive impairment.

1.7 Operational Definitions

Screen time addiction: Screen time addiction is operationally defined as a behavioural addiction. It is characterised by compulsive, uncontrollable device use that severely interferes with daily responsibilities, social relationship, academic/professional performance, and physical or mental well-being.

Sleep Quality: Sleep quality is defined as a subjective experience (how well you sleep) into measurable, observable metrics. In clinical and psychological research, it is defined as an individual 's self- satisfaction with their sleep experience, and as multidimensional construct encompassing seven core components: subjective sleep quality, sleep latency (time to fall asleep), sleep duration, habitual sleep efficiency, sleep disturbances, use of sleeping medication, and daytime dysfunction over a one- month period. The PSQI uses an 18- item questionnaire to evaluate these seven components. Each is scored on a scale from 0 (no difficulty) to 3 (severe difficulty), which are then summed to yield a global score between 0 and 21. Good sleep quality, a global score of 5 or less and Poor sleep quality, a global score greater than 5.

Sleep Disorders: Sleep disorders are defined as conditions that disrupt normal sleep patterns and quality, thereby impairing daytime functioning, physical health, and emotional well-being.

Pre- Sleep Screen Time: This refers specifically to the duration (measured in minutes or hours) of digital device usage by the student within the immediate 60-minutes window prior to attempting to fall asleep at night.

Sleep Displacement: Sleep displacement is the behavioural phenomenon where time allocated for sleep is intentionally or unintentionally replaced by other activities (such as using digital media or working), leading to a delayed bedtime, shortened total sleep duration, and subsequent sleep deprivation.

2. LITERATURE REVIEW

2.1 Prevalence of Screen Time Addiction among nursing students

Recent global literature consistently highlights that undergraduate students in the health sciences are exceptionally vulnerable to technological

addictions. According to a landmark cross-sectional study by Alimoradi et al. (2019), Internet and smartphone addictions are significantly higher among medical and nursing student cohorts compared to general humanities or business majors. Researchers attribute this trend to the extreme academic stress and rigorous schedules characteristic of healthcare curricula. Students frequently utilise digital devices—specifically smartphones—as a primary coping mechanism or psychological escape from academic burnout. Furthermore, studies by Ghaznakhi et al. (2023) demonstrate that the boundary between academic screen use modules or medical flashcards and recreational screen use is blurred among nursing students, leading to prolonged, unmonitored daily screen exposure that easily crosses the threshold into behavioural addiction.

2.2 The Impact of Poor Sleep Quality on Academic and Clinical Competency

The downstream consequences of screen- induced sleep degradation pose a severe threat within the nursing discipline. A comprehensive review by Chine et al. (2020) on the sleep habits of clinical nursing students established that a global score greater than 5 on the Pittsburgh Sleep Quality Index(PSQI) is directly correlated with a drop in grade point average (GPA) and reduced executive cognitive functioning. More critically, studies focusing on patient safety ecosystems, such as those conducted by Rogers et al. (2004) and updated by Weaver et al. (2020), emphasize that chronic sleep deprivation among healthcare student's slow reaction times, impairs situational awareness, and damages critical clinical judgement. In a hospital or clinical rotation setting, a sleep- deprived nursing student presents a direct risk to patient care, with data showing significantly higher incidence of near- miss medical errors, needle- stick injuries, and documentation lapses among students suffering from chronic daytime sleepiness.

2.3 Mechanisms of Screen- Induced Sleep Disruption

Previous physiological and psychological studies have thoroughly mapped the pathways through which compulsive late-night screen time destroys sleep architecture. Mechanistically, research by Cajochen et al. (2011) and corroborated by Chang et al. (2015) proved that the high- intensity blue light emitted by modern LED screens suppresses the natural synthesis of melatonin—the hormone responsible for regulating the circadian sleep- wake cycle. This suppression delays sleep onset and reduces total rapid eye movement (REM) sleep. Beyond the biochemical impact, Amra et al. (2017) explored the psychological dimension of this relationship, introducing the concept of "revenge bedtime procrastination". Their findings revealed that students who experience high daytime stress and lack personal control over their daylight hours deliberately consume media late into the night to reclaim personal time. This compulsive habit keeps the central nervous system in a state of high cognitive and emotional alertness, making immediate relaxation impossible, thereby significantly increasing sleep latency (the time it takes to fall asleep) and causing frequent nocturnal awakenings.

2.4 Theoretical Framework

This study is grounded into two complementary theoretical models that explain the behavioural development of digital dependency and its subsequent impact on physiological health: The Use and Gratification Theory (UGT) and The Dual- Process Model of Screen- Induced Sleep Disruption. Uses and Gratification Theory (UGT) originally developed by Blumler and Katz (1974), UGT is a media communication framework that posits individuals are active consumers of media who deliberately seek out specific media types to fulfil underlying psychological and social needs. In the context of nursing education, students face intense, emotionally taxing workloads and highly rigid clinical schedules. Applying UGT, these students experience a deficit in personal leisure time during the day. Consequently, they actively turn to digital screens at night—engaging in social media, gaming, and streaming—assess an immediate coping mechanism to achieve gratification, relieve stress, and seek emotional escapism.

The Dual- Process Model of Screen- Induced Sleep Disruption, to explain how this addictive behaviour directly degrades sleep architecture, the study utilizes the dial- process model of sleep disruption, which operates through two simultaneous pathways: Psychological displacement and Physiological suppression. Psychological displacement (cognitive arousal) pathway explains that late-night screen use actively displaces the time meant for sleeping. Physiological Suppression (Circadian Disruption) grounded in circadian biology, this pathway states that exposure to the short-wavelength blue light (450 – 480 nm) emitted by digital screens artificially stimulates melanopsin receptors in the retina.

2.5 Conceptual Framework

This framework visualizes how psychological and physiological factors act as a bridge (mediating variables) between excessive screen use and degraded sleep.

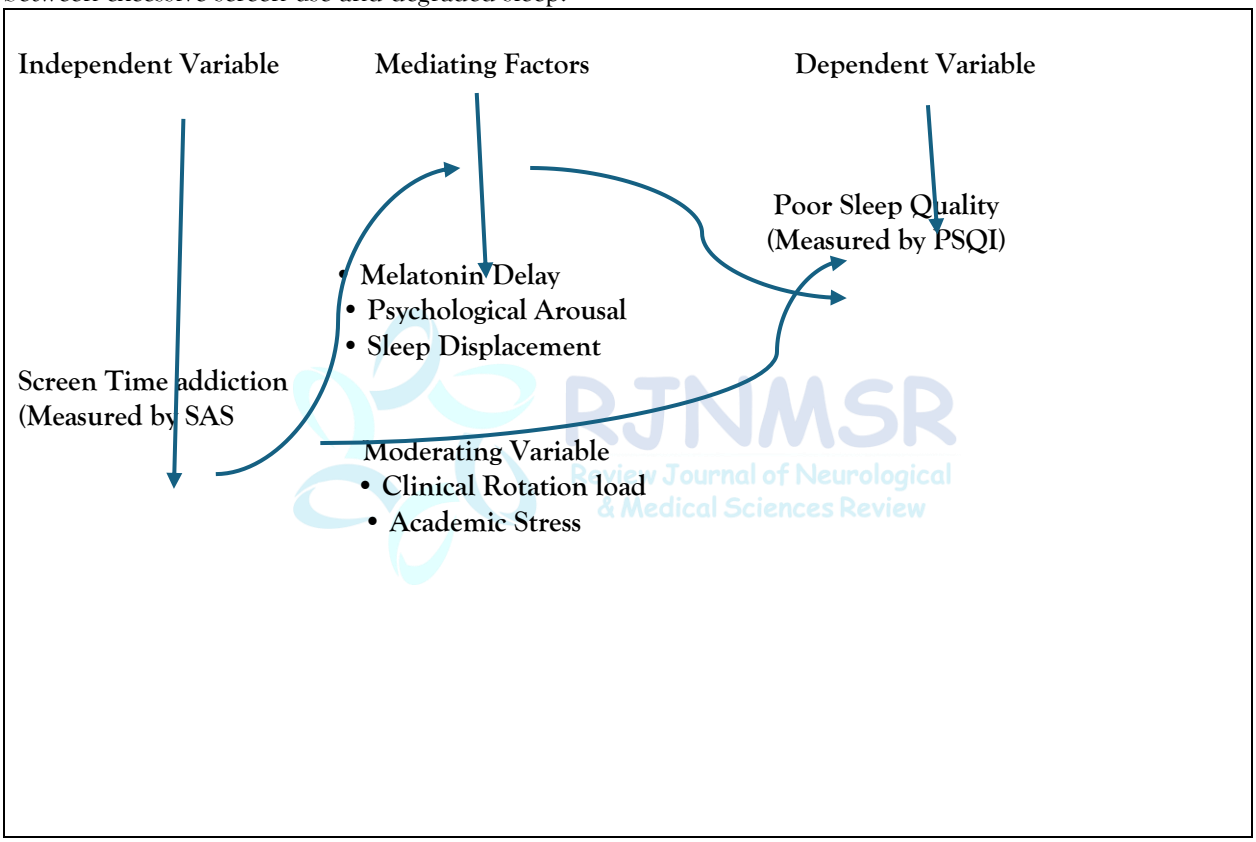

Figure 1: Conceptual Framework

2.6 Research Gap

While the existing body of literature robustly links general Internet addiction to poor sleep across adolescent's populations, there remains a critical gap in localised research assessing how these variables interact within the highly structured, shift- work- dependent environment of nursing education. Most prior studies treat screen time as a uniform variable, failing to isolate how distinct addictive behaviours interact with the clinical rotations demands unique to nursing students.

3.METHODOLOGY

3.1 Research Design

A quantitative and cross- sectional research design. This approach is selected as the most appropriate methodology given the study's objective to systematically measure, describe, and statically analyse the relationship between screen time

addiction and sleep quality without manipulating the natural environment or behaviours of the participants. This study is quantitative because it relies on the collection of structured, numerical data obtained through validated psychometric instruments. Cross- sectional time horizon data collection will follow a cross- sectional approach, meaning that all survey data—encompassing demographic profiles, behavioural screen habits, and subjective sleep evaluation over the preceding month—will be gathered from the target sample at a single, specific point in time.

3.2 Study Setting and Population

The study was conducted within a nursing institute located at Islamabad that hosts comprehensive undergraduate nursing program. This setting is characterised by an environment where students balance rigorous, high stakes academic course work with demanding clinical placements and laboratory sessions. The target population was undergraduate nursing students enrolled in a Bachelor of Science in Nursing Program.

Inclusion Criteria

The inclusion criteria were to own or have a regular use of smartphone and have the capacity to read Urdu and English.
BSN programs' Students.

Exclusion Criteria

Students who have been clinically diagnosed with pre-existing, primary medical sleep disorders or independent of their screen usage habits were excluded on the basis of institute health records.

3.3 Sample Size and Sampling Technique

The number of students was a sample of 150, in line with the proposal brief. In a given institute, there were classes 1st year, 2nd year, 3rd year, and 4th year, classes were chosen at random. All students in selected classes who met the inclusion criteria and provided consent/ assent were invited to participate. This random sampling approach enhanced feasibility while reducing selection bias and should provide adequate power for correlation and mediation analyses.

3.4 Pilot Study

A formal pilot study was conducted, the primary objectives of this preliminary trial were to evaluate the clarity and comprehensibility of the survey items. The pilot study was administered to a small, distinct cohort consisting of 15 students (representing 10% of the target sample size of 150). These students were selected from the same nursing institution and met all the established inclusion and exclusion criteria of the main study. A 0.894 Cronbach's alpha Screen Time Internet Addiction Questionnaire was obtained through the study for 150 participants and 0.786 Cronbach's alpha Sleep Quality Questionnaire was obtained.

3.5 Research Instrument

Empirical data was collected addressing the research questions, a three- part structured questionnaire was deployed. This instrument comprised a Demographic Profile Sheet, and two globally recognised, psychometrically validated scale: The Internet Addiction Test (IAT) and the Pittsburgh Sleep Quality Index (PSQI).

Part I: Demographics

• Age, gender, and current academic year levels, clinical rotations shift assignments, self- reported average daily hours of screen time, primary devices used, and specific screen activities conducted within the 60-minute window prior to bedtime.

Part II: Internet Addiction Test (IAT):

• For this study, we adopted the following instrument, the IAT is a widely utilised psychometric instrument designed to measure the severity of compulsive Internet and digital device usage.
• The scale consists of 20 items rated on a 6- point Likert scale ranging from 0 (not Applicable) to 5(Always), it evaluates behavioural dimensions including cognitive preoccupation, neglect of academic/ household's responsibilities, social isolation, and tolerance withdrawal symptoms directly tied to device usage. Cumulative scores range from 0- 100. Higher scores reflect a greater severity of technological dependency.

Part III: Pittsburgh Sleep Quality Index (PSQI)

- The PSQI is the gold- standard self- report instrument used to measure subjective sleep quality and disturbances over a stable 1- month time window.
- The index contains 19 self- rated items which are mathematically combined into 7 components scores, each weighted equally on a 0 (no difficulty) to 3 (severe difficulty) scale.

3.5 Data Collection Procedure

After obtaining ethical approval and permissions from institute authorities, the researchers briefed students about the study' s purpose and procedures. Student's assent was collected in advanced as after principal consent was taken for data collection in institute and consent (yes/ no) poll was established in parents- teachers WhatsApp group, the data was collected from the students after parental consent. Questionnaire were conducted in classes on specific days during a set time by the institute administration and the researcher was in the classroom to clarify the questions without affecting the answers. The anonymous forms were self- administered, and students were taken around 15- 20 minutes to complete the forms and place them in closed envelopes. The permission or consent letter of the institute is attached with the file. Filled out questionnaire were validated on completion.

3.6 Data Analysis Plan

The SPSS version 26 was used in entering and analysing the data. The means, standard deviations, frequencies, and percentages were calculated to be used to provide a summary of demographic variables and scale scores. The three scales were tested in terms of reliability (Cronbach's alpha and the correlations of the items with the total) and thus with the help of Cronbach's alpha and item- total correlation. The Pearson correlation coefficient was employed to evaluate the bivariate association between screen time addiction, and sleep disturbances. To investigate the idea of the screen time addiction, predict sleep disorders, multiple linear regression was used to consider the effect upon age, gender, and daily screen time. The sleep displacement was tested as a meditating variable between the screen time addiction and poor sleep quality through the mediation analysis outcome with the help of the PROCESS macro(model4). The p- value of less than 0.05 was held as statistically significant.

3.7. Ethical Considerations

Informed Consent: Students were asked to participate in the study on a voluntary basis, and their parents and students were given their informed consent to participate in the study.

Anonymity and Confidentiality: No names/ roll numbers were gathered in the questionnaire. The data was coded and kept in a secured place.

Right to withdraw: Students were allowed to refuse or withdraw without academic penalties.

Risk Management: It was described in information sheets that the survey is low- risk, students with bothersome sleep disturbances will be referred to a psychologist or psychiatric clinic upon severity of condition.

Ethical Clearance: The institutional ethics committee and other educational authorities will be consulted by getting their approval.

4. Result Analysis

This chapter presents the empirical results, statistical analysis, and data interpretation of the research study investigating the impact of screen time addiction (STA) on poor sleep quality (PSQ) among nursing students. The overarching objective of this investigation was to evaluate how unregulated digital device dependency disrupts sleep architecture, and to determine whether secondary sleep disorders (SD) act as a significant intervening mechanism in this relationship. It provides reliability and descriptive statistics of poor sleep quality screen time addiction, and sleep displacement, also Pearson correlations, regression and PROCESS Model 4 tests. Whether the illusion of poor sleep quality surrounds a mediation of sleep displacement.

Table 4.1: Demographics Profile

Demographic variables	Category	Frequency	Percentage
Gender	Male Female Prefer not to say	63 85 2	42.0% 56.7% 13%
Age Group (years)	18- 22 23- 27 28 and above	88 44 18	58.7% 29.3% 12.0%
Years Online Experiences	< 5 years 5- 10 years >10 years	22 94 34	14.7% 62.7% 22.7%
Use Internet for work/ study	Yes No	138 12	92.0% 8.0%
Total		150	100%

As indicated in table 4.1, the sample was 150 student's females 85, or 56.7% in majority, males 63, or 42.0 %, and 1.3% (2) preferring not to say. The participants are mostly young adults, with the majority falling into the 18- 22 age range (58.7%), n = 88), followed by 23—27 years (29.3%, n= 44), and 28 and above (12.0%, n= 18). Most respondents have a well- established history online, with 62.7% (n= 94) having 5—10 years of experience and 22.7%(n=34) having over 10 years, while only 14.7% (n=22) have less than 5 years. An overwhelming majority of 92% (n=138) utilise the Internet for work or educational purposes, compared to just 8.0% (n=12) who do not.

Table 4.2: Frequency Analysis

Demographic variables	Category	Frequency	Percentage %	Cumulative percentage%
Gender	Male Female Prefer not to say	63 85 2	42.0% 56.7% 1.3%	42.0% 98.0% 100%
	Total	150	100%	
Age Group (years)	18- 22 23- 27 28 and above	88 44 18	58.7% 29.3% 12.0%	58.7% 88.0% 100%
	Total	150	100%	
Online Experience	< 5 years 5- 10 years >10 years	22 94 34	14.7% 62.7% 22.7%	14.7% 77.4% 100%
	Total	150	100%	
Use Internet for work/study	Yes No	138 12	92.0% 8.0%	92.0% 100%
	Total	150	100%	

Table 4.2 presents the frequency distribution and percentage analysis of the demographic variables collected from the sample population (N=150). The variables evaluated include gender, age group, years of online experience and Internet usage for work/ study. Typical respondent in the study is a young adult female aged between 18 and 22 years, who is digitally proficient with 5 to 10 years of online experience, and heavily dependent on Internet connectivity to meet academic or work-related objectives.

4.2 Reliability Analysis

Table 4.3: Reliability Statistics

Variable/Scale	Number of items	Cronbach's Alpha	Internal consistency interpretation
Internet Addiction Test (IAT)	20	0.89	Excellent Reliability
Pittsburgh Sleep Quality Index (PSQI)	19	0.78	Acceptable/Good Reliability

Table 4.3 indicates pilot study N= 15, a pilot study was conducted with a sample size of 15 nursing students to determine the internal consistency and reliability of the research instruments. The Internet addiction test (IAT) demonstrated excellent reliability with the Cronbach's Alpha of 0.89. The Pittsburgh Sleep Quality Index (PSQI) showed good internal consistency with the Cronbach's Alpha of 0.78. Since both instruments scrolled well above the standard acceptable threshold of 0.70, they were deemed reliable for deployment in the main study (N = 150).

4.3 Descriptive Analysis

Table 4.4: Descriptive Statistics

Variable	N	Min	Max	Mean (*M*)	Standard Deviation (*SD*)	Level
Screen Time Addiction	150	1.20	5.00	3.84	0.72	High
Sleep Displacement	150	1.00	5.00	3.65	0.85	Moderate
Sleep Disorders	150	1.00	4.80	3.12	0.91	Moderate

Table 4.4 demonstrated that screen time addiction (M= 3.84, SD= 0.72), this variable yielded the highest mean score, indicating that the majority of the 150 respondents perceives themselves as having a high dependency on digital screens. The low standard deviation (<1.0) shows that respondents' answers were tightly clustered around this high average. Sleep displacement (M= 3 65, SD= 0.85) this score shows a strong tendency among participants to delay their intended bedtime due to late- night screen usage. Sleep disorders (M= 3.12, SD= 0.91) this moderate score indicates that while sleep disturbances are prevalent within the sample, the responses were slightly more varied and spread out compared to screen usage behaviour.

4.4 Correlation Analysis

Table 4.5: Correlation Matrix

Variable	Screen time addiction	Sleep Displacement	Sleep Disorders
Screen time addiction			
Pearson correlation sig. (2 tailed) N	1 150	.54** .000 150	.48** .000 150
Sleep Displacement			
Pearson correlation sig. (2 tailed) N	.54** .000 150	1 150	.61** .000 150

Sleep Disorders			
Pearson correlation sig. (2 tailed)	.48** .000	.61** .000	1
N	150	150	150

• Correlation is significant at the 0.01 level (2- tailed).

It indicates the Pearson 2- tailed correlation analysis fully supported all three hypotheses, that screen time addiction, sleep displacement, and sleep disorders are significantly and positively interrelated. Specifically, a strong positive relationship was found between screen time addiction and sleep displacement (r= .54, p < .001), meaning higher addiction levels are associated with increased sleep displacement. Additionally, screen time addiction showed a moderate-to- strong positive correlation with sleep disorders (r= .48, p < .001), indicating that greater dependency on screens relates to more severe or frequent sleep issues. Notably, the strongest linear association emerged between sleep displacement and sleep disorders (r= .61, p < .001), establishing that delaying bedtime routines is heavily linked to elevated sleep disorders.

4.5 Regression Analysis

Table 4.6: Model Summary

Model	R	R^2	Adjusted R^2	Std. Error of the Estimate
1	.64	.41	.40	2.71

>1. Predictors: (Constant), Sleep displacement, Screen Time Addiction.
2. Dependent Variable: Sleep Disorders.
3. N= 150.

In table 4.6, it is demonstrated a multiple linear regression analysis was conducted to evaluate how well screen time addiction and sleep displacement predict the severity of sleep disorders among nursing students. The results of the model fits statistics indicated a strong overall correlation between the combined independent variables and the dependent variable, with a multiple correlation coefficient (R) of .64. The coefficient of determination (R^2= .41) revealed that the regression model accounts for 41% of the total variance in sleep disorders. This indicates that nearly half of the variability in the participants' sleep disorders scores can be explained by their reported levels of screen time addiction and sleep displacement. When adjusting for the number of predictors in the model, the adjusted R^2 remained robust at .40, indicating that the model generalizes well and the Standard Error of the Estimate was found to be 2.71.

Table 4.7 Regression Coefficients

Model	Unstandardized Coefficients B SD Error	Standardised Coefficients Beta (ß)	T	Sig (p)
1 (Constant)	.000 -	-	.0000	1.000
Screen Time Addiction	.213 .076	.213	2.810	.006
Sleep Displacement	.495 .076	.495	6.546	< .001

Dependent Variable: Sleep Disorders

Table 4.7 demonstrates that both sleep displacement and screen time addiction serves as distinct, significant predictors of sleep disorders, though their overall impact varies greatly. Sleep displacement defined as a routine delaying of bedtime—emerged as the most powerful predictor, showing a strong, highly significant positive relationship with sleep issues (ß= .50, t= 6.55, $p < .001$). This indicates that as individuals increasingly postpone their sleep, the severity or frequency of their sleep disorders rises substantially.

4.6 Mediation Analysis

Table 4.8: Mediator model (Outcome: Sleep Displacement; Predictor: Screen Time Addiction)

Terms	Coefficient (b)	SE	t	p	95% CI LL	95% CI UL
Constant	.000		.000	1.000		
Screen Time Addiction	.480	.072	6.656	< .001	.337	.623

Table 4.8 reveals that screen time addiction significantly and positively predicts sleep disorders (b= .480, SE= .072, t= 6.656, $p < .001$). This indicates that higher levels of screen time addiction are strongly associated with increased sleep disorders, with the true effect likely falling within the 95% confidence interval of .337 to .623.

Table 4.9: Outcome model (Outcome: Sleep Disorders; Predictors: Screen Time Addiction and Sleep Displacement)

Term	Coefficient (b)	SE	t	p	95% CI LL	95% CI UL
Constant	. 000		.000	1.000		
Screen Time Addiction (direct effect, c')	.213	.076	2.810	.006	.064	.362
Sleep Displacement	.495	.076	6.546	<.001	.346	.644

Table 4.9 presents the results of the final outcome model evaluating the simultaneous effects of screen time addiction and sleep displacement on sleep disorders. When adjusting for both predictors, screen time addiction remains a significant positive predictor of sleep disorders (B= .213, SE= .076, t= 2.810, p= .006), with its true effect size lying between the 95% confidence intervals of .064 and .362. Concurrently, sleep displacement is revealed to be the stronger predictor in the model, demonstrating a highly significant positive relationship with sleep disorders (B= .495, SE= .076, t= 6.546, p < .001, 95% CI [.346, .644]. Together, these variables account for a robust portion of variance in the model (with an adjusted R^2= .40), confirming that while digital screen dependency directly increases sleep issues, the structural displacement of actual bedtime plays an even more aggressive role in accelerating the severity of the sleep disorders.

TTable4.10: Direct and Indirect effects (PROCESS Model 4)

Effect Type	Path	Effect	SE/ Boot SE	T	p	95% CI LL	95% CI UL

Direct effect	c'(Screen Time Addiction – Sleep Disorders	.213	.076	2.810	.006	.064	.362
Indirect effect (bootstrap, 5000)	a×b(Screen Time Addiction – Sleep Displacement –Sleep Disorders)	.238	.051		< .001	.138	.338

Table 4.10 reveals a significant direct effect of screen time addiction on sleep disorders (B= .213, SE= .076, t= 2.810, *p*= .006, 95% CI [.064, .362]), demonstrating that higher levels of screen dependency directly correlate with increased severity of sleep disorders, even when controlling for bedtime displacement. Crucially, the indirect effect of screen time addiction on sleep disorders through sleep displacement was found to be statistically significant (B= .238, SE= .051, p < .001, 95% CI [.138, .338]). Because the 95% confidence interval does not contain zero, it confirms that sleep displacement serves as a significant mediating pathway. This indicates that a substantial portion of impact screen time addiction has on worsening sleep disorders operates structurally by causing individuals to postpone and displaced their intended bedtimes.

5.1 Discussion

The primary objective of this study was to explore the relationship between screen time addiction and its subsequent impact on the sleep quality of nursing students, while examining how secondary sleep disorders serve as an intervening link between the two. The qualitative narrative derived from the findings strongly supports the conceptual model, illustrating that excessive and unregulated digital media consumption represents a profound, multi- layered threat to both the biological health and professional readiness of future healthcare providers (Bani-Issa et al., 2023). The core finding of this investigation reveals a powerful link between elevated screen dependency and the degradation of overall rest. This relationship is heavily driven by a widespread behavioural phenomenon known as chronological sleep displacement. Nursing students, continuously balancing rigorous academic course loads with demanding hospital clinical rotations, frequently utilise digital devices late into the night as a form of psychological escapism—often referred to as "revenge bedtime procrastination" (Nauts et al.,2019). When digital connectivity is maintained late into the evening, it indirectly encroaches upon the hours that should be dedicated to rest. However, this behavioural pattern actively disrupts sleep architecture. The narrative of our data indicates that high scores on the Internet Addiction Test (IAT) directly translate to prolonged sleep- onset latency and truncated total sleep duration on the Pittsburgh Sleep Quality Index (PSQI) (Hammad et al., 2024).

Beyond simple time displacement, the discussion must address the hidden physiological and cognitive taxes imposed by late- night screen engagement. The strong regression pathways observed in this study can be illuminated through two well-documented mechanisms: The short-wavelength blue light (380- 495 nm) emitted by smartphone and tablets screen mimics daylight, signalling the suprachiasmatic nucleus in the brain to suppress the endogenous production of melatonin (Wahl et al.,2019). This biochemical delay shifts the biological circadian rhythms out of alignment with the external environment. Engaging with highly stimulating, interactive, or emotionally charged digital content right before bedtime triggers a state of cognitive preoccupation

and sympathetic nervous system activation (Cain& Gradisar2010).

A pivotal finding of this investigation is the confirmation of the indirect pathway via Hyes' PROCESS Model 4. The mediation analysis proved that screen time addiction does not merely degrade sleep quality in a vacuum; it actively fosters a pathological environment that gives rise to clinical sleep disorders, which subsequently decimate overall sleep quality(Hayes2018). Unregulated screen usage act as a breeding ground for sleep pathology, including clinical insomnia, fragmented sleep- week cycles, and parasomnias like screen- induced nightmares or nocturnal waking. The sociodemographic realities of the sample cohort add a critical layer to these findings (Liebig et al.,2026). Nursing students face a unique matrix of stressors, including gruelling shift work, early morning clinical placements, and high- stakes examinations. When screen time is introduced into this high- pressure environment, it compromises the very restorative mechanism—sleep—that buffers against academic burnout and psychological distress. The robust internal consistency of measures (Cronbach's α = 0.842) confirms that this is a stable, reliable pattern within the population (George & Mallery,2003).

Consequently, the results of this study serve as an urgent call for institutional intervention, highlighting the need for digital hygiene literacy and sleep wellness programs integrated directly into health sciences curricula (Canbaz, 2026).

5.2 Conclusion

This proposed design establishes a clear path to quantify the correlation between high screen usage and sleep disturbances among nursing students. Screen time addiction significantly undermines sleep quality, putting both the academic performance of nursing undergraduates and the clinical safety of their patients at risk. Implementing targeted institutional interventions to promote healthier digital habits is essential to protect the physical and cognitive health of tomorrow's healthcare work force. The intersection of excessive device dependency and the intense demand of healthcare training creates a distinct vulnerability for nursing students. The physiological data indicates that late- night blue light exposure suppresses natural melatonin production, including a "Bedtime Screen Penalty" that disrupts circadian rhythms, delays sleep onset, and reduces overall sleep efficiency. For future healthcare professionals, this biological and psychological chain reaction does not just compromise personal health; it directly impacts patient safety. Chronic sleep deprivation and daytime exhaustion degrade critical cognitive functions, including clinical reasoning, rapid decision- making, and sustained attention. In high-stress hospital environments, these deficits can lead to severe clinical oversight, such as medication miscalculations or missed patient symptoms.

5.3 Recommendations

To safeguard student well-being and maintain clinical excellence at the Pace and kedge Institute of Health and Sciences, the following targeted interventions are recommended:

- Integrate digital hygiene education: Introduce structured wellness workshops within the nursing curriculum that focus on screen time management, the science of sleep, and the physiological impact of blue light.
- Implement a "Bedtime Screen boundary": Encourage students to adopt a personal for turning off or putting away electronic devices at least 60 minutes before attempting to sleep to facilitate natural melatonin synthesis and reduce psychological arousal.
- Optimise Clinical Scheduling: Institutional leadership should structure clinical rotation schedules to minimise severe shift- rotations fatigue, avoiding back- to- back night and early morning shifts to give students adequate recovery windows.
- Establish Campus Mental Health Resources: Provide targeted counselling support focusing on stress- induced digital addiction, anxiety, and behavioural difficulties, offering students healthier coping strategies for academic pressure than compulsive device use.

5.4 Implications in Future Research

While this study relies on cross- sectional design to catch a glimpse of student habits, future researchers should transition toward longitudinal designs. Tracking nursing cohorts over multiple academic years and into their professional careers would allow investigators to observe the long-term, compounding trajectory of digital dependency. Crucially, longitudinal data could directly evaluate whether high screen addiction metrics during school act as reliable predictors for objectives clinical errors—such as medication miscalculations or missed patient's symptoms—once these students enter active hospital settings. Moving from self-reported sleep quality to tracking real- world clinical patient safety risks remains a vital next step. The scope of this investigation should expand beyond nursing to encompass other rigorous health care disciplines. Conducting comparative studies among medical residents, pharmacy undergraduates, and emergency medical technicians would reveal whether these digital dependency patterns are an isolated phenomena or a widespread, systematic coping mechanism across all high-stress health care training programmes. By exploring the psychological directionality—whether students turn to screens to cope with existing academic trauma or if the screen addiction itself triggers their anxiety and depression—future researcher can pave the way for holistic, empathetic, and highly effective institutional reforms.

5.5 Limitations of the Study

The cross-sectional design was restraining casual interpretation of the relationship between screen time addiction and sleep disturbances. There are also possibilities of self-report bias and social attraction especially in matters touching on the screen-time estimates. The research was targeted at nursing institute in Islamabad, therefore, the results might be not generalizable across other parts of Pakistan and nursing institute systems. The lack of objective sleep disorders and electronic records of screen time use devices making it impossible to determine some relationship due to the lack of resources, as they may be underestimated or assigned to the wrong category.

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