ACADEMICIA: An International Multidisciplinary Research Journal
ISSN: 2249-7137 Vol. 15 Issue 4, April, 2025 SJIF 2022= 8.252
A peer reviewed journal

YOUNG, WIRED, AND STRESSED: SMARTPHONE ADDICTION AND MENTAL HEALTH CHALLENGES AMONG INDIAN STUDENTS

Ms. Aastha Govind Shirodker*; Dr. Janet Fernandes**

*Assistant Professor,
MIE-SPPU Institute of Higher Education (Savitribai Phule PuneUniversity, Qatar Campus)
Doha- Qatar
Email id: aasthashirodker@miesppu.edu.qa

**Professor and Head of the Department,
Department of Psychology (Undergraduate),
St. Xavier's College, Goa, India,
Email id: Janet.D@xaviercollegegoa.ac.in

DOI: 10.5958/2249-7137.2025.00016.8

ABSTRACT

The widespread adoption of smartphones has significantly altered students' lifestyles, facilitating continuous connectivity and access to digital resources. However, increasing dependence on smartphones has prompted critical inquiries into their psychological effects. This study examined the relationships between smartphone addiction, perceived stress, and depression among students aged 15-28 years across five Indian states. Data were collected using convenience and snowball sampling methods from students (n=396) studying and residing in the states of Goa, Gujarat, Karnataka, Maharashtra, and Rajasthanvia Google Forms. Correlational analyses indicated weak yet significant positive associations between smartphone addiction and both perceived stress and depression. Although no significant differences in smartphone addiction were observed based on age or gender, females reported significantly higher levels of depression. These findings highlight the growing needfor digital well-being interventions, and call for further exploration of the psychosocial dynamics of smartphone use among students.

KEYWORDS: *Age And Gender Differences, Depression, Digital Well-Being, Indian Students, Perceived Stress, Smartphone Addiction.*

INTRODUCTION

The widespread use of smartphones has transformed communication and daily life, especially among the youth and students (Ahad &Anshari, 2017;Thulin, 2017;Singh & Samah, 2018). However, concerns regarding their impact on mental health have grown (Prodanova&Chopdar, 2023;Ratan et al., 2021).Smartphone addiction, marked by compulsive use, is increasingly linked to psychological issues, such as depression and elevated stress levels among students (Alotaibi et al., 2022;Swar & Hameed, 2017).

Constant smartphone connectivity can foster compulsive behaviors such as frequent checking of notifications and social media, disrupting academics, sleep, and face-to-face interactions (Kanjo et al., 2017;Kim et al., 2016;Luqman et al., 2020;Throuvala et al., 2020). Excessive smartphone use is linked to depression among young adults, with evidence suggesting a complex,

bidirectional relationship (Aubry et al., 2023; Zhong et al., 2022). Social media overuse can trigger negative social comparisons, feelings of inadequacy, and distorted realities, thereby contributing to depressive symptoms (Han et al., 2020; Kim et al., 2021). Factors like fear of missing out (FOMO) and reduced perceived social support further intensify negative well-being outcomes (Burnell et al., 2019; Dou et al., 2021;Gomez et al., 2021;Weaver & Swank, 2019).

Perceived stress, a key factor in students' mental health, may be heightened by smartphone overuse due to constant information flow, academic pressure, and social expectations (Lee, 2016;Oraison et al., 2020;Wang et al., 2021).The relationship between stress and smartphone addiction is complex, with negative emotions mediating and psychological capital moderating this relationship. Leisure boredom and challenges also influence smartphone use and emotional distress, including stress (Kil et al., 2021).The interplay between smartphone addiction, depression, and perceived stress is particularly relevant in the context of students' lives (Alabdallat et al., 2023; Catling et al., 2022; Gligor & Mozoș, 2018; Kim et al., 2015; Nguyen et al., 2024). Academic pressures, social dynamics, and the transition to adulthood present significant challenges (Barlett et al., 2018; Wagner et al., 2013). The added dimension of smartphone overuse may further complicate these experiences, potentially affecting academic performance, social relationships, and overall well-being (Alotaibi et al., 2022;Kwok et al., 2021).

Understanding the intricate relationships among these variables is crucial for developing effective interventions and support systems for young people. Youth development interventions and support systems are complex, multifaceted approaches that aim to promote positive outcomes and prevent risky behaviors among young people. Research has shown that these interventions can be effective in improving knowledge, attitudes, and behaviors related to healthy relationships, mental health, and overall well-being (Hielscher et al., 2021).

This study aimed to shed light on the complex dynamics of smartphone use, addiction tendencies, depressive symptoms, and stress perceptions among students, contributing to a more comprehensive understanding of the challenges faced by young individuals in the digital age.

Review of Literature

Smartphone addiction has become a prominent concern in the digital age, with an increasing body of research examining its psychological consequences (Ratan et al., 2021;Scott et al., 2016). The widespread use of smartphones has led to growing concerns about their impact on mental health, particularly in terms of stress, anxiety, and depression (Kil et al., 2021;Turgeman et al., 2020). Although a clear relationship between excessive smartphone use and negative psychological outcomes is established, the complexities of this association warrant further exploration (Alotaibi et al., 2022;Lowe-Calverley & Pontes, 2020).

Numerous studies have indicated that prolonged smartphone use is associated with heightened stress levels, driven by the constant need for connectivity and instantaneous response to notifications (Cha et al., 2023;Derakhshanrad et al., 2020).This ongoing connectivity interferes with normal stress-response systems, leading to chronic stress (Giovanniello et al., 2025). Additionally, this perpetual state of alertness often results in anxiety and compulsive checking behaviors, contributing to a negative feedback loop (Jilisha et al., 2019;Pera, 2020). The fear of missing out (FOMO), closely linked to social media use, exacerbates these feelings of anxiety,

especially when users are separated from their devices or unable to check for updates (Lin et al., 2021;Vally et al., 2021;Yang et al., 2021).

Depression is another key psychological concern associated with excessive smartphone use, and several studies have reported a significant positive correlation between smartphone addiction and depressive symptoms (Khan et al., 2023;Kim et al., 2018;Nikolic et al., 2023).The relationship is often bidirectional, with factors such as social comparison, reduced face-to-face interactions, and disrupted sleep contributing to the development of depressive symptoms (Matar Boumosleh&Jaalouk, 2017).

While research has consistently identified associations between smartphone addiction and psychological distress, demographic factors such as age and gender have produced mixed findings. Some studies suggest that adolescents and young adults are particularly vulnerable to smartphone addiction (Twenge, 2020), whereas others report similar effects across age groups. Gender differences remain inconsistent, underscoring the need for more nuanced research that considers these demographic moderators (Cilligol Karabey et al., 2023;Scott et al., 2019).

Most existing studies focus on Western populations, leaving a significant gap in understanding how smartphone addiction manifests in diverse cultural contexts. With its rapid digital growth, cultural diversity, and varying levels of digital literacy, India provides a unique setting for exploring this issue (Burkhard et al., 2021;Pangrazio et al., 2020). The digital divide, characterized by disparities in access to technology and internet connectivity between urban and rural areas, further complicates the study of smartphone addiction in India (Kumar et al., 2022).Additionally, socio-cultural norms and collectivist values, which shape individuals' interactions with technology, may lead to different manifestations of smartphone addiction compared to Western societies (Potnis, 2016;Yogesh et al., 2024).

Research within the Indian context could offer valuable insights into how traditional norms, academic pressures, and urbanization intersect with smartphone use, thereby providing culturally relevant intervention strategies. While existing studies have contributed significantly to the global understanding of smartphone addiction(Ke et al., 2024;Xiao & Huang, 2022), there remains a critical need for more region-specific research to address inconsistencies in demographic moderators and explore cultural variations (Aeron & Rahman, 2023;Jansen & Searle, 2021).

Objectives of the Study

1. To explore the relationship between stress and smartphone addiction.
2. To explore the relationship between depression and smartphone addiction.
3. To assess the difference in smartphone addiction across age groups.
4. To analyze the difference in smartphone addiction based on sex.
5. To examine the difference in depression levels based on sex.

Research Methodology

Sample and Sampling Technique

This study utilized a combination of convenience sampling and snowball sampling. A total of 458 individuals responded to an online questionnaire link shared via social media platforms.

After applying the inclusion and exclusion criteria, 396 completed questionnaires were retained for analysis.

Inclusion criteria:

1. Participants were students currently enrolled in 11th or 12th grade (HSSC), an undergraduate, or postgraduate program.
2. Participants should be pursuing either a general or professional academic course.
3. Participants must be able to read and understand English.

Exclusion criteria:

1. Students not enrolled in the specified academic grades.
2. Individuals aged ≤ 15 or above ≥28 years and foreign nationals were excluded from the study.

Table1 Demographic Profile of the Sample

Factors	Frequency (n = 396)	Percentage(%)
Sex		
Male	146	36.86
Female	250	63.14
Agegroup (in years)		
15 -19	138	34.84
20 - 28	258	65.16
States		
Goa	187	47.23
Gujarat & Rajasthan	80	20.20
Karnataka	52	13.13
Maharashtra	77	19.44
Academic class		
HSSC & Undergraduate	185	46.72
Graduate &Post-Graduate	211	53.28

The sample comprised 396 students aged 15–28 years, including 146 males and 250 females, from five Indian states (refer to Table 1). The multi-state design contributed to geographic and cultural heterogeneity among the participants, thereby enhancing the representativeness of the sample and potentially increasing the generalizability of the findings within the Indian context.

Research Design

This quantitative, cross-sectional study used a correlational design to examine the relationships between smartphone addiction, stress, and depression. This study aimed to identify potential associations among these variables through statistical analysis, providing insights for future research and interventions. The design allowed for a snapshot of the relationships without implying causation.

Data Collection

The questionnaire was administered online via a Google Forms link shared on various social networking sites and media platforms. It consisted of five self-administered sections. Scoring followed the standardized guidelines for each self-report measure used in the study: the Smartphone Addiction Scale (SAS)developed byKwon et al., (2013), Perceived Stress Scale (PSS) developed by Cohen et al., (1983), and The Center for Epidemiologic Studies Depression Scale Revised (CESD-R) by Eaton et al., (2004).

Data Analysis Methods

Data wereanalyzed using the Statistical Package for Social Sciences (SPSS). The data demonstrated normal distribution along the normal probability curve, with a mean of -2.06 and a standard deviation (SD) of 0.0997. Independent Samples t-test and Pearson's Correlation Analysis were employed as the primary statistical methods for data analysis

Ethical Considerations

Ethical considerations were also prioritized. The participants' confidentiality and anonymity were ensured throughout the study. All participants provided informed consent before their involvement in the study.

Results and Discussion

Table 2 presents descriptive statistics for the three variables examined in this study: **perceived stress, depression,** and**smartphone addiction**. The mean score for **perceived stress**was 20.35, with a standard deviation of 5.007, indicating the average level of stress among participants and variability in their stress scores. For **depression**, the mean was 11.20, with a standard deviation of 5.117, reflecting the average level of depressive symptoms reported by the participants, as well as the spread of these scores. The mean **smartphone addiction score**was 110.24, with a standard deviation of 23.575.

Table 2 Descriptive Statistics for Stress, Depression, and Smartphone Addiction

Variables	Mean	SD	N
Perceived Stress	20.35	5.007	396
Depression	11.20	5.117	396
Smartphone Addiction	110.24	23.575	396

Pearson's product-moment correlation analyses were performed to assess the relationships between stress, depression, and smartphone addiction (see Table 3). There was a statistically significant, weak positive correlation between stress and smartphone addiction($r(394) = .122$, $p < .05$), with higher stress levels associated with greater smartphone addiction. A weak positive

correlation was also observed between depression and smartphone addiction($r(394) = .213$, $p < .01$), suggesting that increased depressive symptoms are related to higher levels of smartphone addiction (Kim et al., 2015). Additionally, stress was weakly positively correlated with depression ($r(394) = .158$, $p < .01$), indicating that greater stress levels were associated with greater depressive symptomatology. All reported correlations were statistically significant and aligned with hypothesized directions.

Table 3 Correlations Between Stress, Depression, and Smartphone Addiction

Variables	Pearson's *r*	*p*-value	CI (%)	Interpretation
Perceived Stress ↔ Smartphone Addiction	.122	.018	95	Weak Positive Correlation
Depression ↔ Smartphone Addiction	.213	.000	99	Weak Positive Correlation
Perceived Stress ↔ Depression	.158	.001	99	Weak Positive Correlation

These findings align with previous research suggesting a potential link between excessive smartphone use and adverse mental health outcomes (Grant et al., 2019;Khan et al., 2023;Vujić & Szabo, 2022;Wang et al., 2021;Ziapour et al., 2020). However, the weak nature of these correlations underscores the need for cautious interpretation and further investigation of potential mediating or moderating factors. The variability in present and previous findings suggests that the relationship between perceived stress, depression and smartphone addiction may be influenced by myriad factors, including measurement tools, study populations, and other contextual elements (Wang et al., 2021;Liu & Lu, 2022;Zhang et al., 2023).This homogeneity in addiction patterns across demographic categories suggests that the pervasive nature of smartphone use may transcend traditional sociodemographic boundaries, reflecting the ubiquitous integration of these devices into daily life across diverse populations.

Table 4 Analysis of Smartphone Addiction by Sex and Age Group

Variable	Group	n	M	SD	t	df	p
Smartphone Addiction	Male	185	111.68	25.139	0.936	394	.353
	Female	211	109.40	22.621			
	Adolescent	179	110.38	22.799	-0.087	394	.928
	Young Adult	217	110.16	24.023			

Table 4 presents the descriptive statistics and independent samples t-test results for smartphone addiction with respect to **sex**and**age group**. The t-test analysis revealed no statistically significant difference in smartphone addiction between the male and female participants ($t = 0.936$, $p = .353$).The t-test also showed no significant difference between the two age groups ($t =$

–0.087, p = .928). These findings suggest that, in this sample, neither **sex** nor **age group**had a significant influence on smartphone addiction, contrasting past findings that indicate age-related differences in smartphone overuse, with problematic use increasing from childhood to young adulthood (Csibi et al., 2019). Smartphone use may begin as early as two years of age (Kim & Kang, 2016), while findings on sex differences remain inconclusive (Yadav & Chakraborty, 2017).

While the present study did not find statistically significant age-related differences within the adolescent and young adult sample, the broader literature indicates that age may still be a relevant factor in understanding long-term patterns of smartphone overuse and dependency.

Table 5 Descriptive Statistics for Smartphone Addiction by Sex (Male and Female Participants)

Variable	Sex	n	Mean	SD
Depression	Male	146	10.51	5.161
	Female	250	11.60	5.057

Table 6 Independent Samples t-test Analysis of Depression Between Male and Female Participants

Variable	t-value	df	Sig. (2-tailed)
Depression	-2.067	394	0.039

A significant gender difference was found in depression, with females reporting higher levels of depression than males (Table 5). Table 6 presents a statistically significant difference (p = .039), in the depression scores underscores the importance of considering sex and intersectional factors when examining the relationship between digital behaviors and mental health (Desouky& Abu-Zaid, 2020;Nahidi et al., 2023;Reppas-Rindlisbacher et al., 2022;Sun et al., 2023;Volungis et al., 2019). This highlights a complex link between smartphone addiction and psychological outcomes, influenced by personality and demographic factors (Alqaderi et al., 2023).

These findings highlight the need for more advanced research methodologies to elucidate the complex interactions between digital behaviors, psychological states, and demographic variables (Yogesh et al., 2024). The intricate relationship between these factors emphasizes the importance of adopting a nuanced, intersectional approach when investigating the association between gender and psychological well-being(Liu & Lin, 2023). Future research could benefit from longitudinal designs, exploration of potential mediating factors, and incorporation of qualitative methodologies to provide a more comprehensive understanding of this dynamic relationship. These results have implications for developing targeted interventions and public health strategies. While broad-based approaches to mitigating smartphone addiction may be warranted because of its prevalence across groups, gender-specific interventions addressing vulnerabilities in mental health outcomes could prove particularly effective(Cheng & Ebrahimi, 2023;Zhao et al., 2022).

Limitations

The limitations of the study include the use of self-reported data, which may introduce bias due to potential inaccuracies or social desirability effects. The non-random sampling approach could lead to a sample that is not fully representative of the target population, potentially affecting the generalizability of the results. Future research should consider longitudinal designs, objective measures, and random sampling techniques to address these limitations. Additionally, replication studies in diverse populations and settings would strengthen the validity and applicability of these findings.

Implications and Recommendations

Smartphone addiction among Indian students is a pervasive issue that affects mental health, particularly among female students. The findings of this study highlight the need for targeted interventions and support mechanisms to address the complex relationship between smartphone use and psychological well-being in diverse student populations. The following recommendations were made based on the results and findings.

1. **Develop Gender-Sensitive Mental Health Programs:** Create targeted support initiatives addressing the specific vulnerabilities of female students related to smartphone addiction.
2. **Promote Responsible Smartphone Use:** Integrate digital literacy, mental health awareness, and healthy technological habits into the academic curriculum.
3. **Strengthening Counseling and Screening Services:** Establish dedicated counseling centers and collaborate with mental health professionals to design early screening tools for smartphone addiction.
4. **Implement Institutional Policies:** Encourage educational institutions to adopt policies that promote balanced technology use and foster a healthy digital environment.
5. **Foster Collaborative Interventions:** Partner with tech companies to develop apps that promote digital well-being and encourage peer-led support groups for healthier digital practices.

CONCLUSION

Smartphone addiction remains a significant psychological challenge for Indian students, with no notable differences in addiction levels among demographic groups. However, the study revealed associated mental health concerns, particularly among female students, emphasizing the need for proactive mental health support. This study adds to the growing literature on the psychological impacts of smartphone use, underscoring the necessity for more nuanced investigations into the complex relationship between digital behaviors and emotional well-being across diverse populations. These findings highlight the importance of understanding the intricate interplay between technology use and mental health, suggesting that future research should explore targeted interventions and support strategies. By addressing these issues, educational institutions and policymakers can develop more effective approaches to promote healthy digital habits and mental well-being among students in India and potentially in similar contexts.

REFERENCES

1. Aeron, S., & Rahman, Z. (2023). Discrete emotions effect on consumer evaluation and behaviour: A contextual perspective and directions for future research. *Journal of Consumer Behaviour*, *22*(6), 1543–1573. https://doi.org/10.1002/cb.2243
2. Ahad, A. D., &Anshari, M. (2017). Smartphone Habits Among Youth. *International Journal of Cyber Behavior, Psychology and Learning*, *7*(1), 65–75. https://doi.org/10.4018/ijcbpl.2017010105
3. Alabdallat, Y., Albakri, K. A., Harvey, H., Al-Hanaqtah, B. M., Saleh, O. M., & Al-Dajani, M. H. (2023). The Association between Smartphone Addiction, Depression and Anxiety among Medical Students in Jordan. *Jordan Medical Journal*, *57*(1). https://doi.org/10.35516/jmj.v57i1.1102
4. Alotaibi, M., Coman, R., Ratan, Z., Fox, M., & Hosseinzadeh, H. (2022). Smartphone Addiction Prevalence and Its Association on Academic Performance, Physical Health, and Mental Well-Being among University Students in Umm Al-Qura University (UQU), Saudi Arabia. *International Journal of Environmental Research and Public Health*, *19*(6), 3710. https://doi.org/10.3390/ijerph19063710
5. Alotaibi, M. S., Fox, M., Coman, R., Ratan, Z. A., & Hosseinzadeh, H. (2022). Perspectives and Experiences of Smartphone Overuse among University Students in Umm Al-Qura University (UQU), Saudi Arabia: A Qualitative Analysis. *International Journal of Environmental Research and Public Health*, *19*(7), 4397. https://doi.org/10.3390/ijerph19074397
6. Alqaderi, N., BanibellaAbdelmagied Elamin, A., Yasser Abdelraouf Abdelmonem, K., Teir, H. J., & Andrade, G. (2023). Phone addiction, cyberbullying, and mental health amongst young adults in the United Arab Emirates: a cross-sectional study. *BMC Psychology*, *11*(1). https://doi.org/10.1186/s40359-023-01320-1
7. Aubry, R., Quiamzade, A., & Meier, L. L. (2023). Depressive symptoms and upward social comparisons during Instagram use: A vicious circle. *Personality and Individual Differences*, *217*, 112458. https://doi.org/10.1016/j.paid.2023.112458
8. Barlett, C. P., Barlett, N. D., & Chalk, H. M. (2018). Transitioning Through Emerging Adulthood and Physical Health Implications. *Emerging Adulthood*, *8*(4), 297–305. https://doi.org/10.1177/2167696818814642
9. Burkhard, C., Radhakrishnan, R., Barzilay, R., Guloksuz, S., & Cicek, S. (2021). Need for Ethnic and Population Diversity in Psychosis Research. *Schizophrenia Bulletin*, *47*(4), 889–895. https://doi.org/10.1093/schbul/sbab048
10. Burnell, K., Underwood, M. K., Vollet, J. W., George, M. J., & Ehrenreich, S. E. (2019). Passive social networking site use and well-being: The mediating roles of social comparison and the fear of missing out. *Cyberpsychology: Journal of Psychosocial Research on Cyberspace*, *13*(3). https://doi.org/10.5817/cp2019-3-5
11. Catling, J. C., Bayley, A., Begum, Z., Wardzinski, C., & Wood, A. (2022). Effects of the COVID-19 lockdown on mental health in a UK student sample. *BMC Psychology*, *10*(1). https://doi.org/10.1186/s40359-022-00732-9

12. Cha, J. H., Ryu, S., Moon, J.-H., & Choi, Y.-J. (2023). Association between smartphone usage and health outcomes of adolescents: A propensity analysis using the Korea youth risk behavior survey. *PLOS ONE*, *18*(12), e0294553. https://doi.org/10.1371/journal.pone.0294553

13. Cheng, C., & Ebrahimi, O. V. (2023). Gamification: a Novel Approach to Mental Health Promotion. *Current Psychiatry Reports*, *25*(11), 577–586. https://doi.org/10.1007/s11920-023-01453-5

14. Cilligol Karabey, S., Palanci, A., & Turan, Z. (2023). How does smartphone addiction affect the lives of adolescents socially and academically?: a systematic review study. *Psychology, Health & Medicine*, *29*(3), 631–654. https://doi.org/10.1080/13548506.2023.2229241

15. Cohen, S., Kamarck, T., & Mermelstein, R. (1983). A Global Measure of Perceived Stress. *Journal of Health and Social Behavior*, *24*(4), 385–396. https://doi.org/10.2307/2136404

16. Csibi, S., Griffiths, M.D., Demetrovics, Z. *et al.* Analysis of Problematic Smartphone Use Across Different Age Groups within the 'Components Model of Addiction'. *Int J Ment Health Addiction* **19**, 616–631 (2021). https://doi.org/10.1007/s11469-019-00095-0

17. Derakhshanrad, N., Saberi, H., Mehrdad, R., &Yekaninejad, M. S. (2020). Neck pain associated with smartphone overuse: cross-sectional report of a cohort study among office workers. *European Spine Journal*, *30*(2), 461–467. https://doi.org/10.1007/s00586-020-06640-z

18. Desouky, D. E.-S., & Abu-Zaid, H. (2020). Mobile phone use pattern and addiction in relation to depression and anxiety. *Eastern Mediterranean Health Journal*, *26*(6), 692–699. https://doi.org/10.26719/emhj.20.043

19. Dou, F., Li, Q., Wang, M., Li, Q., & Li, X. (2021). Impact of perceived social support on fear of missing out (FoMO): A moderated mediation model. *Current Psychology*, *42*(1), 63–72. https://doi.org/10.1007/s12144-021-01404-4

20. Eaton, W. W., Smith, C., Ybarra, M., Muntaner, C., & Tien, A. (2004).*Center for Epidemiologic Studies Depression Scale—Revised (CESD-R)*[Database record]. APA PsycTests.https://doi.org/10.1037/t29280-000

21. Giovanniello, J. R., Paredes, N., Wiener, A., Ramírez-Armenta, K., Oragwam, C., Uwadia, H. O., Yu, A. L., Lim, K., Pimenta, J. S., Vilchez, G. E., Nnamdi, G., Wang, A., Sehgal, M., Reis, F. M., Sias, A. C., Silva, A. J., Adhikari, A., Malvaez, M., & Wassum, K. M. (2025). A dual-pathway architecture for stress to disrupt agency and promote habit. *Nature*. https://doi.org/10.1038/s41586-024-08580-w

22. Gligor, Șerban, &Mozoș, I. (2018). Indicators of smartphone addiction and stress score in university students. *Wiener KlinischeWochenschrift*, *131*(5–6), 120–125. https://doi.org/10.1007/s00508-018-1373-5

23. Gomez, M., Klare, D., Ceballos, N., Dailey, S., Kaiser, S., & Howard, K. (2021). Do You Dare to Compare?: The Key Characteristics of Social Media Users Who Frequently Make Online Upward Social Comparisons. *International Journal of Human–Computer Interaction*, *38*(10), 938–948. https://doi.org/10.1080/10447318.2021.1976510

24. Grant, J. E., Chamberlain, S. R., & Lust, K. (2019). Problematic smartphone use associated with greater alcohol consumption, mental health issues, poorer academic performance, and impulsivity. *Journal of Behavioral Addictions*, *8*(2), 335–342. https://doi.org/10.1556/2006.8.2019.32

25. Han, R., Xu, J., Qin, Y., & Ge, Y. (2020). The Impact of Social Media Use on Job Burnout: The Role of Social Comparison. *Frontiers in Public Health*, *8*. https://doi.org/10.3389/fpubh.2020.588097

26. Hielscher, E., Moores, C., Blenkin, M., Jadambaa, A., & Scott, J. G. (2021). Intervention programs designed to promote healthy romantic relationships in youth: A systematic review. *Journal of Adolescence*, *92*(1), 194–236. https://doi.org/10.1016/j.adolescence.2021.08.008

27. Jansen, A. E., & Searle, B. J. (2021). Diverse effects of team diversity: a review and framework of surface and deep-level diversity. *Personnel Review*, *50*(9), 1838–1853. https://doi.org/10.1108/pr-12-2019-0664

28. Jilisha, G., Menon, V., Venkatachalam, J., &Olickal, J. J. (2019). Nomophobia: A Mixed-Methods Study on Prevalence, Associated Factors, and Perception among College Students in Puducherry, India. *Indian Journal of Psychological Medicine*, *41*(6), 541–548. https://doi.org/10.4103/ijpsym.ijpsym_130_19

29. Kanjo, E., Kuss, D. J., & Ang, C. S. (2017). NotiMind: Utilizing Responses to Smart Phone Notifications as Affective Sensors. *IEEE Access*, *5*, 22023–22035. https://doi.org/10.1109/access.2017.2755661

30. Ke, Y., He, B., Yang, G., Wang, J., Zuo, L., Wang, H., Liu, X., & Xu, X. (2024). Self-esteem mediates the relationship between physical activity and smartphone addiction of Chinese college students: a cross-sectional study. *Frontiers in Psychology*, *14*. https://doi.org/10.3389/fpsyg.2023.1256743

31. Khan, A., Mcleod, G., Hidajat, T., & Edwards, E. J. (2023). Excessive Smartphone Use is Associated with Depression, Anxiety, Stress, and Sleep Quality of Australian Adults. *Journal of Medical Systems*, *47*(1). https://doi.org/10.1007/s10916-023-02005-3

32. Kil, N., Kim, J., Mcdaniel, J. T., & Kensinger, K. (2021). Examining associations between smartphone use, smartphone addiction, and mental health outcomes: A cross-sectional study of college students. *Health Promotion Perspectives*, *11*(1), 36–44. https://doi.org/10.34172/hpp.2021.06

33. Kil, N., Kim, J., Park, J., & Lee, C. (2021). Leisure boredom, leisure challenge, smartphone use, and emotional distress among U.S. college students: are they interrelated? *Leisure Studies*, *ahead-of-print*(ahead-of-print), 779–792. https://doi.org/10.1080/02614367.2021.1931414

34. Kim, H., Florack, A., Schlicht, R., & Schardt, M. (2021). The contributions of social comparison to social network site addiction. *PLOS ONE*, *16*(10), e0257795. https://doi.org/10.1371/journal.pone.0257795

35. Kim, M.-O., Kim, K., Choi, J., Ju, S., Yu, M., & Kim, H. (2015). Smartphone Addiction: (Focused Depression, Aggression and Impulsion) among College Students. *Indian Journal of Science and Technology*, *8*(25). https://doi.org/10.17485/ijst/2015/v8i25/80215

36. Kim, S.-K., Kang, H.-B., & Kim, S.-Y. (2016). An Analysis of the Effects of Smartphone Push Notifications on Task Performance with regard to Smartphone Overuse Using ERP. *Computational Intelligence and Neuroscience*, *2016*(4), 1–8. https://doi.org/10.1155/2016/5718580

37. Kim, Y.-J., Lee, D., Lee, Y., Kim, D.-J., & Jang, H. M. (2018). Effects of Internet and Smartphone Addictions on Depression and Anxiety Based on Propensity Score Matching Analysis. *International Journal of Environmental Research and Public Health*, *15*(5), 859. https://doi.org/10.3390/ijerph15050859

38. Kumar, S. K. A., Arumugam, P., Ihita, G. V., & Chaudhari, S. (2022). *A Survey on Rural Internet Connectivity in India*. 911–916. https://doi.org/10.1109/comsnets53615.2022.9668358

39. Kwok, C., Leung, P. Y., Fung, X. C. C., & Poon, K. Y. (2021). The Effects of Internet Gaming and Social Media Use On Physical Activity, Sleep, Quality of Life, and Academic Performance among University Students in Hong Kong. *Asian Journal of Social Health and Behavior*, *4*(1), 36–44. https://doi.org/10.4103/shb.shb_81_20

40. Kwon, M., Kim, D.-J., Yang, S., & Cho, H. (2013). The Smartphone Addiction Scale: Development and Validation of a Short Version for Adolescents. *PLoS ONE*, *8*(12), e83558. https://doi.org/10.1371/journal.pone.0083558

41. Lee, J. (2016). Does Stress from Cell Phone Use Increase Negative Emotions at Work? *Social Behavior and Personality: An International Journal*, *44*(5), 705–715. https://doi.org/10.2224/sbp.2016.44.5.705

42. Lin, L., Li, Q., Wang, X., Xia, B., Chen, P., & Wang, W. (2021). The Influence of Interpersonal Sensitivity on Smartphone Addiction: A Moderated Mediation Model. *Frontiers in Psychology*, *12*. https://doi.org/10.3389/fpsyg.2021.670223

43. Liu, J., & Lin, Z. (2023). Race/Ethnicity, Nativity, and Gender Disparities in Mental Health Trajectories from Mid- to Later-Life: A Life Course-Intersectional Approach. *Journal of Racial and Ethnic Health Disparities*, *11*(6). https://doi.org/10.1007/s40615-023-01808-x

44. Liu, M., & Lu, C. (2022). Mobile phone addiction and depressive symptoms among Chinese University students: The mediating role of sleep disturbances and the moderating role of gender. *Frontiers in Public Health*, *10*. https://doi.org/10.3389/fpubh.2022.965135

45. Lowe-Calverley, E., & Pontes, H. M. (2020). Challenging the Concept of Smartphone Addiction: An Empirical Pilot Study of Smartphone Usage Patterns and Psychological Well-Being. *Cyberpsychology, Behavior, and Social Networking*, *23*(8), 550–556. https://doi.org/10.1089/cyber.2019.0719

46. Luqman, A., Masood, A., Shahzad, F., Shahbaz, M., & Feng, Y. (2020). Untangling the adverse effects of late-night usage of smartphone-based SNS among University students. *Behaviour& Information Technology*, *40*(15), 1671–1687. https://doi.org/10.1080/0144929x.2020.1773538

47. Matar Boumosleh, J., &Jaalouk, D. (2017). Depression, anxiety, and smartphone addiction in university students- A cross sectional study. *PLOS ONE*, *12*(8), e0182239. https://doi.org/10.1371/journal.pone.0182239

48. Nahidi, M., Khadem-Rezayian, M., Ahmadi, M., Abdolalizadeh, A., Morovatdar, N., &FayyaziBordbar, M. R. (2023). The relationship between mobile phone addiction and depression, anxiety, and sleep quality in medical students. *International Clinical Psychopharmacology*, *39*(2), 70–81. https://doi.org/10.1097/yic.0000000000000517

49. Neophytou, E., Manwell, L. A., &Eikelboom, R. (2019). Effects of Excessive Screen Time on Neurodevelopment, Learning, Memory, Mental Health, and Neurodegeneration: a Scoping Review. *International Journal of Mental Health and Addiction*, *19*(3), 724–744. https://doi.org/10.1007/s11469-019-00182-2

50. Nikolic, A., Pavlović, Z., Sipetic, S., Bukurov, B., Vukovic, M., Vrhovac, M., Kocic, I., Kisic, D., Ladjevic, N., &Grujicic, J. (2023). Smartphone addiction, sleep quality, depression, anxiety, and stress among medical students. *Frontiers in Public Health*, *11*. https://doi.org/10.3389/fpubh.2023.1252371

51. Nguyen, B. T. N., Nguyen, N. P. H., Duong Le, H., & Nguyen, L. T. (2024). Smartphone addiction and mental health problems among Vietnamese undergraduate students: the mediating role of sleep quality. *International Journal of Mental Health*, *ahead-of-print*(ahead-of-print), 1–23. https://doi.org/10.1080/00207411.2024.2418621

52. Oraison, H., Nash-Dolby, O., Wilson, B., & Malhotra, R. (2020). Smartphone distraction-addiction: Examining the relationship between psychosocial variables and patterns of use. *Australian Journal of Psychology*, *72*(2), 188–198. https://doi.org/10.1111/ajpy.12281

53. Pangrazio, L., Ledesma, A. G. L., &Godhe, A.-L. (2020). What is digital literacy? A comparative review of publications across three language contexts. *E-Learning and Digital Media*, *17*(6), 442–459. https://doi.org/10.1177/2042753020946291

54. Pera, A. (2020). The Psychology of Addictive Smartphone Behavior in Young Adults: Problematic Use, Social Anxiety, and Depressive Stress. *Frontiers in Psychiatry*, *11*(1). https://doi.org/10.3389/fpsyt.2020.573473

55. Potnis, D. (2016). Inequalities creating economic barriers to owning mobile phones in India. *Information Development*, *32*(5), 1332–1342. https://doi.org/10.1177/0266666915605163

56. Prodanova, J., &Chopdar, P. K. (2023). The interplay of app characteristics and smartphone addiction in mobile shopping behaviour. *International Journal of Consumer Studies*, *48*(1). https://doi.org/10.1111/ijcs.12992

57. Ratan, Z., Zaman, S., Alotaibi, M., Parrish, A.-M., & Hosseinzadeh, H. (2021). Smartphone Addiction and Associated Health Outcomes in Adult Populations: A Systematic Review. *International Journal of Environmental Research and Public Health*, *18*(22), 12257. https://doi.org/10.3390/ijerph182212257

58. Reppas-Rindlisbacher, C., Siddhpuria, S., Hallet, J., Savage, R., Mahar, A., & Rochon, P. (2022). Gender Differences in Mental Health Symptoms Among Canadian Older Adults During the COVID-19 Pandemic: A Cross-Sectional Survey. *Canadian Geriatrics Journal*, *25*(1), 49–56. https://doi.org/10.5770/cgj.25.532

59. Scott, D. A., Valley, B., &Simecka, B. A. (2016). Mental Health Concerns in the Digital Age. *International Journal of Mental Health and Addiction*, *15*(3), 604–613. https://doi.org/10.1007/s11469-016-9684-0

60. Scott, H., Biello, S. M., & Woods, H. C. (2019). Identifying drivers for bedtime social media use despite sleep costs: The adolescent perspective. *Sleep Health*, *5*(6), 539–545. https://doi.org/10.1016/j.sleh.2019.07.006

61. 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. https://doi.org/10.5539/ass.v14n11p83

62. Swar, B., & Hameed, T. (2017). *Fear of Missing out, Social Media Engagement, Smartphone Addiction and Distraction: Moderating Role of Self-Help Mobile Apps-based Interventions in the Youth*. *6*. https://doi.org/10.5220/0006166501390146

63. Sun, Y., Sun, W., Fan, X. W., Zhong, Y., Chu, L., & Long, J. (2023). More prevalent and more severe: gender differences of depressive symptoms in Chinese adolescents. *Frontiers in Public Health*, *11*. https://doi.org/10.3389/fpubh.2023.1167234

64. Throuvala, M. A., Rennoldson, M., Kuss, D. J., & Griffiths, M. D. (2020). Mind over Matter: Testing the Efficacy of an Online Randomized Controlled Trial to Reduce Distraction from Smartphone Use. *International Journal of Environmental Research and Public Health*, *17*(13), 4842. https://doi.org/10.3390/ijerph17134842

65. Thulin, E. (2017). Always on My Mind. *YOUNG*, *26*(5), 465–483. https://doi.org/10.1177/1103308817734512

66. Turgeman, L., Bazon, M., Hefner, I., Yehoshua, O., & Weinstein, A. (2020). 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*, *17*(4), 1262. https://doi.org/10.3390/ijerph17041262

67. Twenge, J. M. (2020). Increases in Depression, Self-Harm, and Suicide Among U.S. Adolescents After 2012 and Links to Technology Use: Possible Mechanisms. *Psychiatric Research and Clinical Practice*, *2*(1), 19–25. https://doi.org/10.1176/appi.prcp.20190015

68. Vally, Z., Alghraibeh, A. M., & Elhai, J. D. (2021). Severity of depression and anxiety in relation to problematic smartphone use in the United Arab Emirates: The mediational roles of rumination and fear of missing out. *Human Behavior and Emerging Technologies*, *3*(3), 423–431. https://doi.org/10.1002/hbe2.259

69. Volungis, A. M., Popores, C., Kalpidou, M., & Joyce, M. (2019). Smartphone Addiction and Its Relationship with Indices of Social-Emotional Distress and Personality. *International Journal of Mental Health and Addiction*, *18*(5), 1209–1225. https://doi.org/10.1007/s11469-019-00119-9

70. Vujić, A., & Szabo, A. (2022). Hedonic use, stress, and life satisfaction as predictors of smartphone addiction. *Addictive Behaviors Reports*, *15*(1), 100411. https://doi.org/10.1016/j.abrep.2022.100411

71. Wagner, J., Trautwein, U., Jonkmann, K., & Lüdtke, O. (2013). Cherish yourself: Longitudinal patterns and conditions of self-esteem change in the transition to young adulthood. *Journal of Personality and Social Psychology*, *104*(1), 148–163. https://doi.org/10.1037/a0029680

72. Wang, W., Mehmood, A., Qiu, X., Chu, H., Yang, Y., Li, P., Qiao, Z., Niu, J., Yang, Z., Yang, X., & Zhou, J. (2021). Perceived Stress and Smartphone Addiction in Medical College Students: The Mediating Role of Negative Emotions and the Moderating Role of Psychological Capital. *Frontiers in Psychology*, *12*. https://doi.org/10.3389/fpsyg.2021.660234

73. Weaver, J. L., & Swank, J. M. (2019). Mindful Connections: A Mindfulness-Based Intervention for Adolescent Social Media Users. *Journal of Child and Adolescent Counseling*, *5*(2), 103–112. https://doi.org/10.1080/23727810.2019.1586419

74. Xiao, Z., & Huang, J. (2022). The Relation Between College Students' Social Anxiety and Mobile Phone Addiction: The Mediating Role of Regulatory Emotional Self-Efficacy and Subjective Well-Being. *Frontiers in Psychology*, *13*. https://doi.org/10.3389/fpsyg.2022.861527

75. Yadav, S., & Chakraborty, P.(2017). Children aged two to four are able to scribble and draw using a smartphone app. *Acta Paediatrica*, *106*(6), 991-994.

76. https://doi.org/10.1111/apa.13818

77. Yang, H., Fang, J., & Liu, B. (2021). Stress and Problematic Smartphone Use Severity: Smartphone Use Frequency and Fear of Missing Out as Mediators. *Frontiers in Psychiatry*, *12*. https://doi.org/10.3389/fpsyt.2021.659288

78. Yogesh, M., Ladani, H., & Parmar, D. (2024). Associations between smartphone addiction, parenting styles, and mental well-being among adolescents aged 15–19 years in Gujarat, India. *BMC Public Health*, *24*(1). https://doi.org/10.1186/s12889-024-19991-9

79. Zhang, Y., Shang, S., Tian, L., Zhu, L., & Zhang, W. (2023). The association between fear of missing out and mobile phone addiction: a meta-analysis. *BMC Psychology*, *11*(1). https://doi.org/10.1186/s40359-023-01376-z

80. Zhao, Z., Chen, C., Zhang, Y., Zhao, S., & Wang, Q. (2022). Effects of Physical Exercise on Mobile Phone Addiction in College Students: The Chain Mediation Effect of Psychological Resilience and Perceived Stress. *International Journal of Environmental Research and Public Health*, *19*(23), 15679. https://doi.org/10.3390/ijerph192315679

81. Zhong, Y., Liang, Y.-F., Zhang, C.-C., Liao, C.-J., Jiang, W.-J., & Ma, H. (2022). Prevalence of smartphone addiction among Asian medical students: A meta-analysis of multinational observational studies. *International Journal of Social Psychiatry*, *68*(6), 1171–1183. https://doi.org/10.1177/00207640221089535

82. Ziapour, A., Kianipour, N., Azizi, S., Mansourian, M., Gilan, H., Abbas, J., Toghroli, R., Salahshoor, M., Lebni, J., Chaboksavar, F., &Nejhaddadgar, N. (2020). A study of internet addiction and its effects on mental health: A study based on Iranian University Students. *Journal of Education and Health Promotion*, *9*(1), 205. https://doi.org/10.4103/jehp.jehp_148_20

Acknowledgement

The authors express their sincere gratitude to all individuals who contributed to the successful completion of this paper, your support is greatly appreciated. Special thanks to Min Kwon, Assistant Professor, Department of Nursing, University of Suwonfor permitting us to use the Smartphone Addiction Scale in this study.

Conflict of Interest

The authors have explicitly stated that this paper does not have any conflicts of interest.

Author Contributions

AGS (first author) helped conceptualize the study, obtained the necessary permissions for the use of standardized scales and measures, conducted data collection, and drafted the manuscript. JF contributed to the conceptualization and design of the study, performed the statistical analyses, and assisted in revising and refining the manuscript. Both authors critically reviewed and approved the final version of the manuscript for submission.

Funding

This study was conducted without financial support or funding from external sources, agencies, or institutions. All research activities, including data collection, analysis, and manuscript preparation, were conducted independently without any financial assistance. The authors declare that there are no conflicts of interest related to this study, and all the findings and conclusions are those of the authors alone.