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Smartphone Addiction among College Students: A Systematic Review of Risk and Protective Factors

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A B S T RAC T

Smartphone addiction refers to a compulsive and hard to control pattern of smartphone use that leads to various psychological and behavioral impacts. This study employs a Systematic Literature Review (SLR) to identify risk and protective factors associated with smartphone addiction among college students. Using predefined inclusion criteria, 18 empirical studies published between 2020–2025 were reviewed from Scopus and Publish or Perish databases. The analysis highlights consistent risk factors such as stress, loneliness, neuroticism, and alexithymia, as well as key protective factors including self-control, mindfulness, physical activity, and social support. These findings emphasize the importance of strengthening psychological and social resources in preventing smartphone addiction among college students.

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INTRODUCTION

Smartphone addiction, often referred to as problematic smartphone use, can be defined as a compulsive and uncontrollable pattern of smartphone use, which ultimately leads to various negative consequences on an individual's physical, psychological, and social aspects (Ting & Chen, 2020). Research by Alotaibi et al. (2022) in Saudi Arabia reported that around 67% of students were addicted to smartphones and more than half of the respondents had been using smartphones for 5-8 years with an average daily duration of 6 to 11 hours, and most of the activities carried out were accessing social media (82.6%), entertainment (66.2%), and web browsing (59.6%). Research in Indonesia found that smartphone addiction in 63% of students was in the moderate category and 20% was in the high category (Aulia & Fikry, 2025).

Various studies show that smartphone addiction is associated with negative consequences on health and psychological problems. Problematic smartphone use is associated with increased daytime fatigue, eye strain, physical dysfunction, decreased immunity, and poor sleep quality (Xie et al., 2018). Students with high levels of addiction tend to experience decreased self-esteem, increased depression, stress, and loneliness (Mohamed & Mostafa, 2020; Elamin et al., 2024; Su & He, 2024). This addiction also has a negative impact on academic aspects, including decreased achievement, learning fatigue, and procrastination (Zhang & Zeng, 2024; Purnomo et al., 2020). In addition, the presence of smartphones has been shown to interfere with concentration and cognitive attention (Schwaiger & Tahir, 2022).

Several studies have identified a number of factors that contribute to the emergence of smartphone addiction among students. Loneliness was found to have a positive correlation with smartphone addiction among students living away from home (Aulia & Fikry, 2025). Personality factors such as shyness (Li et al., 2022), symptoms of anxiety, depression, and executive dysfunction were positively and significantly correlated with smartphone usage levels (Ge et al., 2023). On the other hand, there is also a relationship between life meaning and academic adjustment ability and a decrease in smartphone addiction (Zhao et al., 2023).

Various factors that influence smartphone addiction can be categorized into risk factors and protective factors. Empirical research by Lai et al. (2022) found that depression, social anxiety, and phubbing behavior are risk factors that increase the tendency for smartphone addiction, while self-control and psychological security act as protective factors that prevent smartphone addiction among students. Meanwhile, Osorio-Molina et al. (2021) conducted a systematic review of risk factors and the negative impacts of smartphone addiction among nursing students. Understanding risk and protective factors is important to clarify how certain conditions can exacerbate or prevent the emergence of addictive smartphone behavior among students.

Thus, this study aims to compile a systematic review of risk and protective factors for smartphone addiction among students, in order to gain a more comprehensive understanding of the psychological conditions that strengthen or protect individuals from addictive tendencies. This study is expected to enrich

scientific understanding of the psychological mechanisms behind smartphone addiction, while practically, the results can form the basis for the development of interventions and prevention strategies in higher education settings.

LITERATURE REVIEW

Smartphone addiction or problematic smartphone use can be defined as compulsive and uncontrollable smartphone use, which ultimately causes various negative consequences on an individual's physical, psychological, and social aspects (Ting & Chen, 2020). Kwon et al. (2013) mention six aspects of smartphone addiction, namely: 1) daily-life disturbance, which is excessive smartphone use that can disrupt daily activities; 2) positive anticipation, which is the tendency to feel happy, entertained, or more relaxed when using a smartphone; 3) withdrawal, which is feeling restless, irritable, or uneasy when unable to access one's smartphone, even when the device is not in one's possession; 4) cyberspace-oriented relationships, where users feel more connected to social relationships in the virtual world than to real-life relationships; 5) overuse, which is a pattern of smartphone use that is difficult to control, a strong urge to return to using the device, and dependence on smartphones to complete various tasks; and finally, 6) tolerance, which describes the failure to limit use despite trying to do so.

The literature shows several motives that drive smartphone addiction (Zhang et al., 2014). Individuals tend to use smartphones because: 1) as an escape strategy to cope with stress, anxiety, boredom, and other negative emotions (coping & pastime motives), 2) social pressure and the need to be accepted or not miss out on information (conformity motive) also increase addictive tendencies; 3) the motive to seek pleasure or positive stimulation (enhancement motives). Smartphone addiction is viewed as a multifactorial phenomenon, influenced by both internal and external conditions. Therefore, this systematic review aims to identify risk factors that increase vulnerability to smartphone addiction, as well as protective factors that have the potential to reduce such addictive behavior.

METHODOLOGY

The systematic review process was conducted following the stages outlined by Kitchenham (2004), namely planning, implementation, and reporting. In the planning stage, the author formulated research questions using the SPIDER model with a focus on: what are the risk factors and protective factors associated with smartphone addiction among college students? Next, the author developed a search protocol by determining relevant search terms, namely: “smartphone addiction OR problematic smartphone use OR mobile phone addiction” AND “college students OR university students OR undergraduate students” AND “protective AND risk”. The search was conducted through the Scopus and Publish or Perish databases.

The inclusion criteria for this review were: (1) articles examining risk and/or protective factors for smartphone addiction; (2) participants were university students; (3) use of standardized measurement instruments; (4) quantitative design; (5) published between 2020 and 2025; and (6) written in

English. Articles were excluded if they did not meet these criteria. All search results were managed using Rayyan for duplication identification, title-abstract selection, and full-text review. Of the 1175 articles found, 18 articles met the criteria. The results of this review are reported following the PRISMA guidelines in **Figure 1**.

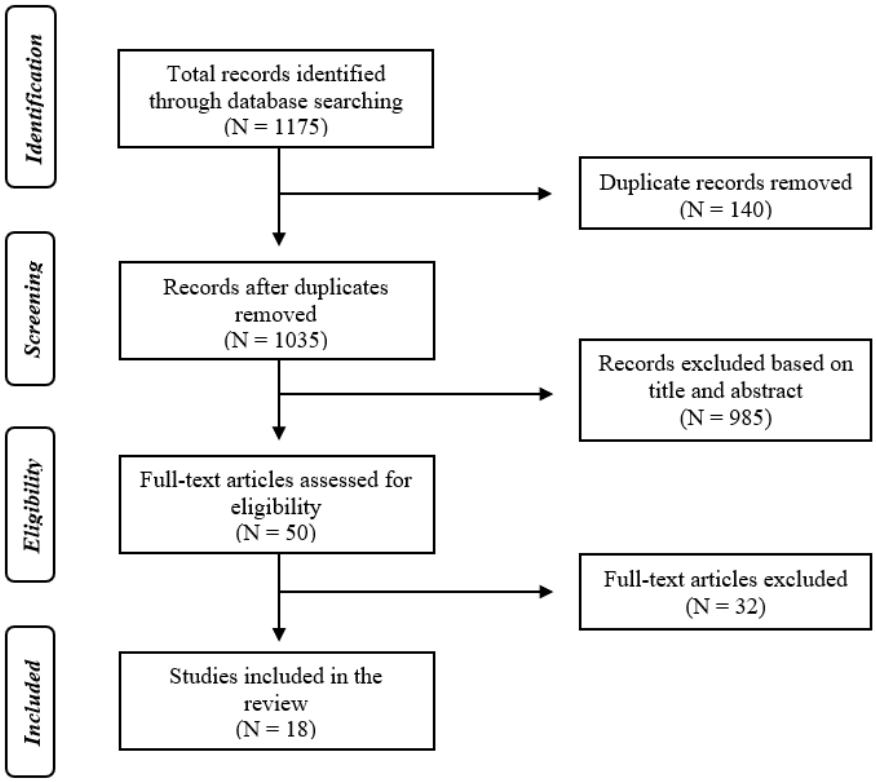

Figure 1. PRISMA Flow Diagram

RESULTS AND DISCUSSION

A review of 18 studies shows that smartphone addiction among students is influenced by a combination of psychological, social, and behavioral risk factors, and can be mitigated by a number of internal and external protective factors. In general, the most consistent pattern is that psychological distress (e.g., stress, anxiety, loneliness, or depression) is positively associated with smartphone addiction, while self-regulation, self-control, and adaptive activities such as physical activity or time management serve as significant protective factors. The details of the review results are presented in **Table 1.**

Table 1. Research Results on Risk and Protective Factors Affecting Smartphone Addiction in University Students

No.	Authors	Subjects	Findings		Conclusion
			Risk Factors	Protective Factors	
1.	Wang et al. (2025)	268 Chinese college students	Parental psychological control	Physical activity	The higher the psychological control of parents and the greater the sense of

			and loneliness.		loneliness, the higher the risk of smartphone addiction among students. Physical activity can reduce the negative influence of loneliness on smartphone addiction.
2.	Kong et al. (2025)	685 Chinese university students	Academic anxiety and self-regulatory fatigue.	Mindfulness	Academic anxiety and regulatory fatigue significantly increase the risk of smartphone addiction. Meanwhile, mindfulness serves as a significant protective factor because it reduces the negative effects of regulatory fatigue on smartphone addiction.
3.	Zhang et al. (2022)	999 Chinese university students	Attachment anxiety	Teacher-student relationship and school connectedness.	Attachment anxiety increases the risk of smartphone addiction. Positive relationships with teachers and school connectedness act as significant protective factors against smartphone addiction.
4.	El-Zhoghby et al. (2024)	1435 Egypt medical students	Cyberchondria level	Physical activity	The use of Facebook, WhatsApp, daily online duration, and increasing online health anxiety (cyberchondria) have the potential to increase smartphone addiction. Regular physical activity can

					reduce the risk of smartphone addiction.
5.	Tong & Meng (2023)	4621 Chinese university students	Negative emotion	Physical exercise and E-health literacy.	Negative emotions are significantly positively associated with increased smartphone addiction. Physical activity and increased digital literacy can reduce smartphone addiction.
6.	Kil et al. (2024)	601 US undergraduate students	Boredom and awareness	Challenge	High levels of boredom and awareness significantly increase smartphone addiction. Positive challenging experiences can reduce smartphone addiction.
7.	Cheng et al. (2020)	270 Chinese college students	Rumination	Mindfulness and self-control	Negative emotions (rumination) can increase smartphone addiction. Mindfulness reduces smartphone addiction before bedtime by increasing self-control and decreasing rumination.
8.	Xiao et al. (2024)	718 Chinese university students	Low perceived social mobility	Hope and high family socioeconomic status	Students from low-income backgrounds who believe that social mobility is still possible tend to have higher expectations and are less dependent on smartphones.
9.	Zheng et al. (2024)	900 Chinese nursing students	Perceived stress	Organizational caring and self control	The higher the perceived support from the organization (campus, faculty, or

					institution), the more calm students will feel or the lower their perceived stress will be, the better their self-control will be, and the less addictive behavior they will exhibit toward their cell phones.
10.	Li et al. (2025)	592 Chinese nursing students	Stress perception	Self control and psychological capital	Students with high self-control and psychological capital are more resistant to the negative effects of stress and better able to control their cell phone use.
11.	Li et al. (2023)	1580 Chinese college students	Loneliness	Family functioning and capacity to be alone	A healthy family function can reduce the risk of mobile phone addiction directly or indirectly by reducing loneliness, and this protective effect is stronger in students who are less able to enjoy solitude.
12.	Liu et al. (2020)	1169 Chinese college students	Childhood psychological maltreatment, neuroticism and negative coping style	-	Experiences of psychological abuse in childhood can increase smartphone addiction through increased neuroticism and negative coping styles.
13.	Basti et al. (2021)	684 students from 4 Indian colleges	Anxiety, depression, and stress	-	Depression, anxiety, and stress are positively associated with smartphone addiction. Stress is the strongest predictor of

					smartphone addiction.
14.	Kartal & Ayhan (2020)	437 Turkey college students	Eating behavior disorder	-	Eating disorders are closely related to internet and smartphone addiction, as well as longer periods of digital media use. Women are more at risk for eating disorders.
15.	Elkholy et al. (2024)	200 Egypt university students	Alexithymia	-	Alexithymia (individuals with difficulty recognizing emotions) has a strong and significant relationship with smartphone addiction.
16.	Chen & Guo (2022)	783 Chinese university students	-	Personal growth initiative and self control	Personal-growth initiative and self-control initiatives act as protective factors against smartphone addiction, with self-control mediating the relationship between the two.
17.	Atiri et al. (2020)	248 Nigeria undergraduate students	-	Self regulation	Students with good self-regulation tend to have lower levels of smartphone addiction.
18.	Gezgin et al. (2021)	591Turkey university students	-	Free time management skills (leisure, leisure attitude, and goal setting	Good leisure time management reduces the risk of smartphone addiction; scheduling is the strongest protective factor.

Based on Table 1, several dominant risk variable groups emerged, including: 1) stress, anxiety, and depression were consistently positively associated with smartphone addiction (Basti et al., 2021; Kong et al., 2025; Li et

al., 2025). These negative emotional conditions are thought to increase individuals' need to seek distraction through smartphone use; 2) loneliness and attachment anxiety are also strong predictors (Zhang et al., 2022; Li et al., 2023), lonely students tend to use smartphones for social compensation; 3) parental psychological control and unsupportive childhood experiences, such as childhood psychological maltreatment (Liu et al., 2020; Wang et al., 2025), increase vulnerability to maladaptive smartphone use, particularly through increased neuroticism or negative emotions; 4) maladaptive behavioral factors, such as rumination (Cheng et al., 2020), boredom (Kil et al., 2024), cyberchondria (El-Zhoghby et al., 2024), and eating disorders (Kartal & Ayhan, 2020) were also found to increase the risk of smartphone addiction; and 5) personality and emotional factors, such as alexithymia (Elkholy et al., 2024), showed a significant relationship with smartphone addiction, indicating that difficulty recognizing and managing emotions increases addictive tendencies. These findings support the theoretical model of compensatory internet use theory (Kardefelt-Winther, 2014), that excessive use of technology can be a compensatory strategy for stress, loneliness, or dissatisfaction with life.

Conversely, a number of studies have identified protective factors that reduce the risk of smartphone addiction, including: 1) self-control and self-regulation emerged as the most consistent protective factors (Cheng et al., 2020; Chen & Guo, 2022; Ororume et al., 2020; Li et al., 2025; Zheng et al., 2024), students with the ability to regulate impulses and emotions are better able to adaptively control their phone use; 2) mindfulness and psychological capital (Kong et al., 2025; Li et al., 2025) play an important role in reducing the negative effects of stress and regulatory fatigue, mindfulness also increases self-control, which ultimately reduces addictive behavior; 3) Physical activity is a significant protective factor in several studies (Wang et al., 2025; Tong & Meng, 2023; El-Zhoghby et al., 2024). This activity helps divert attention from smartphone use and improves psychological well-being; 4) Positive social relationships, such as family support, teacher-student relationships, and organizational caring (Zhang et al., 2022; Li et al., 2023; Zheng et al., 2024), have been shown to strengthen the sense of belonging and suppress compensatory behavior through smartphones; 5) leisure time management and goal orientation (Gezgin et al., 2021) also protect individuals by creating meaningful activity structures, thereby reducing the urge to use smartphones impulsively; and 6) positive expectations and perceptions of social mobility (Xiao et al., 2024) also act as protective psychosocial factors, particularly among students with low socioeconomic status, by fostering a constructive future orientation.

Most studies also examine mediating mechanisms, particularly those involving self-control, expectations, or loneliness. For example, the negative effects of loneliness on smartphone addiction can be reduced through physical activity (Wang et al., 2025) or family support (Li et al., 2023). Mindfulness works indirectly through increased self-control (Cheng et al., 2020), while hope mediates the relationship between perceptions of social mobility and smartphone addiction (Xiao et al., 2024). This pattern suggests that emotional regulation and

self-control are the primary psychological mechanisms that bridge risk and protective factors for smartphone addiction.

Cross-sectional study findings confirm that smartphone addiction is not merely a habitual behavior, but is closely related to deep psychological factors such as emotional regulation, stress, and social relationships. In addition, cultural factors also appear to play a role. Most studies have been conducted in East Asia, namely China, with a collectivist cultural context that emphasizes social harmony, which may influence the way individuals use smartphones for social compensation. Cross-cultural studies are needed to test the generalizability of these findings.

CONCLUSIONS AND RECOMMENDATIONS

Overall, smartphone addiction among students is influenced by a combination of internal risk factors (such as stress, loneliness, neuroticism, and alexithymia) and psychosocial protective factors (such as self-control, mindfulness, physical activity, and social support). Various studies show that mediation mechanisms through self-control and emotional regulation are important pathways that explain how these psychological factors contribute to addictive behavior. Thus, strengthening students' psychological capacity, especially in terms of self-regulation, can be a relevant prevention strategy. Practically, the findings of this review imply the need for campus intervention programs that focus on improving self-control, digital health literacy, and providing social support. Educational institutions can also integrate mindfulness training, physical activity programs, and time management to reduce excessive exposure to smartphones.

FURTHER STUDY

This study still has limitations, so further research is still needed on the topic “Smartphone Addiction among College Students: A Systematic Review of Risk and Protective Factors.” Further studies are recommended to expand the methodological design, present a more diverse population, and explore psychological mechanisms that have not been fully revealed in previous studies.

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