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ORIGINAL ARTICLE

Smartphone use and its relationship with addiction, depression, and anxiety among undergraduate medical students in Nawabshah, Pakistan: A cross-sectional study.

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ABSTRACT… Objective: 1. To investigate smartphone use and severity of addiction, anxiety and depression. 2. To find out the relationship between smartphone use with addiction, anxiety and depression. **Study Design:** Cross-sectional study. **Setting:** At MBBS and Allied (DPT, Pharmaceutical Sciences, Public Health & Nursing) Departments of Peoples University of Health Sciences for Women, Shaheed Benazirabad, Pakistan. **Period:** from August 2023 to January 2024. **Methods:** Among undergraduate medical students aged 18 to 25 the study's sample size was 350, and a multistage random sampling technique was used to select the participants from the Peoples University of Medical and Health Sciences for Women. After approval by the institution, data were collected from the medical students using validated tools, including smartphone addiction (SAS scale), depression (PHQ-9), and anxiety (GAD-7). The data were analyzed using SPSS software version 25. A chi-square test was used to identify the association between smartphone usage and addiction, depression, and anxiety, and a p-value of <0.05 was considered statistically significant. **Results:** The findings revealed that half the students (49.7%) spent more than 6 hours per day on their mobile screens. (49.1%) of medical students reported having a high prevalence of smartphone addiction, (48.6%) reported having moderate to severe depression, and (55.8%) reported having moderate to severe anxiety. Addiction, depression, and anxiety scores were higher among the excessive smartphone use group than in the low smartphone users. A statistically positive association was found between smartphone usage and the addiction level, depression level, and anxiety level scores. **Conclusion:** This study highlights the overdependence on smartphones among medical students and the positive association between smartphone usage and mental health outcomes like addiction, anxiety and depression among PUMHSW medical students in Pakistan. Excessive screen time can impact students' academic performance, sleep quality, and eating behaviors.

Key words: Anxiety, Depression, Medical Students, Smartphone Usage, Smartphone Addiction, Undergraduate.

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INTRODUCTION

Electronic devices have become ubiquitous in today's world, with smartphones being the most commonly used electronic items among college students and younger generations.[1] These devices facilitate various functions, such as making calls, taking pictures, playing media, browsing the web, and sending emails.[2] In Pakistan, there are over 185.62 million smartphone users, according to newly released statistics, while the global smartphone user count has surpassed 7.10 billion. However, there is currently no demographic information available regarding the prevalence of smartphone addiction in Pakistan or around the world.[3]

Students at universities can stay up-to-date on the latest innovations in communications technology and stay within reach of their friends and family through their smartphones.[4] Digital technologies have revolutionized the lives of youth and students, providing access to education, communication, and social interaction. Technology has created new educational and personal development possibilities by providing easier access to educational materials and enabling real-time collaboration with peers and teachers.[5] On the other hand, problematic smartphone use is recognized as a significant issue, especially among younger generations. Smartphone addiction influences their thoughts, behavior, habits, feelings, and overall well-being.

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Addiction symptoms appear in many forms, including obsession, intolerance, loss of control, mood swings, and disinterest in other activities.[6] Its problematic use which in turn contributes to social isolation, reduced self-confidence, and increased mental health issues like depression and anxiety.[7] Academic engagement, headaches, neck pain, exhaustion, sleep disturbances, memory loss, and hearing loss are all negatively impacted.[8] Furthermore, there has been a noticeable rise in the occurrence of insomnia, a frequently encountered sleep disorder characterized by challenges in either falling asleep or maintaining sleep.[9]

Globally, it is believed that 27% and 34% of medical student's experience anxiety and depression.[10,11] The percentage of Asian medical students who were addicted to their smartphones was 41.93%.[12] Compared to the entire population, medical students are more likely to suffer from mental health issues.[10,11]

370 medical students between the ages of 16 and 41 participated in a cross-sectional survey between July and October 2020. According to the findings, 79% of students use their smartphones excessively, 78% of them experience depressed symptoms, and 69% experience anxiety symptoms. Additionally, there is a correlation between anxiety-related symptoms and smartphone misuse.[13] Another cross-sectional study involving 600 participants was carried out in India to evaluate the effect of smartphones on the mental health of undergraduate medical students. According to the findings, 42% of the participants used a screen for 4–6 hours every day on average. About 15.6% of people with mild depression, 16% of people with moderate depression, and 11.6% of people with really severe depression, respectively, exhibited symptoms.[14]

According to a study, 60% of Pakistani young people reported having a smartphone dependency. This is due to students' overreliance on smart screens for studying and a lack of understanding of their harmful effects. Awareness sessions have a positive impact on students' use of mobile phones, according to a cohort study done on students in Pakistan.[15] A systematic survey has determined a strong correlation between cellphone reliance and the severity of feelings of depression and anxiety.[16]

A recent study using a sample of 436 students from public and private universities in Bahawalpur, Pakistan, aimed to determine the prevalence of stress, anxiety, and nomophobia among university students. The study's findings show that 56.2% of students felt uneasy not having a constant connection to their smartphones, and those who suffered from that also reported feelings of anxiousness and nervousness, which made them uncomfortable among other people.[17] More evidence confirms the findings that smartphone reliance is associated with depression or anxiety symptoms, as those people with depression excessively use their mobile phones to reduce their symptoms because they have insufficient solutions for coping with their symptoms.[18] This cross-sectional study aimed to investigate the relationship between smartphone usage with addiction, depression, and anxiety among medical students at PUMHSW, Nawabshah, Pakistan. By concentrating on this group, we intend to advance knowledge about the possible negative consequences of smartphone use on psychological well-being and possibly provide guidance for interventions.

METHODS

This descriptive cross-sectional study was conducted among undergraduate female students at the Peoples University of Medical & Health Sciences for women Shaheed Benazirabad from August 2023 to January 2024.

The sample size 325 calculated by using formula $n = X^2.NP\ (1 – p) \div d^2\ (N – 1) + X^2\ P\ (1 – p)$ at a 95% confidence interval with a 5% margin of error, and the 44.7% prevalence of excessive smartphone use was calculated from the previous study in South India.[19] To further minimize the margin of error, the sample size was increased to 350. (X = 1.96, P = 0.447, (1-p) = 0.553, N = 2240, d = 0.05). The students were selected randomly using a multi-stage sampling technique (Stratified and systematic random sampling). This sample was proportionally allocated: (MBBS) = 182, (BSPH) = 39, (Pharm-D) = 39, (DPT) = 49, and (BSN) = 41.

Inclusion criteria were students using smart phone

aged 18-25 years from different departments of PUMHSW (MBBS, DPT, Pharm-D, BSN and Public health). Exclusion criteria were Smartphone users aged below 18 and above 25, Students apart from PUMHS SBA, students having Pre-existing psychiatrist problem (diagnosed) and who are on substance abuse and Participants who are having recent major traumatic life event.

The data collection was performed using a self-administered composed of five main sections: demographics, smartphone usage, SAS scale, PHQ-9 depression scale, and GAD-7 scale for anxiety. To assess the validity of the questionnaire, a pilot study was conducted among 30 university students which indicated that the questionnaire had good reliability and validity. Informed written consent of participants was obtained before involving them in the study. The participants were informed about the purpose, method of collection, benefits, and risks of the study. They were assured of the maintenance of privacy and confidentiality throughout the data collection, analysis, and dissemination of the research. This study was performed after the permission of Institutional Ethical Review Board (PUMHS/SBA/CHS/588/05(21-1-23).

Data analysis was carried out using the software SPSS (Statistical Package for the Social Sciences) for Windows version 25.0. Descriptive statistics were performed to report the analysis of the data presented as frequencies, percentages, mean, and standard deviation. The chi-square test was employed to determine the association between smartphone usage with the addiction, depression, and anxiety. A p-value of < 0.05 indicated a statistically significant relationship. Categories of smartphone usage duration was measured as: Low usage (0-2 hours), Moderate usage (3-5 hours), High usage (6 or >6 hours).

RESULTS

Out of the 350 students, 172 (49.1%) were between 20 and 22 years old, whereas 138 (39.4%) were aged 23 to 25, and those less than 20 years old were 40 (11.4%). The majority of the students from the MBBS department were 181 (51.7%); Pharm-d and BSPH students were 39 (11.1%); DPT students were 50 (14.3%); and BSN students were 41 (11.7%), respectively. First-year and 3rd-year students were 21.4%; however, 21.1% in the 4th year, 20.9% in the 2nd year, and 15.1% in the 5th year. (Table-I)

TABLE-I

Demographic characteristics of respondents (n=350)

Demographics		Frequency (%)
Age of Respondents	Less than 20 years	40 (11.4)
	20 to 22 years	172 (49.1)
	23 to 25 years	138 (39.4)
Mean ± SD		21.86±1.887
Department	MBBS	181 (51.7)
	DPT	50 (14.3)
	Pharm-D	39 (11.1)
	BSPH	39 (11.1)
	BSN	41 (11.7)
Year of Study	1st Year	75 (21.4)
	2nd Year	73 (20.9)
	3rd Year	75 (21.4)
	4th Year	74 (21.1)
	5th Year	53 (15.1)

Figure-1 shows the level of depression among medical students. Out of the total, 8.0% of participants have experienced severe depression, 46.6% have mild depression, 40.6% have moderate depression, and 4.9% have no depression. The mean and standard deviation of depression were 9.80 ± 5.87.

FIGURE-1

Level of Depression among medical students

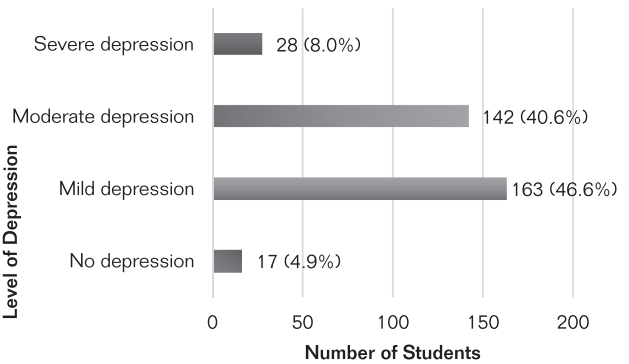

Table-II represents that for a total of 350 participants, the students spent their time on mobile screens for more than 6 hours per day (49.7%), while 48.9% used them for 3 to 5 hours per day, and a few students (1.4%) spent less than 2 hours. 48.3% of participants checked their mobile phones occasionally, whereas 12.6% rarely checked. Most students never checked their smartphones while sleeping (77.4%); however, 22.6% of students occasionally checked their screens. The total scoring of smartphone usage was 59.4% of participants who moderately used their smart screens, 39.1% highly used their phones, and 1.4% limited use.

TABLE-II

Smartphone usage

Smartphone usage		Participants, n=350 n(%)
Duration of mobile phone usage per day	0-2 hour	5 (1.4)
	3-5 hour	171 (48.9)
	6 or >6 hour	174 (49.7)
Frequency of mobile phone checking	Rarely	44 (12.6)
	Occasionally	169 (48.3)
	Frequently	137 (39.1)
Checking mobile phone in between sleep	Rarely or Never	271 (77.4)
	Occasionally	79 (22.6)
	Frequently	0 (0.0)
Total scoring of Smartphone usage	Mild	5 (1.4)
	Moderate	208 (59.4)
	High	137 (39.1)
Mean ± SD	2.38 ± 0.514	

Table-III shows the level of addiction, depression, and anxiety among medical students. Out of the total, 49.1% of participants have exhibited high addiction, 45.4% moderate addiction, and 4.3% very high addiction levels. Similarly, 8.0% of participants have experienced severe depression, 46.6% have mild depression, 40.6% have moderate depression, and 4.9% have no depression. Furthermore, 46.9% of medical students experienced a moderate level of anxiety and 8.9% severe anxiety.

Table-IV represents the distribution of smartphone usage with addiction, depression, and anxiety levels. Out of the total of 350 undergraduate students, among moderate smart phone users 142 (89.3%) were having moderate addiction, 130 (79.8%) had mild depression and 105 (84.7%) had mild anxiety (p-value <0.05). Among high smart phone usage 106 (61.6%) had high addiction, 82 (57.7%) had moderate depression and 92 (56.1%) had moderate anxiety (p-value <0.05).

TABLE-III

Level, mean and standard deviation: smartphone addiction, depression and anxiety (n=350)

Variable	n (%)
Low addiction	4 (1.1%)
Moderate addiction	159 (45.4%)
High addiction	172 (49.1%)
Very high addiction	15 (4.3%)
No depression	17 (4.9%)
Mild depression	163 (46.6%)
Moderate depression	142 (40.6%)
Severe depression	28 (8.0%)
No anxiety	31 (8.9%)
Mild anxiety	124 (35.4%)
Moderate anxiety	164 (46.9%)
Severe anxiety	31 (8.9%)

DISCUSSION

The present study demonstrated to explore the relationship between smartphone usage and the level of addiction, depression, and anxiety among undergraduate medical students in Nawabshah, PUMHSW. Our study findings revealed that 49.1% of the participants were 20–22 years old, and their mean age was 21.86±1.887. Majority of the undergraduate students 49.7% used their mobile phones for >6 hours per day, and 48.9% used them for 3-5 hours.The study findings are aligned with research done in Switzerland, which revealed the duration of smartphone use was 5.6 hours per day.[20] In contrast to earlier data, research conducted in the United Kingdom showed a lower screen time use of 3.1 hours per day.[21]

The findings revealed that 45.4% were at a moderate level of addiction, 49.1% of medical students reported high smartphone addiction, and 4.3% experienced very high addiction, means almost all of the students showed addiction.

TABLE-IV

Related Frequency between Smartphone usage with smartphone addiction, depression and anxiety

Total scoring of variables	Smartphone Usage			P-Value
	Limited	Moderate	High	
	n (%)	n (%)	n (%)	
Smartphone Addiction				
Low addiction	4 (100%)	0 (0.0%)	0 (0.0%)	
Moderate addiction	1 (0.6%)	142 (89.3%)	16 (10.1%)	
High addiction	0 (0.0%)	66 (38.4%)	106 (61.6%)	<0.001*
Very high addiction	0 (0.0%)	0 (0.0%)	15 (100%)	
Total	5 (1.4%)	208 (59.4%)	137 (39.1%)	
Depression				
No depression	0 (0.0%)	16 (94.1%)	1 (5.9%)	
Mild depression	4 (2.5%)	130 (79.8%)	29 (17.8%)	
Moderate depression	1 (0.7%)	59 (41.5%)	82 (57.7%)	<0.001*
Severe depression	0 (0.0%)	3 (10.7%)	25 (89.3%)	
Total	5 (1.4%)	208 (59.4%)	137 (39.1%)	
Anxiety				
No anxiety	0 (0.0%)	31 (100%)	0 (0.0%)	
Mild anxiety	4 (3.2%)	105 (84.7%)	15 (12.1%)	
Moderate anxiety	1 (0.6%)	71 (43.3%)	92 (56.1%)	<0.001*
Severe anxiety	0 (0.0%)	1 (3.2%)	30 (96.8%)	
Total	5 (1.4%)	208 (59.4%)	137 (39.1%)	

These prevalence rates are higher compared to those of Bangladeshi university students, who were at 86.9%[22]; nursing students in Karachi, Pakistan, at 69.39%[23]; medical students in India, at 52.7%[24]; and young adults in Brazil, where it was found that 35% aged 18 to 25 had smartphone addiction.[25] According to the study findings, a substantial portion of high smartphone users (61.6%) demonstrated a high level of addiction. In contrast, all cases of severe addiction were documented among participants categorized as high smartphone users. Meanwhile, the majority of moderate smartphone users (89.3%) experienced a moderate level of addiction. The P-value <0.001 highlights a significant association between smartphone usage and level of addiction. The findings of this study are consistent with the previous study showing that excessive smartphone use can lead to smartphone addiction, which has a negative effect on mental health among undergraduate university students.[6] A study was conducted in Sudan and in this study 67.6% exhibited only in high levels of smartphone addiction which is higher than our finding of high smart phone addiction.[26] Other studies reported that smartscreen use can result in modifications related to lifestyle factors that can cause irregular dietary behaviors.[27] Constant access to social media, academic materials, and gaming platforms are the fundamental causes of smartphone addiction. These factors support compulsive behaviour's, which in turn contribute to the development of the addiction. Students often rely on smartphones as a coping mechanism for stress, which inadvertently contributes to addiction.

Depression was also prevalent in medical students, who suffered from moderate to severe depression were 48.6%. The prevalence of depression in this study is higher than that of a study conducted in Uganda in 2023 that was 16.73% using a comparable measurement.[28] The prevalence of depression and anxiety symptoms among the medical students was 57.5 which is higher than our findings.[29] According to the investigation, out of 137 students who used

smartphones high reported having moderate levels of depressive symptoms in 82, while 208 who were using smart screens moderately they had moderate depression in 59. Additionally, severe depression was found individuals who were using high smartphone. The study found a significant correlation (p-value <0.01) between high levels of depression and excessive smartphone use. Individuals who experience loneliness often use their phones more, struggle with personal issues and struggle with performance, and feel disconnected from others surrounding them as a result of their increasing smartphone use.[30,31] Several studies showed that excessive smart screen use was correlated with decreased quality of sleep among medical students, as we observed in our study also, which can lead to an impact on their academic performance, according to the findings of other research that revealed comparable findings at the same time.[19,32] A study conducted in Saudi Arabia presents findings that are inconsistent with the results of our research.[33]

In accordance with the findings, 55.8% of medical students exhibited moderate to severe anxiety. A similar prevalence of anxiety, 59.5%, was found among Saudi medical students.[34] Additionally, 96.8% of high smartphone users were experiencing severe anxiety symptoms, although 56.1% of high screen users reported having moderate anxiety symptoms. The related frequency is statistically significant between smartphone usage and anxiety (p-value <0.01). These results are consistent with the previous findings that showed excessive smartphone use can lead to social anxiety.[34,35] According to a systematic review of 23 peer-reviewed publications, using smartphones excessively is significantly associated with anxiety and depressive symptoms.[16] Prior research suggests that people with high levels of anxiety may favor social communication that helps them to manage and avoid undesirable aspects of their behavior or appearance. Because of this, people could use their phones excessively to avoid social situations, which has detrimental effects for social communication.[36] Additionally, a study revealed the overuse of smartphones leads to disruptive behavioral issues and concentration deficits, inhibits students from attending education and employment, affects academic progress, and diminishes the amount of time spent on real-life connections with others.[37] Loneliness also corresponds to several adverse mental and physical outcomes, such as anxiety, depression, obesity, and heart disease.[33]

This study has some limitations. Firstly, the cross-sectional design prevents establishing a causal link between smartphone usage and mental health effects. In addition, drawing a sample from just one university and only girl students limits our ability to generalize the findings to all medical students in Pakistan. Moreover, not analyzing specific usage behaviors, such as the duration of internet or gaming activities, restricts our capacity for deeper analysis. Additionally, failing to consider factors associated with excessive screen time impacts the results.

CONCLUSION

The results of the current study provide significant associations among the excessive use of smartphones with moderate to high level of addiction, depression, and anxiety. Furthermore, the study highlights the need of maintaining adequate control over social media use and its adverse consequences, such as depression and anxiety disorder.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

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REFERENCES

1. Rathakrishnan B, Bikar Singh SS, Kamaluddin MR, Yahaya A, Mohd Nasir MA, Ibrahim F, et al. **Smartphone addiction and sleep quality on academic performance of university students: An exploratory research.** International Journal of Environmental Research and Public Health. 2021 Aug 5; 18(16):8291.
2. Lee H, Kim JW, Choi TY. **Risk factors for smartphone addiction in Korean adolescents: smartphone use patterns.** Journal of Korean Medical Science. 2017 Aug 30; 32(10):1674.
3. Jan AA, Hanif MW, Hafeez S. **Factors affecting the acceptance of mobile marketing: role of ethics and permission-based marketing.** City University Research Journal. 2022; 12(1):1-10.

4. Desouky DE, Abu-Zaid H. **Mobile phone use pattern and addiction in relation to depression and anxiety.** Eastern Mediterranean Health Journal. 2020; 26(6):692-9.
5. Yadav KK, Reddy LJ. **Psychological effects of technology on college students.** Journal of Clinical Otorhinolaryngology, Head, and Neck Surgery. 2023; 27(1):1805-16.
6. Kil N, Kim J, McDaniel JT, Kim J, Kensinger K. **Examining associations between smartphone use, smartphone addiction, and mental health outcomes: A cross-sectional study of college students.** Health Promotion Perspectives. 2021; 11(1):36.
7. Brodersen K HN, Katapally TR. **Smartphone Use and Mental Health among Youth: It Is Time to Develop Smartphone-Specific Screen Time Guidelines.** Youth. 2022; 2:23-38.
8. Baby RS, Issac A, Vasudev A, Sabu DK, Gopika TS, Pal M, et al. **Impact of screen time on sleep quality.** Indian Journal of Psychiatric Nursing. 2021 Jan 1; 18(1):29-32.
9. Jahrami H. **The relationship between nomophobia, insomnia, chronotype, phone in proximity, screen time, and sleep duration in adults: A mobile phone app-assisted cross-sectional study.** Healthcare. 2023; 11(10):1503.
10. Rotenstein LS, Ramos MA, Torre M, Segal JB, Peluso MJ, Guille C, et al. **Prevalence of depression, depressive symptoms, and suicidal ideation among medical students: A systematic review and meta-analysis.** Jama. 2016; 316(21):2214-36.
11. Tian-Ci Quek T, Wai-San Tam W, X. Tran B, Zhang M, Zhang Z, Su-Hui Ho C, et al. **The global prevalence of anxiety among medical students: A meta-analysis.** International Journal of Environmental Research and Public Health. 2019; 16(15):2735.
12. Zhong Y, Ma H, Liang Y-F, Liao C-J, Zhang C-C, Jiang W-J. **Prevalence of smartphone addiction among Asian medical students: A meta-analysis of multinational observational studies.** International Journal of Social Psychiatry. 2022; 68(6):1171-83.
13. Santander-Hernández FM, Peralta CI, Guevara-Morales MA, Díaz-Vélez C, Valladares-Garrido MJ. **Smartphone overuse, depression & anxiety in medical students during the COVID-19 pandemic.** PLoS One. 2022; 17(8):e0273575.
14. Prafull K, Rao A, Doijad V, Patil P, Daulatabad VS, John NA. **Impact of smartphone on mental health among medical undergraduates: A cross-sectional study.** Journal of Education and Health Promotion. 2024; 13(1):137.
15. Kamal S, Kamal S, Mubeen SM, Shah AM, Samar SS, Zehra R, et al. **Smartphone addiction and its associated behaviors among medical and dental students in Pakistan: A cross-sectional survey.** Journal of Education and Health Promotion. 2022 Jan 1; 11(1):220.
16. Elhai JD, Dvorak RD, Levine JC, Hall BJ. **Problematic smartphone use: A conceptual overview and systematic review of relations with anxiety and depression psychopathology.** Journal of Affective Disorders. 2017 Jan 1; 207:251-9.
17. Akram M, Mahmood W, Saleem A. **Smartphone induced anxiety: An investigation into nomophobia and stress levels among universities students.** Journal for Social Science Archives. 2024; 2(2):65-88.
18. Madiha Khan Niazi FH, Kinza Jalal, Khadija Riaz, Sahar Imran, Bahisht Rizwan. **Association of Screen time with Depression or anxiety in Adolescence: In Pakistan.** Int health Rev. 2022; 2(1):15-31.
19. Kumar VA, Chandrasekaran V, Brahadeeswari H. **Prevalence of smartphone addiction and its effects on sleep quality: A cross-sectional study among medical students.** Industrial Psychiatry Journal. 2019; 28(1):82-5.
20. Haug S, Castro RP, Kwon M, Filler A, Kowatsch T, Schaub MP. **Smartphone use and smartphone addiction among young people in Switzerland.** Journal of Behavioral Addictions. 2015; 4(4):299-307.
21. Hussain Z, Griffiths MD, Sheffield D. **An investigation into problematic smartphone use: The role of narcissism, anxiety, and personality factors.** Journal of Behavioral Addictions. 2017; 6(3):378-86.
22. Jahan I, Hosen I, Al Mamun F, Kaggwa MM, Griffiths MD, Mamun MA. **How has the COVID-19 pandemic impacted internet use behaviors and facilitated problematic internet use? A Bangladeshi study.** Psychology Research and Behavior Management. 2021; 1127-38.
23. Ali SA, Marshall P, Bashir S. **Investigating the smartphone addiction among undergraduate nursing students: Smartphone addiction and nursing students.** Pakistan BioMedical Journal. 2024; 02-6.
24. Jahagirdar V, Rama K, Soppari P, Kumar MV. **Mobile phones: Vital addiction or lethal addiction? Mobile phone usage patterns and assessment of mobile addiction among undergraduate medical students in Telangana, India.** Journal of Addiction. 2021; 2021(1):8750650.
25. Khoury JM, de Freitas AAC, Roque MAV, Albuquerque MR, das Neves MdCL, Garcia FD. **Assessment of the accuracy of a new tool for the screening of smartphone addiction.** PloS one. 2017; 12(5):e0176924.
26. Amin MHJ, Alhadi HA, Mohamed AEA, Yacoub HKET, Khalifa RMH, Dafallah IAE, et al. **Impact of smartphone addiction on health status, mental well-being, and sleep quality among medical students in Sudan.** BMC Psychiatry. 2024 Dec 31; 24(1):965.
27. Zengin O. Ilgaz AvDG, H. **Examination of the relationship between eating addiction, appetite status and smartphone addiction.** UNIKA Toplum ve Bilim Dergisi. 2023; 3(1):31-42.
28. Sserunkuuma J, Kaggwa MM, Muwanguzi M, Najjuka SM, Murungi N, Kajjimu J, et al. **Problematic use of the internet, smartphones, and social media among medical students and relationship with depression: An exploratory study.** Plos one. 2023; 18(5):e0286424.
29. Shao R, He P, Ling B, Tan L, Xu L, Hou Y, et al. **Prevalence of depression and anxiety and correlations between depression, anxiety, family functioning, social support and coping styles among Chinese medical students.** BMC Psychol. 2020 Apr 22; 8(1):38.

30. Kara M, Baytemir K, Inceman-Kara F. **Duration of daily smartphone usage as an antecedent of nomophobia: Exploring multiple mediation of loneliness and anxiety.** Behaviour & Information Technology. 2021; 40(1):85-98.
31. Jiang Q, Li Y, Shypenka V. **Loneliness, individualism, and smartphone addiction among international students in China.** Cyberpsychology, Behavior, and Social Networking. 2018; 21(11):711-8.
32. Ibrahim NK, Baharoon BS, Banjar WF, Jar AA, Ashor RM, Aman AA, et al. **Mobile phone addiction and its relationship to sleep quality and academic achievement of medical students at King Abdulaziz University, Jeddah, Saudi Arabia.** Journal of Research in Health Sciences. 2018; 18(3):e00420.
33. Alzhrani AM, Aboalshamat KT, Badawoud AM, Abdouh IM, Badri HM, Quronfulah BS, et al. **The association between smartphone use and sleep quality, psychological distress, and loneliness among health care students and workers in Saudi Arabia.** PLoS One. 2023 Jan 26; 18(1):e0280681.
34. Elhadad AA, Alzaala MA, Alghamdi RS, Asiri SA, Algarni AA, Elthabet MM. **Social phobia among Saudi medical students.** Middle East Current Psychiatry. 2017; 24(2):68-71.
35. Lee Y-S, Joo JH, Shin J, Nam CM, Park E-C. **Association between smartphone overdependence and generalized anxiety disorder among Korean adolescents.** Journal of Affective Disorders. 2023; 321:108-13.
36. Turgeman L, Hefner I, Bazon M, Yehoshua O, Weinstein A. **Studies on the relationship between social anxiety and excessive smartphone use and on the effects of abstinence and sensation seeking on excessive smartphone use.** International Journal of Environmental Research and Public Health. 2020; 17(4):1262.
37. Kuss DJ, Griffiths MD. **Online social networking and addiction—a review of the psychological literature.** International Journal of Environmental Research and Public Health. 2011; 8(9):3528-52.

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1	**Imran Mirbahar:** Conceptualization of project.
2	**Anum Saleem:** Statistical analysis.
3	**Fiza Anis:** Data collection.
4	**Hasnat Fatima:** Manuscript writing.
5	**Ujala Arshad:** Data collection.
6	**Saqiba Khalil:** Literature search, revision.