SCREEN TIME AND SLEEP QUALITY AND STRESS: AN EXAMINATION OF THE EFFECTS OF SMARTPHONE USE ON FEMALE UNIVERSITY STUDENTS OF LAHORE

Hina Malik[1], Saima Iqbal[*2], Mehwish Batool[3]

[1]Lecturer Mass Communication, Queen Mary Graduate College, Lahore and PhD scholar, Lahore College for Women University, Lahore; [*2]Lecturer Mass Communication, Queen Mary Graduate College, Lahore and PhD scholar, Lahore College for Women University, Lahore; [3]Lecturer Mass Communication - Forman Christian College (A Chartered University) PhD. scholar - University of the Punjab

[1]rangehina95@gmail.com; [*2]pusaima5@gmail.com; [3]mehwishbatool@fccollege.edu.pk
Corresponding Author: *

ABSTRACT

The evolution proliferation of smartphones, driven by technological advancements that enhance accessibility and affordability, has resulted in their widespread adoption. Simultaneously, the escalating concern of smartphone addiction, often referred to as "smartphone overuse," has become a notable issue affecting individuals across diverse demographics. This study investigates the relationship between smartphone addiction, sleep quality, and stress, employing dependency theory as a conceptual framework. A survey was conducted among 650 university students in Lahore to comprehensively examine this issue comprehensively. The findings of the study highlight a discernible positive correlation between smartphone dependence and sleep quality. Additionally, the results also suggest that individuals heavily reliant on smartphones may cause experience sleep-related challenges and heightened stress levels.

INTRODUCTION

The omnipresence of smartphones has undergone a profound transformation in the daily lives and routines of Pakistani students. Despite serving as essential tools for academics, social interactions, and entertainment, growing apprehensions surround their potential adverse effects on sleep quality and stress levels. With smartphones granting unbridled access to a diverse array of applications and ensuring constant connectivity, the conventional boundaries between study and leisure becomes increasingly blurred. This potential disruption to established boundaries is suspected to have detrimental consequences on sleep patterns, potentially amplifying existing stress levels among students. Excessive smartphone usage, a key component of addiction, negatively affects users' daily lives, leading to distractions, reduced focus on important tasks, decreased productivity, and compromised time management (Alkhateeb et al., 2020). They further highlight the adverse effects of smartphone overuse, including memory and concentration problems, physical abnormalities, changes in eating behavior, and sleep disturbances.

Concerns about smartphone addiction have risen sharply, with terms such as "smartphone overuse," "mobile phone addiction," and "problematic mobile use" being used interchangeably to describe this phenomenon (Alotaibi et al., 2022). They have categorized smartphone addiction as a behavioral addiction, signifying its growing impact on individuals across various demographics. The link between smartphone addiction and internet addiction is noteworthy, as both share common symptoms and negative impacts. Described as a behavioral or internet addiction, smartphone addiction exhibits characteristics such as salience, tolerance, mood swings, conflict, withdrawal, problems, and relapse—similar to chemical addiction (Cha & Seo, 2018). Smartphones, widely embraced by young adults, have witnessed exponential growth in usage globally. A study by Cohen (Rathakrihnan et al., 2021) reported that 50%

of youth perceive themselves as addicted to smartphones, and 59% of adults acknowledge a strong attraction among their children. The proliferation of smartphones, driven by technological advancements, has made them more accessible, with over 4.78 billion users in 2020, expected to rise to 7.516 billion by 2026 (Li et al., 2020).

The prevalence of smartphone addiction has reached epidemic proportions, impacting individuals across various age groups and ethnicities. (Khalily et al., 2020). Notably, mobile phone awareness programs have shown positive effects on teenagers, emphasizing the need for targeted interventions, the added. Smartphone addiction, categorized as a behavioral addiction (Alotaibi et al., 2022), has reached alarming levels, affecting diverse demographics.This addiction is considered a precursor to internet addiction, sharing common symptoms and negative consequences (Cha & Seo, 2018). However, the consequences of smartphone addiction extend to sleep quality, defined as the overall satisfaction and effectiveness of sleep experiences. Wang and Éva Bíró (2021) and Kline (Nelson et al., 2021) offer definitions of sleep quality, encompassing satisfaction with sleep initiation, maintenance, quantity, and refreshment upon awakening. Despite smartphones' integral role in daily life, their excessive use negatively impacts sleep quality. The blue light emitted disrupts sleep patterns, leading to difficulties falling and staying asleep. Globally, 27% of individuals suffer from sleep problems, a concern underscored by the World Health Organization (WHO) (Wang, 2018). Smartphones, indispensable for work and socializing, contribute to anxiety when absent, affecting sleep patterns(Febrina et al., 2022).

Excessive smartphone usage, leading to addiction, significantly heightens stress among female university students. The constant need to check notifications and engage with social media becomes overwhelming, impacting overall well-being and quality of life. Furthermore, stress, inversely related to sleep, presents a complex challenge. Dewe et al (2012) define stress as psychological, physiological, and behavioral reactions to perceived imbalances between demands and willingness to meet expectations. Stress, identified by the Mental Health Foundation as a natural response to challenging situations, gradually increases over time, impacting mental and physical health (Manosso et al., 2022). The American Institute of Stress (2017) emphasizes the perception of demands exceeding personal and social resources as the basis for stress, with coping abilities influencing stress levels (Shyan & Arshat, 2019).

Rationale of the Study

In recent years, smartphone addiction, particularly among the youth, has become a significant concern worldwide. Surveys indicate a widespread acknowledgment by parents, with 59% in the United States and 61% in Japan expressing concerns about their children's smartphone addiction (Loleska & Pop-Jordanova, 2021). In Pakistan, gender disparities in smartphone addiction have been observed, with 57.3% of males exhibiting high addiction compared to females (Khalily et al., 2022). The smartphone addiction extend beyond mere device dependence, influencing both physical and mental well-being, notably disrupting sleep quality and elevating stress levels. Studies in Pakistan's Khyber Pakhtunkhwa province revealed that 56% of female medical students experienced disturbed sleep due to excessive cell phone use (Aman et al., 2015). Additionally, in Karachi, 51.5% of medical students were reported as addicted to smartphones, highlighting a positive correlation between smartphone addiction and compromised sleep quality (Mansoor et al., 2020). The Pew Research Center's recent data underscores this dependence, with 46% of smartphone owners in the USA expressing an inability to live without their devices (Samaha & Hawi, 2016). The prevalence of smartphones and social media applications is evident, with approximately 66% of the world's population owning smartphones and 53% engaging with popular applications like WhatsApp, Facebook, and Instagram (Marino et al., 2021). Moreover, in the academic field, smartphones play a pivotal role, with a significant portion of university students relying on them for social, entertainment, and educational purposes. A study by Kibona and Mgaya revealed that 65% of students use smartphones for social networking, while 20% utilize them for educational purposes, collectively highlighting the pervasiveness of smartphone usage and the potential for addiction (Singh & Samah, 2018). The choice of smartphones as a research medium is grounded in their prevalence and influence, providing an apt platform to study the dynamics of smartphone addiction among university students.

Statement of Problem:

Smartphones offer diverse functionalities that seamlessly integrate into various aspects of our routines (Tariq & Bin Irfan, 2019). Globally, approximately 5.22 billion people, constituting 66.6% of the world's population, use smartphones, with a notable 1.8% surge in users during the COVID-19 era (Kalal et al., 2023). However, the widespread use of smartphones has given rise to concerns about addiction and its association with adverse health outcomes, including compromised sleep quality and stress levels. This concern is particularly pertinent for female university students who navigate significant academic and social pressures.

The detrimental impact of smartphone addiction on sleep quality is evident through mechanisms such as the suppression of melatonin, a crucial hormone regulating sleep-wake cycles. Exposure to the blue light emitted by smartphones disrupts sleep patterns, potentially leading to sleep deprivation. A UK population survey found a substantial correlation between smartphone addiction and poor sleep quality, with 68.7% of smartphone addicts reporting compromised sleep (Lane et al., 2021). Prolonged smartphone use has been linked to physical health issues, including headaches and muscle tension, as well as mental health challenges such as heightened stress. A study in Saudi Arabia highlighted the prevalence of physical discomfort, with 57.8% reporting eye pain and significant impacts on cognitive functions, concentration, creativity, and problem-solving abilities (Alotaibi et al., 2022).

In the context of Pakistan, this issue assumes significance, warranting further investigation. The present study seeks to explore the prevalence of smartphone addiction and discuss the relationship between smartphone addiction, sleep quality, and stress among female university students. This research will contribute to the current understanding of the impact of smartphone usage on student well-being and inform strategies for mitigating potential negative effects.

Literature Review

Several recent studies have investigated the concerning link between smartphone addiction and sleep quality among university students, highlighting the detrimental effects on sleep patterns. Sei Yon Sohn et al. (2021) conducted a study in the UK, revealing a surprising finding that 68.7% of individuals without smartphone addiction experienced poor sleep compared to 61.6% of smartphone addicts. This suggests that other factors may also influence sleep quality (Sei Yon Sohn et al., 2021). However, the study still emphasizes that nearly 40% of young adults with smartphone addiction faced challenges impacting their sleep (Sei Yon Sohn et al., 2021). Mohamed and Moustafa (2021) conducted a study at Suez Canal University, focusing specifically on medical students. Their findings painted a concerning picture, with 74.7% of students acknowledging smartphone addiction and experiencing significantly poorer sleep quality compared to their non-addicted counterparts (Mohamed & Moustafa, 2021).

Similarly, Ozcan and Acimis (2021) investigated the issue at Pamukkale University, finding that over half of the students (52.4%) frequently experienced poor sleep, with a prevalence of smartphone addiction of 34.6% (Ozcan & Acimis, 2021). They established a clear link, as students with smartphone addiction were significantly more likely to report poor sleep quality. Chatterjee and Kar (2021) focused on medical students in North India, revealing a gender disparity in smartphone addiction, with a higher prevalence among males (46.15%) compared to females (33.33%). However, regardless of gender, over 63% of the students reported poor sleep quality. This study uniquely employed the General Health Questionnaire (GHQ) to assess overall well-being, highlighting the multifaceted impact of smartphone addiction, as it not only affects sleep but potentially other aspects of health (Chatterjee & Kar, 2021).

While Sei Yon Sohn et al. (2021) noted a lower prevalence of poor sleep among smartphone addicts compared to non-addicts, further research is needed to explore this seemingly contradictory finding. Ghosh et al. (2021) investigated this issue in urban nursing students in West Bengal, India. They found that nearly half (45%) of the participants exhibited smartphone addiction, as assessed by the Smartphone Addiction Scale (SAS), and a significant majority (82.42%) experienced poor sleep quality based on the Pittsburgh Sleep Quality Index (PSQI). The study also identified associations between age and smartphone addiction, as well as between daily calls and sleep quality, highlighting potential influencing factors (Ghosh et al., 2021).

Similarly, Zhang and Wu (2020) examined the relationship between smartphone addiction and sleep quality among 427 Chinese undergraduate students. Their findings indicated that approximately 33% of participants reported poor subjective sleep quality. Notably, the study revealed a positive correlation between smartphone addiction and delayed bedtime, suggesting that both factors contribute to unsatisfactory sleep quality, they added. Additionally, they found that self-regulation played a significant role, with higher self-regulation being associated with better sleep quality. Expanding on the link between smartphone use, sleep quality, and health behaviors, Haripriya et al. (2019) conducted research among 113 health science students in Mangaluru, India. Their investigation explored the relationship between smartphone addiction, sleep quality, and physical activity. The study identified a moderate positive correlation between smartphone addiction and sleep quality, suggesting a possible indirect association requiring further exploration, they added. Furthermore, they discovered a moderate negative correlation between smartphone addiction and physical activity, highlighting potential trade-offs in how individuals spend their time. The studies by (Kumar et al. 2019; Nowreen & Ahad, 2018; Ibrahim et al., 2018; Kwon & Paek, 2018; Kurugodiyavar et al., 2017; Soni et al., 2017) conducted studies in India, Saudi Arabia and Korea found that over 41% of males and 58% of females were highly addicted to smartphones. Their research also showed that nearly half (48.3%) of respondents experienced poor sleep quality associated with smartphone addiction.

Sahin et al. (2013) conducted a similar study with 576 university students in Turkey. Utilizing the Problematic Mobile Phone Use Scale and the Pittsburgh Sleep Quality Index, they found a positive correlation between smartphone addiction and poorer sleep quality. The study further identified socio-economic factors and earlier phone ownership as contributing to increased smartphone addiction, suggesting potential risk factors to consider (Sahin et al., 2013). Expanding on the broader implications, Samaha and Hawi (2016) explored the association between smartphone addiction, stress, and various aspects of well-being among 300 university students. Additionally, the study revealed a mediated negative correlation between smartphone addiction and life satisfaction, suggesting a potential indirect effect on overall well-being, they added.

Objectives of the Study

In light of the escalating concerns surrounding smartphone addiction and its potential impact on the well-being of female university students, this study aims to delve into the prevalence of smartphone addiction and its associations with sleep quality and stress. The following objectives will guide our investigation:

- To explore the prevalence of smartphone addiction among female university students.
- To investigate the relationship between smartphone addiction and sleep quality among female university students.
- To explore the link between smartphone addiction and stress among female university students.

Hypothesis

H1: There is a positive correlation between smartphone addiction and sleep quality among female university students.

H2: There is a positive correlation between smartphone addiction and stress levels among female university students.

Theoretical Framework

The Media Dependency Theory, which originated from the Users and Gratification Theory, provides a comprehensive perspective for understanding the relationships among mass media, audiences, and social systems (Ball-Rokeach & DeFleur, 1976). This theory, evolving during a transformative period in communication studies, transitioned from a strong media effects model to a limited effects model. At its core, the Media Dependency Theory systematically explores how mass media influences individuals and their interactions within social contexts. It posits that individuals and societies develop a dependency on media to fulfill various needs, including information, entertainment, and social interaction. In the context of this study, the theory serves as a foundational framework for investigating how smartphone addiction impacts sleep quality and stress levels among female university students in Pakistan (Ball-Rokeach & DeFleur, 1976).

This theoretical framework enables an exploration of the dependency on smartphones for information, social interaction, and entertainment, highlighting the dynamics between media usage, individual well-being, and societal factors. Emphasizing the reliance of individuals on mass

media to fulfill specific needs, the theory investigates that the extent of this dependency shapes the impact of media messages on attitudes, beliefs, and behaviors (Ball-Rokeach & DeFleur, 1976). Applied to the study of smartphone usage among female students in Pakistan, the Media Dependency Theory provides a structured framework to analyze how dependence on smartphones for various purposes may contribute to altered sleep patterns and increased stress levels. This framework is crucial for guiding the study toward a comprehensive exploration of the relationship between smartphone use, sleep quality, and stress among female students in Pakistan (Ball-Rokeach & DeFleur, 1976).

Research Methodology

This study employed a descriptive research design specifically utilizing a survey method to investigate the impact of smartphone addiction on sleep quality and stress among female university students in Lahore, Pakistan. A sample of 650 female university students of Lahore (Lahore College for Women University, Kinnard College for Women University, and Punjab University) were recruited through convenience sampling technique. Inclusion criteria stipulated:

- Being female university students
- Aged between 18 and 30 years old
- Identified as heavy smartphone users
- The data was collected through a self-administered questionnaire distributed via Google Forms. The questionnaire comprised three sections: Demographic Information: Age,

gender, and educational qualification, Smartphone Addiction: Measured using the Smartphone Addiction Scale-Short Version (SAS-SV), Sleep Quality and Stress: Measured using the Sleep Quality Scale (SQS) and the Perceived Stress Scale (PSS) respectively. A pilot study was conducted with 100 participants to evaluate the effectiveness of the questionnaire and data collection procedures.

Instrument

A survey questionnaire incorporating the Smartphone Addiction Scale-Short Version (SAS-SV), Sleep Quality Scale, and Perceived Stress Scale was employed. We utilized the SAS-SV to assess women's smartphone addiction risk, as introduced by Kwon et al. (2013b). The scale was adapted by Lopez-Fernandez in 2017. A 6-point scale ranging from 1 (strongly disagree) to 6 (strongly agree) (Kwon et al., 2013b) was used to collect responses. The initial SAS-SV displayed internal consistency with a Cronbach's alpha of 0.91, as reported by Lopez-Fernandez in 2015 and .832 in this study which indicate that the scale is highly reliable.

Reliability and Validity

Reliability, examined through Cronbach's Alpha, ensured the stability of measurement instruments, while validity, both external and internal, verified the accuracy and appropriateness of the study's design, methods, and measurements. The table presents an overview.

Table:1 Pilot Study

Pilot Study 1 (N=100)			Study 2 (N=650)		
Construct	N of items	Cronbach's Alpha Value	No of Items	Cronbach's Alpha Value	
Smartphone Addiction Scale	10	.889	10	.928	
Sleep Quality	28	.873	28	.943	
Stress	10	.793	10	.832	

Almost 48.6 % were between 18-22, aged between 22-26 were 33.8% and 27-30 were almost 16.2% while 50.2% were Graduate, 25.5 % Masters, 20 MPhil and 4% were PhDs or others. However, mostly users (57.7%) were heavy mobile users who consume 5-6 hours a day on mobile, almost 30% use mobile more than 6 hours, almost 7.5% use mobile between 1-3 hours a day while 4.8 % use mobile less than an hour a day.

The findings from demographics of participants reveal that the largest cohort falls within the 18-22 age bracket and has attained graduation. Moreover, the data indicates that a significant portion of participants dedicates an average of 4-6 hours daily to smartphone usage, with the highest proportion utilizing their smartphones primarily for

Table 2: Descriptive interpretation of Pearson Correlation test

Variables	1	2	3
Smartphone Addiction	-	.678**	.685**
Sleep Quality	-	-	.599**
Stress	-	-	-

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

Note: A positive and highly significant Pearson Correlation was observed between smartphone addiction and sleep quality (r = .685**), indicating a substantial and positive association between the two variables while the relationship between smartphone addiction and stress is positive and statistically highly significant (r = .599**). However, H1, there is correlation between smartphone addiction and sleep quality is accepted.

Regression Analysis

To investigate that there is correlation between smartphone addiction and stress, the researcher has applied Regression Analysis. The following table presents an overview of Regression Analysis.

entertainment purposes. However, the analysis show that the majority of respondents (41) use their smartphones for entertainment purposes, 36.9% of respondents use their smartphones for social networking sites and messaging while 5.9% respondents use a smartphone for web browsing and 16.2% respondents use for other purposes.

Analysis and Discussion
Pearson Correlation

To investigate that there is a correlation between Smartphone Addiction and Sleep Quality, the researchers have applied Pearson Correlation Test. The following table shows the summary Pearson Correlation test.

Table3: *Correlation between smartphone addiction and stress.*

Predictors	R^2	ΔR	B
Step 1 Smartphone Addiction	.356	.375	-
Sleep Quality	-	-	.675
Step 2 Smartphone Addiction	.286	.293	-
Stress	-	-	.538

*P<.01. **P<.05

Note: The above table illustrates that the outcomes from step. 1 reveal a positive and highly significant correlation between smartphone addiction and sleep quality. This signifies that smartphone addiction serves as a positive predictor of sleep quality, thereby confirming the acceptance of hypothesis H1. Similarly, the results from step 2 demonstrate a positive and highly significant association between smartphone addiction and stress, establishing smartphone addiction as a positive predictor of stress. Consequently, hypothesis H2 is affirmed based on these findings.

Discussion

The results align with previous research highlighting the concerning prevalence of smartphone addiction among young adults (Kwon &

Paek, 2018; Nowreen & Ahad, 2018; Soni et al., 2017). The present study found that a significant portion of the female university students exhibited signs of smartphone addiction, corroborating growing concerns regarding excessive smartphone use. The study employed Pearson's correlation and regression analyses, revealing a significant positive correlation between smartphone addiction, sleep quality, and stress levels. This finding is consistent with prior research demonstrating an association between excessive smartphone use and both sleep quality and stress levels (Kumar et al., 2019; Lei et al., 2020; Sahin et al., 2013). Furthermore, regression analysis confirmed that smartphone addiction emerged as a positive predictor of poor sleep quality and increased stress levels. These findings support previous studies suggesting a causal link between smartphone dependence and negative health consequences (Gligor & Mozoș, 2019; Mohammed Beigi et al., 2016). A study by (Ohayon et al., 2017) stated that mobile phone usage lead to sleep disturbances. Additionally, engaging with stimulating content on smartphones before bedtime can increase arousal and make it difficult to fall asleep (Yen et al., 2017). Moreover, the constant pressure to stay connected and the fear of missing out (FOMO) associated with smartphone use can contribute to stress and anxiety (Przybylski et al., 2013).

While Balan et al. (2021) indicate that individuals with higher levels of smartphone addiction tend to experience poorer sleep quality. Dependency on smartphones create difficulties in sleep because of blue light emitted from smartphone screens can suppress melatonin production which cause negative health effects (Özgün et al., 2021). Engaging with stimulating content on smartphones before bed (e.g., social media, games) can **heighten alertness and make it harder to fall asleep** (Yen et al., 2017) which contributes to **anxiety and stress.** The consequences of poor sleep quality related to smartphone addiction extend beyond immediate sleep difficulties. Poor sleep can lead to **impaired cognitive function**, including **reduced attention, memory, and learning ability**. This can significantly impact academic performance and daily productivity among university students. The results of present study (hypothesis 2) are aligned with previous research (Samaha & Hawi, 2016), this study revealed a **positive and statistically significant correlation** between smartphone addiction and stress levels among female university students. This indicates that individuals with higher levels of smartphone addiction tend to experience greater stress.

Conclusion

The study investigated the impact of smartphone addiction on sleep quality and stress among female university students, employing the quantitative research method (survey). The close-ended questionnaire served as the primary tool for evaluation. The research's findings have demonstrated a significant positive correlation between smartphone addiction and sleep quality, coupled with a moderately positive correlation between smartphone addiction and stress. Notably, female university students emerged as extensive smartphone users, with the majority dedicating 4-6 hours daily to entertainment and Social Networking Sites, revealing a pronounced addiction to smartphones. The study identified a dependency on smartphones for diverse activities, including social media engagement, web surfing, academic tasks, and entertainment, resulting in disrupted sleep patterns and heightened stress levels.

Limitations and Future Agenda of the Study:

The focus solely on female university students restricts the generalizability of findings to male respondents, potentially limiting the comprehensive understanding of smartphone addiction, sleep quality, and stress within the broader university population. The exclusion of male university students from the research scope means that the insights gained may not be applicable or representative of potential gender-specific variations in smartphone usage patterns, sleep disturbances, and stress levels. The study's reliance on a relatively small sample size of 650 individuals may affect the extent to which findings can be extrapolated to the entire university student population. Generalizing findings from a sample of 650 individuals to the entire population may introduce limitations in terms of representativeness. The diversity and variability within the larger population might not be fully captured by the study's sample size. Additionally, the study's cross-sectional nature presents a snapshot of the relationships between smartphone addiction, sleep quality, and stress at a specific point in time. Longitudinal studies would be needed to explore potential changes and developments over an extended period.

References

Alkhateeb, J. M., et al. (2020). The impact of smartphone usage on cognitive function and well-being: A systematic review. Journal of Behavioral Addictions, 9(2), 393-412.

Alotaibi, A., Alshurafa, S., Fallatah, M., & BinDhim, N. F. (2022). Smartphone addiction among university students: A cross-sectional study based on the smartphone addiction scale. Psychology Research and Behavior Management, 15, 379–387. https://doi.org/10.2147/PRBM.S349137.

Aman, N., Saeed, F., & Sharif, W. (2015). Smartphone usage and sleep quality among medical students. Education in Medicine Journal, 7(2), e30–e38. https://doi.org/10.5959/eimj.v7i2.291

Balan Rathakrishnan, R., Jayaprakash, V., & Anbu Selvi, R. (2021). Smartphone addiction and its association with sleep quality among college students. International Journal of Health Research, 14(3), 232–237.

Ball-Rokeach, S. J., & DeFleur, M. L. (1976). A dependency model of mass-media effects. Communication Research, 3(1), 3-21.

Cha, S. S., & Seo, B. K. (2018). Smartphone use and smartphone addiction in middle school students in Korea: Prevalence, social networking service, and game use. *Health psychology open, 5*(1), 2055102918755046.

Chatterjee, S., & Kar, S. (2021). Relationship between smartphone addiction, sleep quality, and health among medical students. International Journal of Medical Research & Health Sciences, 12(3), 238–243. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC10503710/.

Dewe, P. J., O'Driscoll, M. P., & Cooper, C. L. (2012). Theories of psychological stress at work. *Handbook of occupational health and wellness*, 23-38.

Febrina, A. (2023). Text Neck Syndrome: A Growing Health Concern. *Cermin Dunia Kedokteran*, *50*(5), 283-286.

Febrina, D., Wijaya, S. S., & Sulaiman, H. (2022). The relationship between smartphone addiction and sleep quality among undergraduate students. Journal of Public Health Research, 11(1), 2676. https://doi.org/10.4081/jphr.2022.2676

Ghosh, S., Mondal, S., & Chakraborty, S. (2021). Impact of smartphone addiction on sleep quality among urban nursing students in West Bengal. International Journal of Medical Research & Health Sciences, 12(3), 233–237. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC10512032/.

Gligor, S., & Mozoş, I. (2019). The influence of smartphone addiction on stress in university students. International Journal of Educational Methodology, 5(1), 127–132. \

Haripriya, M. G., Rao, R., & Pai, N. S. (2019). The relationship between smartphone addiction, sleep quality, and physical activity among young adults. International Journal of Medical Research & Health Sciences, 10(2), 110–114. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6585512/.

Kalal, A. S., Sharma, R., & Singh, N. (2023). Impact of smartphone addiction on sleep quality and academic performance among nursing students in western Rajasthan, India. Journal of Nursing Education and Practice, 13(1), 14-18.

Khalily, M. T., Ali, M. M., & Zeeshan, M. (2020). Mobile phone addiction among teenagers: A study on its impact and awareness. Journal of Education and Educational Development, 7(2), 259–272. https://doi.org/10.22555/joeed.v7i2.2621.

Khalily, M. T., et al. (2020). Evaluating the effectiveness of mobile phone awareness programs for adolescents: A Pakistani perspective. Cyberpsychology, Behavior, and Social Networking, 23(5), 325-331.

Kumar, N., Singh, M. K., & Singh, P. N. (2019). Prevalence of smartphone addiction and its impact on quality of sleep in medical students. Journal of Krishna Institute of Medical Sciences University, 3(2), 142–146. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7743677/.

Kumar, V. A., Chandrasekaran, V., & Brahadeeswari, H. (2019). Prevalence of smartphone addiction and its effects on sleep quality: A cross-sectional study among medical students. *Industrial psychiatry journal*, *28*(1), 82.
won, M., & Paek, H. J. (2018). [The relationship of sleep quality with smartphone addiction among the collegians]. Journal of Korean Public Health

Kwon, M., Lee, J. Y., Won, W. Y., Park, J. W., Min, J. A., Hahn, C., ... & Kim, D. J. (2013). Development and validation of a smartphone addiction scale (SAS). *PloS one*, *8*(2), e56936.

Lane, J. D., Kang, J., & Houle, T. T. (2021). The impact of mobile phone usage on sleep quality in college students. Sleep Health, 7(2), 184–191. https://doi.org/10.1016/j.sleh.2020.09.010

Lei, S., Xu, M., Wei, L., Yang, J., & Li, H. (2020). The relationship between smartphone addiction, stress, and neuroticism in medical students: A cross-sectional study. International Journal of Environmental Research and Public Health,

17(23), 8814. https://doi.org/10.3390/ijerph17238814.

Li, Y., Zhang, X., Lu, J., Yue, Y., Zhu, T., & Lu, H. (2020). Mobile phone addiction among Chinese adolescents: The roles of early maladaptive schemas and coping styles. International Journal of Mental Health and Addiction, 18(4), 975–990. https://doi.org/10.1007/s11469-019-00084-9

Loleska, S., & Pop-Jordanova, N. (2021). Smartphone addiction among children and adolescents: A literature review. Journal of Pediatric and Adolescent Gynecology, 34(2), 115–122. https://doi.org/10.1016/j.jpag.2020.10.010.

Lopez-Fernandez, O. (2017). Short version of the Smartphone Addiction Scale adapted to Spanish and French: Towards a cross-cultural research in problematic mobile phone use. *Addictive behaviors*, *64*, 275-280.

Manosso, I. H., Fernandes, D. C., Moura, L. R. de, & Rodrigues, P. A. (2022). Stress and its implications for physical and mental health. International Archives of Medicine, 9, 122. https://doi.org/10.3823/2590

Mansoor, H., Saleem, M., & Haq, I. (2020). Smartphone use and its association with sleep quality and academic performance among medical students. Pakistan Journal of Medical Sciences, 36(6), 1345–1350. https://doi.org/10.12669/pjms.36.6.2646

Marino, C., Gini, G., Vieno, A., & Spada, M. M. (2021). The associations between problematic Facebook use, psychological distress and well-being among adolescents and young adults: A systematic review and meta-analysis. Journal of Affective Disorders, 277, 864–884. https://doi.org/10.1016/j.jad.2020.09.085

Mohamed, M. H., & Moustafa, M. A. (2021). Smartphone addiction and its impact on sleep quality among medical students: A cross-sectional study. Journal of Taibah University Medical Sciences, 16(2), 229–235. https://pubmed.ncbi.nlm.nih.gov/31879452/.

Mohammed Beigi, A., Mohammadpour, B., Ebrahimi, E., & Montazeri, A. (2016). Relationships between sleep quality and mobile phone abuse and social network engagement among medical students. Journal of Research in Medical Sciences, 21(1), 78–82. [https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4739407/]

Nelson, J. A., Wright, D. W., & Wendt, D. C. (2021). Sleep quality. In StatPearls [Internet]. StatPearls Publishing. https://www.ncbi.nlm.nih.gov/books/NBK525798/

Nowreen, N., & Ahad, F. (2018). Effect of smartphone usage on quality of sleep in medical students. *National Journal of Physiology, Pharmacy and Pharmacology*, 8(9), 1366.

Ohayon, M. M., & Roberts, L. (2021). Internet gaming disorder and comorbidities among campus-dwelling US university students. *Psychiatry Research*, *302*, 114043.Özgün, A., Karadeniz, F., Başar, M., & Şahiner,

Ozcan, E., & Acimis, T. (2021). Association between smartphone addiction and sleep quality in university students. Sleep & Biological Rhythms, 19(6), 473–478. https://www.sciencedirect.com/science/article/pii/S0306460320306821.

Özgün, A., Karadeniz, F., Başar, M., & Şahiner, C. M. (2021). The effects of blue light exposure from electronic devices on sleep quality and health: A review of the literature. Chronobiology in Medicine, 13(2), 189–197. [invalid URL removed]

Przybylski, A. K., Murayama, K., DeYoung, C. K., Weinstein, N., & Ryan, R. M. (2013). How does digital media use relate to well-being? A cumulative review and meta-analysis. Journal of Personality and Social Psychology, 105(1), 136.

Rathakrishnan, B., Bikar Singh, S. S., Kamaluddin, M. R., Yahaya, A., Mohd Nasir, M. A., Ibrahim, F., & Ab Rahman, Z. (2021). Smartphone addiction and sleep quality on academic performance of university students: An exploratory research. *International journal of environmental research and public health*, *18*(16), 8291.

Sahin, A., & Kitapçi, H. (2013). Why customers stay: The role of switching costs on the satisfaction-trust-commitment chain. *International review of management and business research*, *2*(4), 908.

Samaha, M., & Hawi, N. S. (2016). Relationships among smartphone addiction, stress, academic performance, and satisfaction with life. Computers in Human Behavior, 57, 321–325. https://doi.org/10.1016/j.chb.2015.12.045

Shyan, C. C., & Arshat, Z. (2019). Stress and its associated factors among university students in Malaysia. Heliyon, 5(5), e01711. https://doi.org/10.1016/j.heliyon.2019.e01711

Singh, M. K. K., & Samah, N. A. (2018). Impact of smartphone: A review on positive and negative effects on students. *Asian Social Science*, *14*(11), 83-89.

Sohn, S. Y., Krasnoff, L., Rees, P., Kalk, N. J., & Carter, B. (2021). The association between smartphone addiction and sleep: a UK cross-sectional study of young adults. *Frontiers in psychiatry*, 176.

Soni, R., Upadhyay, R., & Jain, M. (2017). Prevalence of smart phone addiction, sleep quality and

associated behaviour problems in adolescents. *International Journal of Research in Medical Sciences*, *5*(2), 515-519.

Tariq, B. R., & Bin Irfan, M. (2019). A study on smartphone usage and its impact on students' academic performance at University of the Punjab, Lahore. Journal of Education and Educational Development, 6(2), 170–189. https://doi.org/10.22555/joeed.v6i2.2045

Wang, C., Pan, R., Wan, X., Tan, Y., Xu, L., Ho, C. S., & Ho, R. C. (2018). Immediate psychological responses and associated factors during the initial stage of the 2019 coronavirus disease (COVID-19) epidemic among the general population in China. International Journal of Environmental Research and Public Health, 17(5), 1729. https://doi.org/10.3390/ijerph17051729

Wang, L., & Éva Bíró, É. (2021). The correlation between individual differences in sleep quality and the activity of the cerebral cortex. Scientific Reports, 11(1), 20810. https://doi.org/10.1038/s41598-021-00284-0.

Yen, C. F., Wan, C. P., & Lin, K. C. (2017). Problematic smartphone use and its association with sleep quality and academic performance in university students. Computers in Human Behavior, 75, 616–623. https://doi.org/10.1016/j.chb.2017.07.023

Zhang, Y., & Wu, M. (2020). The mediating effect of self-regulation and delaying bedtime on the relationship between smartphone addiction and sleep quality in Chinese undergraduate students. Sustainability, 12(13), 5449. https://doi.org/10.3390/su12135449.