

Screen Time and University Students' Life: Exploring the Impact of Smartphone Usage on Sleep Quality, Well-Being, Social Behavior, and Academic Performance

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This study investigates the impact of smartphone usage on sleep quality, mental and physical health, academic performance, and social behavior, while also examining how sleep quality affects these factors. This study surveyed 224 university students to test nine hypotheses, using a five-point Likert scale. Data responses were analyzed with SPSS. The findings indicate that excessive smartphone use significantly reduces sleep quality, which in turn negatively affects mental and physical health, academic performance, and social interactions. Poor sleep quality is linked to increased stress, fatigue, and health issues, contributing to lower academic achievement and negative social behaviors. Furthermore, high smartphone usage is associated with decreased face-to-face interactions and social well-being. These results highlight the need for students to practice self-discipline in smartphone usage, as it can have both positive and negative effects. Promoting healthier digital habits and improving sleep quality are essential for enhancing students' well-being and academic success. Universities and policymakers should consider interventions, such as awareness programs and digital detox strategies, to mitigate the adverse effects of excessive smartphone use. Addressing these challenges can help students achieve a better balance between technology use, health, and academic performance.

Keywords: Academic Performance; Mental Health; Physical Health; Sleep Quality; Smartphone Usage; Social Behavior; University Students

INTRODUCTION

The usage of smartphones is frequently connected to positive and negative impacts on a person's daily life. A common habit is using smartphones throughout the house, including in bed at night. However, this behavior can affect sleep quality because of exposure to blue light from smartphone screens and other displays (Huang et al., 2020). The circadian cycle of the organism is greatly influenced by light. The visual system uses changes in light levels to communicate with the internal clock, which helps preserve the normal rhythm of behavioral and physiological activities. Beyond its visual impacts, light also affects cognitive ability and brain function through non-visual pathways. This has something to do with how animals' innate free-running time affects how sensitive and responsive they are to light (Li & Xu, 2024). In this study, smartphone usage is examined as a primary variable influencing both sleep quality and other aspects of well-being, emphasizing the need for balance in its use to mitigate potential negative effects.

Sleep quality acts as a key mediator in this framework, connecting smartphone usage to different aspects of mental and physical health. Research has shown that excessive smartphone use negatively impacts sleep quality, which in turn affects academic performance, mental well-being, and social interactions (Kolhar et al., 2021). Poor sleep quality has also been linked to increased impulsivity and reduced cognitive function, further influencing students' ability to maintain healthy interpersonal relationships and academic success (Douris & Jung., 2023). Additionally, studies indicate that social media use and cyberbullying exacerbate sleep disturbances, leading to heightened psychological distress and reduced work engagement (Kee et al., 2022). The relationship between sleep deprivation and overall health is well-documented, with chronic sleep loss contributing to various physical and mental health conditions. Moreover, interventions promoting reduced smartphone use and healthier sleep habits have demonstrated positive effects on well-being and academic performance (Busch & McCarthy, 2021).

Social behaviors can be significantly influenced by many factors, such as smartphone usage and sleep quality, both of which affect how individuals interact with others and handle social situations. One such factor is the widespread use of social networking sites among university students. While these platforms facilitate social connections, their impact on students' academic performance and overall well-being can vary depending on how they are utilized and their effect on daily routines (Ratan et al., 2021). Furthermore, excessive use of social media platforms can contribute to cyberbullying, as highlighted during the COVID-19 pandemic, where increased online activity was linked to higher instances of such behavior (Kee et al., 2022). Similarly, workplace bullying on social media has been found to negatively impact work engagement, with psychological well-being playing a critical role in mediating this relationship (Anwar et al., 2022a).

Exposure to social media news during the COVID-19 pandemic has been shown to influence employee behavior, with psychological well-being and depression playing mediating roles in this relationship (Anwar et al., 2022b). Social media can also act as a catalyst for open innovation, with implications for innovation performance, particularly among SMEs (Teh & Kee, 2021). Poor sleep can impact the quality and quantity of social relationships, including romantic, family, and work interactions, highlighting the critical role of sleep in maintaining overall health and well-being throughout the lifespan. It can lead to difficulties in communication, reduced emotional closeness, and strained connections, further emphasizing the importance of good sleep for fostering positive and supportive relationships (Gallego-Gómez et al., 2021). By looking at these interactions, the study seeks to determine if controlling smartphone usage and improving sleep quality can promote more socially responsible behavior.

Academic achievement is directly impacted by sleep quality, as irregular, insufficient, or poor sleep can lead to excessive daytime sleepiness and impaired cognitive functioning. Factors such as biological changes, psychosocial pressures, and academic demands often contribute to these sleep issues, particularly during critical periods like exam preparation. Consequently, maintaining good sleep habits is essential for optimizing concentration, memory, and overall academic performance (Suardiaz-Muro et al., 2023). Furthermore, excessive smartphone use before bedtime can significantly disrupt sleep by delaying its onset, suppressing melatonin production, and reducing overall sleep quality, ultimately impairing critical cognitive functions such as focus, memory, and learning ability (Yang et al., 2023). This study emphasizes the dual influence of smartphones, both as potential tools and distractions, while highlighting the essential role of adequate sleep in fostering academic achievement.

Smartphone usage and sleep quality are closely related factors that influence mental health outcomes, often having a significant effect on overall well-being. Furthermore, excessive smartphone use can negatively impact mental, physical, and neurological health, contributing to issues such as anxiety, depression, and stress (Pirdehghan et al., 2021). Excessive smartphone use and poor sleep quality can negatively impact physical health by promoting inactivity, poor posture, and disrupting the body's natural sleep cycle. However, lifestyle factors such as stress, screen time, and sleep disorders often lead to sleep deprivation, which increases the risk of chronic health issues, accidents, reduced quality of life, and higher mortality (Liew & Aung, 2021).

This study aims to examine the direct impact of excessive smartphone use on sleep quality and its subsequent effects on physical health, mental well-being, academic performance, and social behavior among university students. By highlighting the connection between poor sleep and long-term health consequences, the research underscores the importance of adopting healthier digital habits and establishing improved sleep routines. The significance of this study lies in its comprehensive analysis of how sleep quality mediates the relationship between smartphone usage and various health and behavioral outcomes. The novelty of this research stems from its integrated approach, examining not only the direct effects of smartphone use but also the indirect consequences of sleep disturbances on multiple aspects of student life. This study contributes to the growing body of literature by offering practical recommendations for mitigating the adverse effects of excessive smartphone use, promoting healthier sleep patterns, and ultimately enhancing overall well-being among university students.

LITERATURE REVIEW

In today's changing lifestyle, many people, particularly students, use smartphones. These gadgets have developed into essential tools for entertainment, education, and communication, influencing how people engage with the outside world and obtain information. Since smartphones are so widely used, researchers have been looking more closely at the effects of smartphone use on social behavior, mental health, and academic performance. In the context of contemporary student life, this review examines the body of research to comprehend the various impacts of smartphone use, stressing both its advantages and possible disadvantages.

Hypotheses Development

Impact of Smartphone Usage on Sleep Quality

Recent studies emphasize the significant impact of smartphone usage on sleep quality, with a focus on mechanisms such as blue light exposure, behavioral changes, and psychological effects. According to research by Kheirinejad et al. (2023) blue light from smartphones has a negative impact on the production of melatonin, a hormone essential

for sleep. Longer sleep latency and shorter sleep duration can result from melatonin suppression. The prevalence of this problem was highlighted by data from an analysis of Moroccan medical students, which revealed that over 97% of participants used blue-light-emitting devices before bed, and 35% of them reported having trouble sleeping.

Besides that, procrastination before bed, which is frequently caused by engaging smartphone activities like social media or gaming, is another important factor. Sleep duration and quality are decreased as a result of this behavior. A study by [Gallego-Gómez et al. \(2021\)](#), which was conducted in Spain, showed a direct link between problematic smartphone use, procrastinating before bed, and poor sleep quality. Procrastination at bedtime is a crucial target for interventions because the study found that it mediated the association between smartphone use and sleep problems.

Finally, sleep disturbances are also influenced by psychological dependence on smartphones. Constant connectivity and notifications cause anxiety, making it more difficult for people to relax before bed. Research by [Mao et al. \(2022\)](#) has indicated a correlation between smartphone addiction and both daytime fatigue and fragmented sleep. Enhancing pre-sleep digital detox techniques and addressing such dependencies through behavioral adjustments can greatly enhance the quality of sleep.

H1: Smartphone usage negatively impacts the sleep quality of university students.

Smartphone Usage and Mental Health

There are significant concerns about how the growing use of smartphones may affect mental health, especially for university students. Smartphones' widespread use promotes convenience and connectivity, but excessive use of them is becoming more and more linked to negative mental health effects. Recent research has illuminated the difficulties presented by our digital age by examining the complex relationship between smartphone use and problems like social isolation, anxiety, and depression.

A study that was published by [Yang et al. \(2023\)](#) looks at the relationship between problematic smartphone use and mental health issues like social disengagement, anxiety, and depression. This study explores how despite their advantages for social interaction, smartphones can lead to obsessive behaviors like obsessive notification checking and an excessive dependence on virtual interactions. An increase in stress and negative affect is closely linked to these patterns. As part of mental health strategies, the study highlights the significance of controlling screen time and supporting activities that encourage offline engagement and physical well-being.

Furthermore, [Schmickler et al. \(2023\)](#) highlight the link between excessive screen time, emotional dysregulation, and sleep disturbances. Students who use smartphones regularly are more likely to have higher impulsivity, poorer self-regulation, and decreased cognitive control. In addition to harming academic achievement and interpersonal relationships, these factors also contribute to anxiety and depression. In addition, some applications' addictive qualities make compulsive usage worse and make it harder for people to set up appropriate digital boundaries.

Finally, a more comprehensive review examines the connections between problematic smartphone use and emotional and behavioral issues, such as loneliness, insecurity, and low self-esteem based on [Đurić et al. \(2024\)](#). This study emphasizes how critical it is to address the psychological weaknesses that underlie people's propensity for over-reliance on smartphones. Cognitive-behavioral techniques and public health campaigns that encourage digital hygiene may be effective interventions. To combat these negative

effects, it is essential to promote in-person interactions and establish "digital detox" periods.

H2: Smartphone usage negatively affects the mental health of university students.

Physical Health Problems Associated with Smartphone Use

University students' use of smartphones has been connected to a number of physical health problems, as research shows that extended use of smartphones can have a variety of physiological effects. Long-term smartphone use, particularly in uncomfortable positions like excessive neck flexion or bad sitting postures, dramatically raises the risk of musculoskeletal disorders (MSDs), according to [Kolhar et al. \(2021\)](#). The Rapid Upper Limb Assessment (RULA) method was used in the study to classify smartphone-use postures. It was discovered that many of the examined postures were classified as "medium to high risk" and needed to be corrected. In the evening, when smartphone use was at its highest, the risk was especially noticeable, indicating the need for ergonomic interventions to lower MSDs in this population.

In addition, research on patterns of technology dependence has shown that excessive smartphone use among college students leads to a sedentary lifestyle, according to [Huang et al. \(2020\)](#). Physical health risks like obesity, poor cardiovascular fitness, and metabolic problems are made worse by this inactivity. Additionally, unhealthy habits like prolonged sitting and poor eating habits are frequently linked to sedentary smartphone use, and these behaviors together negatively impact physical well-being. Digital eye strain is a common eye-related health issue associated with prolonged smartphone use, as noted by [Ratan et al. \(2021\)](#). University students who spend excessive time in front of screens often experience symptoms such as headaches, dry eyes, and blurred vision. These risks are further exacerbated by the high intensity of screen light and the frequent use of smartphones at night in dimly lit environments. To mitigate these negative effects, it is essential to adopt preventive measures such as taking regular screen breaks and using blue light filters.

H3: Smartphone usage is associated with physical health problems.

Smartphone Usage and Academic Performance

Numerous studies have examined the connection between smartphone use and academic achievement, with results highlighting both the advantages and disadvantages of this relationship. According to [Yang et al. \(2023\)](#), using smartphones excessively frequently causes distractions that cut into the amount of time and concentration available for academic work. Students usually multitask by using their smartphones while studying, which impairs cognitive focus and has a detrimental effect on memory retention. Despite these disadvantages, some students use smartphones to access learning materials, showing that when properly incorporated into study habits, moderate smartphone use can improve academic performance. Plus, the dual function of smartphones as sources of distraction and academic development was examined based on [Schmickler et al. \(2023\)](#).

Social media and entertainment apps frequently lower student productivity, while educational platforms and communication tools encourage teamwork and learning. Additionally, there is a statistical correlation between poorer academic performance and problematic smartphone use, which is characterized by frequent disruptions during study sessions. The study highlighted the significance of raising student awareness about self-regulated usage and suggested structured guidelines for smartphone use to reduce its negative effects.

Finally, a study that used a mediation and moderation analysis showed how smartphones have a complex impact on academic results. According to [Busch and McCarthy \(2021\)](#), students' performance is affected differently depending on whether they use their smartphones for entertainment or academic purposes. These results were strongly impacted by moderating factors like addiction levels and mediating factors like attitudes towards technology. Crucially, using a smartphone for educational purposes was linked to improved performance, whereas using it excessively for non-academic purposes resulted in worse grades. In order to properly utilize the educational benefits of technology, the study emphasizes the significance of developing deliberate smartphone habits and incorporating them into educational programs.

H4: Increased smartphone usage negatively impacts academic performance.

Social Behavior and Smartphone Usage

Recent studies have shown that university students' use of smartphones has a significant impact on their social behaviour, with both positive and negative results. Smartphones make it easier to communicate and access social networks, but they can also increase feelings of social anxiety and loneliness, according to research. According to [Đurić et al. \(2024\)](#), excessive use of social media platforms frequently leads to social comparisons, which lowers life satisfaction and self-esteem. These actions highlight a paradox of hyper-connectedness but decreased emotional intimacy by promoting isolation rather than deep social connections.

Moreover, among university populations, the practice of "phubbing," which is ignoring someone in favour of a smartphone, has been extensively studied. The relationship between smartphone addiction, phubbing behaviour, and fear of missing out (FoMO) was examined by [Talan et al. \(2024\)](#). It was discovered that phubbing damages interpersonal relationships and degrades the quality of face-to-face communication. This behaviour, which not only damages friendships and romantic relationships but also reinforces social withdrawal, is especially common among university students who are lonely.

Finally, students who are addicted to smartphones may have trouble communicating and be less satisfied with social interactions in general, according to [Zhou et al. \(2024\)](#). Over-reliance on smartphones for social connectivity may block the development of emotional intelligence and result in a decrease in face-to-face communication abilities. It is interesting to note that these actions also have an impact on more general social issues, like the use of smartphones in class. The majority of students display maladaptive behaviours, such as avoiding social interaction during group projects, even though some use smartphones for educational purposes.

H5: Higher smartphone usage negatively affects social behavior among university students.

Sleep Quality and Mental Health

University students' mental health depends heavily on the quality of their sleep. According to [Alrashed et al. \(2022\)](#), university students who lack enough sleep have much higher levels of anxiety and depression. Plus, sleep disturbances like trouble falling or staying asleep can make pre-existing mental health conditions worse or even lead to the emergence of brand-new psychological problems ([Kee et al., 2021](#)). It highlights how crucial it is to deal with sleep issues in order to enhance mental well-being and academic achievement. Sleep ambient music is one intervention that has shown promise in easing some of these problems, enhancing sleep quality, and lowering students' symptoms of anxiety and depression. Additionally, a cross-sectional study carried out during the

COVID-19 pandemic discovered a clear link between university students' declining mental health and lack of sleep. Based on [Varma et al. \(2021\)](#), students who experienced sleep disturbances were more likely to report feeling depressed, anxious, and lonely. Likewise, the study showed that extended screen time, which is common practice among students during the pandemic, had a negative impact on sleep quality, leading to mental health problems. The researchers suggested that better sleep can result in better mental health outcomes and highlighted the significance of practicing good sleep hygiene to reduce these effects.

Finally, universities must acknowledge the significance of sleep hygiene and mental health in assisting students, especially in light of the wealth of research on the mutually beneficial connection between sleep and mental health. According to [Alkhawaldeh et al. \(2023\)](#), both mental health and academic performance may be enhanced by offering tools for better sleep habits, counselling services, and a restful environment. Promoting enough sleep may become a key element of comprehensive student support as universities continue to adapt to post-pandemic realities, with the goal of ending the cycle of sleep deprivation and mental health decline.

H6: Poor sleep quality negatively affects the mental health of university students.

Sleep Quality and Physical Health

The demands of social and academic life frequently cause major disruptions to university students' sleep quality. According to [Carpi et al. \(2022\)](#), the Pittsburgh Sleep Quality Index indicates that almost half of university students have poor sleep quality. These students typically report feeling more stressed, exhausted, and performing poorly in the institution. Age, academic discipline (business students are more at risk), self-rated health, and stress levels are some of the factors that affect the quality of sleep.

Furthermore, getting too little sleep during college may damage one's mental and physical health, indicating the need for focused interventions to help this population's sleeping patterns. Moreover, university students' physical health problems are well-documented, with multiple studies showing that sleep deprivation increases the risk of developing chronic illnesses like obesity, cardiovascular disease, and metabolic disorders, which are based on [Schmickler et al. \(2023\)](#). The general health of students may be severely affected by sleep disturbances, which are also associated with decreased immune function and increased levels of fatigue. Additionally, students who have poor sleep quality are more likely to report lower HRQoL (physical health-related quality of life), which includes lower self-perceived health, less energy, and less physical activity. This emphasizes how crucial it is to improve sleep hygiene in order to improve both physical and mental health outcomes.

Finally, the mediating function of smartphone use in the association between physical exercise and sleep quality was the subject of another recent study that was published by [Brautsch et al. \(2023\)](#). It found a strong correlation between poorer sleep quality and excessive smartphone use, especially late at night. According to the study, exercise may also help people sleep better, but this benefit is negated by excessive smartphone use. Therefore, in order to improve sleep and general physical health, the results highlight the necessity of focused interventions that minimize smartphone use before bed and encourage physical activity.

H7: Poor sleep quality is associated with more physical health problems among university students.

Sleep Quality and Academic Performance

University students' academic performance is greatly affected by their sleep quality because numerous studies have shown a direct link between inadequate sleep and diminished cognitive function. A study on the direct effects of sleep patterns on academic performance was carried out among university nursing students and published by [Fernández-Medina et al. \(2020\)](#). The findings showed that poor sleep habits, such as irregular sleep schedules and lack of sleep, were associated with a higher likelihood of poor academic performance for nursing students. These students' inability to stick to a regular study schedule ultimately resulted in poorer academic performance. The study further linked irregular sleep patterns to academic underperformance by emphasizing that students with evening chronotypes who prefer studying or staying up late had the worst academic results.

On top of that, new research highlights the strong link between university students' academic achievement and their sleep quality. According to [Douris and Jung \(2023\)](#), students who regularly slept fewer than six hours a night at the beginning of the semester saw a drop in their GPA by the end of the term. This is consistent with earlier studies showing that getting enough sleep is essential for cognitive processes like memory and learning, which are closely related to academic success.

Finally, a student's academic performance may be affected by sleep problems. A study that was published by [Steffey et al. \(2023\)](#) emphasizes how important sleep timing and consistency are. Academic results are generally better for college students who maintain regular sleep patterns as opposed to those who experience irregular sleep. Poor sleep frequently results in a decrease in a student's capacity for concentration, memorization, and critical thought, all of which are critical for success in classes.

H8: Poor sleep quality negatively impacts academic performance among university students.

Sleep Quality and Social Behavior

University students' social behavior is greatly affected by the quality of their sleep. A lack of sleep can lead to mood swings, irritability, and trouble interacting with others, all of which can affect social relationships. Students at universities frequently have trouble getting enough sleep, which can be made worse by personal struggles, social media use, and academic demands. According to [Yang et al. \(2023\)](#), getting too little sleep is associated with more emotional instability, which makes it harder to function in social situations. These disturbances can cause students to distance themselves from others, which further reduces their wellbeing and social engagement.

Additionally, a study published by [Zhong et al. \(2024\)](#), examined the connection between university students' interpersonal functioning, impulsivity, and sleep quality. Poor sleep quality was found to have a significant impact on impulsivity, which in turn affected students' capacity to maintain stable relationships and participate in constructive social behaviors. The results imply that sleep disturbances lead to impulsive behavior, which prevents students' ability to communicate with others.

Finally, another study examined the effects of mobile phone addiction on university students' mental health and sleep quality, and it was according to [Nakie et al. \(2024\)](#). The findings showed that the association between mobile phone addiction and harmful mental health outcomes like anxiety and depression was mediated by poor sleep quality. Meanwhile, the study discovered that students who felt more supported by other students had better sleep, which reduced the negative impact on their mental health.

H9: Poor sleep quality negatively affects social behavior among university students.

RESEARCH METHOD

This study employs both primary and secondary data to analyze smartphone usage among university students. Primary data is collected through an online survey distributed via Google Forms to students from various universities. The survey examines smartphone usage habits, sleep quality, well-being, social behavior, and academic performance. The online distribution method through social media was chosen for its efficiency in reaching a diverse range of respondents. Utilizing a five-point likert scale, respondents rated their opinions from 1 (strongly disagree) to 5 (strongly agree). A total of 200 responses were gathered and analyzed to identify patterns of smartphone usage and its correlation with various aspects of student life. The collected data was processed and analyzed using Statistical Package for the Social Sciences (SPSS) software, which allowed for statistical analysis, including descriptive statistics, correlation tests, and regression analysis to determine the significance of relationships between variables.

To complement the primary data, this study incorporates secondary sources from academic journals and articles, providing a theoretical foundation and broader context. A key reference is the International Journal of Accounting & Finance in Asia Pacific (IJAFAP), a peer-reviewed, open-access journal that focuses on accounting and finance research within the Asia-Pacific region. Additionally, articles from Frontiers in Psychology and Biomedcentral (BMC) offer scientific insights into the relationship between smartphone usage and sleep quality, mental well-being, and social behavior.

By integrating empirical data with established literature and utilizing SPSS for data processing, this study aims to present a comprehensive, evidence-based analysis of smartphone usage patterns among university students and their broader implications.

RESULTS

Respondents' Demographic Details

Table 1. Demographic Profile (N =224)

Response	Frequency	Percentage (%)
Gender		
Female	116	51.8
Male	108	48.2
Age		
18 - 25 years old	74	33.0
26 - 30 years old	31	13.8
31 - 35 years old	30	13.4
36 - 40 years old	25	11.2
41 - 45 years old	30	13.4
46 - 50 years old	24	10.7
Above 50 years old	10	4.5
Type of University		
Public University	223	99.6
Private University	1	.4
Educational Qualification		
Bachelor's Degree	178	79.5
Master's Degree	27	12.1
PhD	7	3.1
Diploma	5	2.2
Pre-University	7	3

Respondents' demographic data is shown in Table 1, serving as the foundation to visualize the results. The study indicates a balanced gender representation, with 48.2% male (108 respondents) and 51.8% female (116 respondents). The largest group of respondents falls within the 18–25 years old category, comprising 33% (74 responses), followed by the age groups of 26–30 years old (13.8%), 31–35 years old (13.4%), 36–40 years old (11.2%), 41–45 years old (13.4%), 46–50 years old (10.7%), and above 50 years old (4.5%), indicating that young adults make up the majority of the sample, consistent with university demographics. Additionally, 79.5% of respondents hold a bachelor's degree, while 12.1% hold a master's degree, 3.1% hold a PhD, 3.0% are pre-university students, and 2.2% hold a diploma, highlighting that the study primarily focuses on undergraduate students. However, the presence of 7 pre-university students suggests that a small portion of the sample may not yet be fully enrolled in a degree program. Furthermore, 99.6% (223 respondents) are from public universities, while only 0.4% (1 respondent) comes from a private university, suggesting that the study findings predominantly reflect the experiences of students in public higher education institutions. Overall, the demographic data represents a population primarily consisting of undergraduate students attending public universities, aligning with the study's probable focus on university students, particularly those from public institutions.

Statistical Results

Table 2. Summary of Descriptive statistics, Cronbach's Coefficients Alpha, and Zero-Order Correlations for All Study Variables

Variable		1	2	3	4	5	6
1	Smartphone Usage	0.853					
2	Sleep Quality	0.673**	0.946				
3	Social Behavior	0.730**	0.924**	0.919			
4	Academic Performance	0.781**	0.848**	0.902**	0.905		
5	Physical Health	0.698**	0.859**	0.893**	0.894**	0.950	
6	Mental Health	0.643**	0.902**	0.914**	0.887**	0.927**	0.943
Number of Items		223	224	224	224	224	224
Mean		4.0004	3.5283	3.5643	3.6551	3.6310	3.5277
Standard Deviation		.70426	1.16958	1.12316	1.12213	1.14101	1.20013

Note: N = 224; *p < 0.05, **p < 0.01, ***p < 0.001. The diagonal entries represent Cronbach's Coefficient Alpha.

Table 2 presents descriptive statistics, measures of reliability, and zero-order correlations among the study variables. The diagonal values represent Cronbach's Alpha coefficients, which indicate internal consistency and reliability of the measurement scales, ranging from 0.85 to 0.94, suggesting that the research measures are highly reliable. The zero-order correlations show significant relationships among all variables, where smartphone usage has the highest correlation with academic performance ($r = 0.781$, $p < 0.01$) and social behavior ($r = 0.730$, $p < 0.01$), indicating that higher smartphone usage is associated with better academic engagement and social interactions. Similarly, sleep quality is strongly correlated with physical health ($r = 0.859$, $p < 0.01$) and mental health ($r = 0.902$, $p < 0.01$), suggesting that better sleep contributes to improved overall well-being. The mean values range from 3.523 (Sleep Quality) to 4.000 (Smartphone Usage), indicating generally positive ratings among respondents, while standard deviation values between 0.70426 and 1.20013 reflect moderate variability in responses. Overall, these findings confirm the strong reliability of the measurement instruments, highlight significant relationships among key study variables, and provide meaningful insights that align with the study's objectives.

Table 3. Summary of Regression Analysis

Variable		Social Behavior	Academic Performance	Physical Health	Mental Health	Sleep Quality
1	Smartphone Usage	0.051**	0.065**	0.072**	0.066**	0.083**
2	Sleep Quality	0.031**	0.039**	0.043**	0.039**	-
R ²		0.878*	0.800*	0.765*	0.823*	0.453*
F value		790.036	438.898	358.699	510.669	182.742
Durbin-Watson Statistic		1.896	1.592	1.811	1.574	1.304

Note: N = 224, *p < .05, **p < .01, ***p < .001.

Table 3 presents the results of the regression analysis, which examines the impact of smartphone usage and sleep quality on various dependent variables, namely social behavior, academic performance, physical health, mental health, and sleep quality. The findings indicate that the regression model is statistically significant, as evidenced by high R² values ranging from 0.453 to 0.878, suggesting that the model explains a substantial proportion of variance in these outcomes. Specifically, smartphone usage has significant effects across all dependent variables, with the highest beta value observed for sleep quality ($\beta = 0.083$, $p < 0.01$), implying that increased smartphone usage negatively affects sleep patterns. Similarly, sleep quality also significantly predicts all other variables, further emphasizing the crucial role of sleep in overall well-being. Additionally, high F-values confirm the strength of the model across all tested relationships. The Durbin-Watson statistics fall within an acceptable range, indicating no significant autocorrelation issues. Overall, these findings highlight the necessity of addressing smartphone usage habits among students to mitigate its negative impact on their academic performance, mental and physical health, and overall well-being, reinforcing the need for better digital consumption habits to promote a healthier lifestyle.

DISCUSSION

The Impact of Smartphone Usage on Various Aspects of Life

Smartphones' growing popularity has changed how people communicate, learn, and take care of their health. The relationship between smartphone usage and sleep quality shows a correlation coefficient of 0.00673 and a p-value less than 0.01. The dataset also shows a significant negative relationship between smartphone use and sleep quality. This result is consistent with previous research that indicates excessive smartphone use, especially right before bed, which may cause sleep disturbances (Kheirinejad et al., 2023). Screen blue light disrupts the production of melatonin, making it harder for users to fall asleep and lowering the quality of their sleep overall. This disturbance has long-term effects on cognitive function and physical health in addition to its immediate effects on restfulness. Blue light filters and screen-free periods before bed are two tactics that can help lessen these effects.

Besides that, the relationship between social behavior and smartphone usage shows a significant positive correlation of 0.00730 with a p-value of less than 0.01. This suggests that more smartphone use might result in fewer in-person encounters. This finding is in line with a study by Zhou et al. (2024) that discovered a negative correlation between screen time and social interaction quality. The richness of face-to-face interactions is diminished by the dependence on digital communication, which can also result in loneliness and isolation. Even though smartphones make it possible to connect over long distances, maintaining meaningful relationships requires striking a balance between digital and in-person interactions.

Furthermore, the relationship between smartphone usage and academic achievement shows a positive correlation remarkably, which indicates a p-value of less than 0.01 and a positive correlation of 0.00781. This implies that learning experiences can be improved by using smartphones for educational purposes. Students can access information and participate in interactive learning through educational apps, online resources, and collaborative tools. Academic results can be enhanced by properly incorporating smartphones into educational activities based on Wang et al. (2023). To prevent any distractions that might negate these advantages, it is imperative to strike a balance between recreational and educational use.

Moreover, the relationship between smartphone usage and physical health shows a positive correlation of 0.00698 with a p-value less than 0.01. This concerns sedentary behavior linked to extended screen time. According to research, excessive smartphone use is associated with a number of health problems, such as obesity and musculoskeletal disorders (Sirajudeen et al., 2022). These negative effects can be mitigated by encouraging regular physical activity and establishing "tech-free" periods, which will promote a better balance between screen time and physical health.

Additionally, the relationship between smartphone usage and mental health shows a correlation of 0.00643 with a p-value less than 0.01. This indicates that excessive smartphone use may have a negative impact on mental health. As Anwar et al. (2022b) pointed out, excessive smartphone use has been associated with higher levels of anxiety and depression, especially in teenagers. Continuous connectivity increases stress and feelings of lacking by creating a sense of duty to reply to messages and notifications right away. Some of these mental health issues can be lessened by promoting thoughtful smartphone use, such as establishing limits on social media use.

Overall, academic performance, mental health, and social behavior all have strong correlations which indicate a close relationship between these variables. According to Agnafors et al. (2021), better social interactions can improve mental health, which in turn has a positive impact on academic performance. This interdependence highlights how crucial it is to create positive social environments so that people can flourish emotionally and academically. Societies can maximize the positive aspects of smartphones while reducing their negative effects by tackling the underlying causes of social isolation and promoting holistic well-being.

The Impact of Sleep Quality on Various Aspects of Life

Sleep quality has a significant impact on numerous aspects of life, such as social behavior, academic achievement, physical health, and mental health. According to the research, the relationship between sleep quality and social behavior implies that relationships and social interactions may be hampered by irritability and mood swings brought on by lack of sleep. People who fail to get enough sleep have higher emotional reactivity and poorer social functioning, according to Yang et al. (2023). This can set off a vicious cycle in which social disengagement brought on by inadequate sleep causes feelings of isolation and loneliness. Besides that, the relationship between sleep quality and academic achievement implies that better academic results are linked to higher-quality sleep. A study by Medikonda (2023) claims that students who report getting better sleep do better academically and show greater interest in their studies. Academic success depends on cognitive functions like memory consolidation and learning, both of which depend on sleep (Douris & Jung, 2023). On the other hand, inadequate sleep degrades cognitive function and attention, which lowers academic achievement. To improve students' learning experiences, educational institutions should promote behaviors that promote healthy sleep hygiene.

Furthermore, the significant influence of sleep on general well-being is demonstrated by the correlation between physical health and sleep quality ($r = 0.00859$, $p < 0.01$). Chronic conditions like obesity, diabetes and cardiovascular diseases are associated with poor sleep (Schmickler et al., 2023). Sleep aids in the body's healing processes and insufficient sleep can raise inflammation, which interferes with immunological function and upsets hormonal balance (Kelley & Hartman, 2020). These risks can be reduced by raising awareness of the negative effects sleep deprivation has on one's health and by promoting lifestyle modifications.

Moreover, sleep quality and mental health are significantly positively correlated, according to the dataset ($r = 0.00902$, $p < 0.01$). Higher levels of anxiety and depression are frequently linked to poor sleep quality. A study by Carpi et al. (2022) highlights how lack of sleep can worsen mental health conditions and cause mood swings. Additionally, a meta-analysis by Alrashed et al. (2022) highlighted the reciprocal relationship between sleep and mental health by revealing that insufficient sleep is a risk factor for the development of anxiety and depressive disorders. Making sleep a priority can both prevent mental health issues from getting worse and support other therapeutic approaches.

Overall, a high level of interconnectedness can be seen in the relationships among social behavior, physical health, mental health, academic performance, and sleep quality. For example, inadequate sleep can harm mental health, which impacts social interactions and academic achievement. In the same way, physical health problems brought on by insufficient sleep can worsen mental health issues, which result in a vicious cycle. Improving one aspect of sleep's effects can have a domino effect on other areas. For instance, getting better sleep can improve physical health, lower stress levels, and improve cognitive function, all of which eventually result in more satisfying social relationships and academic success. People can adopt holistic approaches to enhance their general well-being by acknowledging and addressing these interconnected variables.

CONCLUSION

In conclusion, this study provides an in-depth analysis of the complex and interconnected effects of smartphone usage on various dimensions of university students' lives. The research findings emphasize the significant impact of excessive smartphone use, particularly in its association with negative outcomes in sleep quality, mental and physical health, academic performance, and social behavior. The central role of sleep quality is particularly noteworthy, as it serves as a mediator linking smartphone usage to these adverse effects. Poor sleep quality, exacerbated by excessive screen time and problematic smartphone habits, emerges as a critical factor affecting not only students' well-being but also their cognitive functioning, emotional regulation, and interpersonal relationships.

This study underscores the dual nature of smartphones as indispensable tools for learning, communication, and entertainment, while simultaneously acting as potential sources of distraction and harm when used excessively or without regulation. To address these challenges, the research advocates for fostering healthier digital habits among university students, including the implementation of pre-sleep digital detox strategies, promoting awareness of the benefits of digital hygiene, and encouraging a balanced and mindful approach to smartphone usage. Additionally, it highlights the need for universities and educational institutions to play a proactive role in mitigating the negative effects of smartphone overuse by providing targeted support systems. These may include workshops on sleep hygiene, counseling services tailored to address digital

addiction, and awareness campaigns about the importance of ergonomic practices and balanced digital habits.

Overall, this study not only advances the understanding of the relationship between smartphone usage and students' holistic well-being but also provides actionable insights for individuals and institutions seeking to harness the benefits of digital technology while minimizing its potential harms. By adopting a strategic and mindful approach to smartphone usage, students and institutions alike can create a healthier balance between the digital and real-world aspects of life, ultimately fostering a more supportive and productive academic environment.

LIMITATION

This study has several limitations that should be considered. First, the reliance on self-reported data from an online survey introduces potential biases, such as social desirability and subjective recall inaccuracies. Incorporating qualitative methods like interviews or focus groups could provide deeper insights into the underlying behaviors and perceptions. Second, the sample primarily consists of university students, which limits the generalizability of the findings to other populations. Future studies could include participants from diverse demographic backgrounds to broaden the scope.

Additionally, the study focuses on the immediate impacts of smartphone usage without examining long-term effects, which may provide a more comprehensive understanding of its influence. The geographical focus on a specific region further limits the applicability of findings across cultural contexts. Lastly, while the study identifies key variables such as sleep quality and mental health, it does not account for other potential mediators like lifestyle habits or environmental factors. Addressing these limitations in future research could yield a more nuanced and holistic understanding of the relationship between smartphone usage and overall well-being.

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