

Smartphone Addiction and Loneliness Among Adolescents: A Comprehensive Review of Psychological, Behavioural, and Social Correlates.

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ABSTRACT

Smartphone use has become nearly universal among adolescents, providing convenience, communication, entertainment, and social connectivity. However, excessive and maladaptive use, often described as smartphone addiction or problematic smartphone use, has emerged as a growing behavioural and public health concern. At the same time, loneliness remains a significant psychosocial issue during adolescence, a developmental stage characterised by increased sensitivity to peer relationships, belongingness, and social evaluation. Evidence from recent and foundational studies indicates that smartphone addiction and loneliness are closely related and may influence each other in a bidirectional manner. Adolescents experiencing loneliness often turn to smartphones as a coping mechanism for emotional relief, social reassurance, and distraction. Digital platforms can provide a temporary sense of connection; however, excessive smartphone use may reduce face-to-face interactions, contribute to social withdrawal, disrupt sleep, and impair emotional regulation. Over time, these effects may worsen feelings of loneliness and negatively impact psychosocial well-being. Several psychological mechanisms help explain this relationship, including fear of missing out, social comparison, emotional avoidance, and reduced development of social competence.

In addition, factors such as depression, anxiety, stress, low self-esteem, parenting style, and poor family communication may influence both smartphone addiction and loneliness, increasing their severity and persistence. Overall, problematic smartphone use should not be viewed merely as excessive screen time, but as a complex psychosocial issue embedded within emotional, developmental, and relational contexts. Future research should focus on longitudinal and intervention-based approaches to promote healthier digital behaviour and improve adolescent mental well-being.

Keywords: Smartphone Addiction; Loneliness; Adolescents; Problematic Smartphone Use; Social Withdrawal; Mental Health; Digital Behaviour; Psychosocial Well-Being

INTRODUCTION

Adolescence is a critical developmental period characterised by rapid biological, cognitive, emotional, and social changes. During this stage, peer relationships, identity formation, emotional regulation, and social belonging become central to psychological well-being. At the same time, adolescents are among the most active users of smartphones, with mobile technology becoming deeply embedded in their daily communication, education, entertainment, and social interaction. Although smartphones offer convenience, connectivity, and access to information, growing evidence suggests that excessive and maladaptive smartphone use may have important consequences for adolescent mental and social health.^[1,2]

In recent years, smartphone addiction, often referred to as problematic smartphone use (PSU), has emerged as a significant public health and behavioural concern. While smartphone addiction is not yet universally classified as a formal psychiatric disorder, it is increasingly conceptualised as a behavioural pattern marked by excessive use, impaired self-control, compulsive checking, withdrawal-like symptoms, tolerance, and functional impairment in daily life.^[3] Adolescents appear particularly vulnerable to such patterns because of ongoing neurodevelopment, heightened sensitivity to reward, greater emotional reactivity, and increased dependence on peer validation and digital social engagement.^[4] These developmental characteristics may increase susceptibility to excessive smartphone use, especially in environments where online interaction is normalised and continuously reinforced.

One of the most concerning psychosocial outcomes associated with problematic smartphone use is loneliness. Loneliness is a subjective and distressing emotional state resulting from a perceived discrepancy between desired and actual social relationships. Unlike objective social isolation, loneliness reflects the quality rather than merely the quantity of interpersonal connections.^[5] During adolescence, loneliness has been associated with a range of adverse outcomes, including low self-esteem, poor academic adjustment, emotional dysregulation, depression, anxiety, and reduced life satisfaction.^[6] Because adolescence is a period in which social belonging strongly influences psychological development, persistent loneliness may exert profound effects on well-being and social functioning.

The relationship between smartphone addiction and loneliness is particularly complex and may be bidirectional. On one hand, adolescents who experience loneliness may turn to smartphones as a coping mechanism to seek distraction, companionship, social reassurance, or escape from unpleasant emotions. Digital platforms, instant messaging, short-form media, gaming, and social networking applications may provide temporary emotional relief and a sense of connectedness. On the other hand, excessive smartphone use may displace face-to-face interactions, reduce participation in family and peer activities, impair communication quality, disrupt sleep, and reinforce social comparison, thereby intensifying feelings of loneliness over time.^[7] Recent longitudinal evidence suggests that loneliness may significantly predict problematic smartphone use in adolescents, supporting the view that emotional vulnerability can drive maladaptive digital behaviour.^[8]

Importantly, smartphone addiction rarely occurs in isolation. It is often intertwined with a broader constellation of psychosocial and behavioural problems such as depression, anxiety, sleep deprivation, stress, low self-esteem, poor emotional regulation, family dysfunction, and social withdrawal.^[2,9] These associated factors may either mediate or moderate the relationship between smartphone addiction and loneliness, making the association more dynamic than a simple one-directional effect. For example, lonely adolescents may engage more heavily with smartphones because of boredom, reduced offline social support, or unmet emotional needs, while excessive smartphone use may further impair emotional resilience and real-world social connectedness. Thus, smartphone addiction may not merely be a technological habit, but a behavioural manifestation of underlying psychosocial vulnerability.

Another reason this topic warrants careful review is the increasing normalisation of constant smartphone engagement among adolescents. The ubiquity of smartphones can obscure the distinction between adaptive high-frequency use and truly problematic use. Because smartphones are used for communication, education, socialisation, and entertainment, excessive use may often be underestimated or dismissed until functional, emotional, or relational problems become pronounced. Furthermore, the design features of smartphone-based applications—including notifications, infinite scrolling, algorithm-driven reinforcement, social feedback loops, and

reward-based interaction—may amplify compulsive use patterns and make disengagement particularly difficult for young users.^[3]

This raises important concerns not only for mental health research but also for public health policy, parental guidance, educational settings, and digital well-being interventions. Although a growing body of literature has examined problematic smartphone use among adolescents, the specific relationship between smartphone addiction and loneliness remains scattered across cross-sectional studies, longitudinal analyses, and broader mental health investigations. Existing evidence often overlaps with related constructs such as social isolation, social withdrawal, fear of missing out, depression, anxiety, and poor interpersonal functioning, making it necessary to synthesise findings in a focused and critical manner. A clearer understanding of this association is essential for identifying at-risk adolescents, understanding the mechanisms that sustain maladaptive smartphone use, and informing prevention and intervention strategies. Therefore, this review aims to comprehensively examine the association between smartphone addiction and loneliness among adolescents, with emphasis on their psychological, behavioural, and social correlates. In addition to summarising the available evidence, this review explores potential explanatory mechanisms, associated mental health factors, and implications for future research, school-based interventions, family support, and adolescent mental health promotion.

Smartphone Addiction in Adolescents

Smartphone use has become nearly universal among adolescents, transforming the way young people communicate, learn, socialise, and entertain themselves. Smartphones now function as multifunctional devices that integrate messaging, gaming, social networking, academic access, video streaming, photography, and instant information retrieval into everyday life. For adolescents, these devices are not merely communication tools but central components of social participation and identity expression. While moderate smartphone use may support connection, learning, and convenience, excessive and dysregulated use has raised growing concerns regarding its impact on mental, behavioural, and social well-being.^[1,3]

The term smartphone addiction is widely used in the literature to describe a pattern of excessive smartphone use characterised by impaired control, compulsive engagement,

preoccupation, withdrawal-like discomfort when access is restricted, and continued use despite negative consequences.^[3] Although debate remains regarding whether the term “addiction” should be applied in a strict clinical sense, the concept is frequently operationalised under related terms such as problematic smartphone use, compulsive smartphone use, or maladaptive smartphone use.^[3,4] These constructs share a common emphasis on loss of control and functional impairment rather than simply high screen time. This distinction is important because frequent smartphone use alone does not necessarily indicate addiction; rather, problematic use is defined by the degree to which smartphone behaviour interferes with sleep, emotional regulation, academic functioning, interpersonal relationships, and daily responsibilities.^[3]

The assessment of smartphone addiction in adolescents has increasingly relied on standardised psychometric tools. One of the most commonly used instruments is the Smartphone Addiction Scale–Short Version (SAS-SV), which was specifically developed and validated for adolescent populations.^[10] This tool evaluates key dimensions such as daily-life disturbance, withdrawal, overuse, and tolerance, and has been widely applied in both school-based and clinical research settings.^[10] Later validation studies in adolescent populations across different countries have supported its usefulness and reliability, highlighting the growing need for standardised measurement in this field.^[10] The availability of validated tools has helped strengthen the empirical study of problematic smartphone use and distinguish it from general high-frequency technology use. A substantial body of literature suggests that problematic smartphone use among adolescents is associated with a wide range of adverse outcomes. These include sleep disturbances, reduced sleep quality, poor academic concentration, procrastination, emotional dysregulation, stress, anxiety, depressive symptoms, reduced physical activity, and interpersonal difficulties.^[1-3] Although the direction of causality varies across studies, repeated findings indicate that adolescents with higher problematic smartphone use scores often experience greater psychosocial burden than their peers.^[1] In particular, nighttime smartphone use and compulsive checking behaviours have been linked to delayed sleep onset, shorter sleep duration, daytime fatigue, and impaired school

functioning, all of which may indirectly worsen emotional and social well-being.^[2]

Importantly, problematic smartphone use in adolescence is also shaped by multiple individual, familial, and social risk factors. Individual vulnerabilities may include impulsivity, low self-esteem, boredom proneness, poor emotional regulation, fear of missing out (FoMO), anxiety, depressive tendencies, and loneliness.^[3,4] Family-related influences may include limited parental monitoring, inconsistent discipline, poor parent-child communication, and emotionally unsupportive home environments.^[2,9] Social factors such as peer pressure, social comparison, cyber-communication dependence, and the need for online validation may further reinforce problematic use. Adolescents who rely heavily on smartphones to maintain social presence or avoid social exclusion may be especially vulnerable to excessive use patterns. Within the context of the present review, smartphone addiction is particularly relevant because it may both contribute to and arise from loneliness, emotional insecurity, and weakened real-world social engagement. Adolescents who increasingly substitute offline relationships with digital interaction may become more vulnerable to feelings of disconnection, despite being constantly “connected” online. For this reason, smartphone addiction must be understood not only as a technological or behavioural issue, but also as a psychosocial phenomenon with significant implications for adolescent development and well-being.

Understanding Loneliness During Adolescence

Loneliness is a complex and multifaceted psychological construct defined as the subjective distress arising from a discrepancy between desired and actual social relationships.^[5] Unlike objective social isolation, which refers to the absence of social contacts, loneliness reflects perceived inadequacy in the quality, intimacy, or meaningfulness of interpersonal connections.^[5] This distinction is particularly important in adolescence, where individuals may be socially surrounded yet still experience profound emotional loneliness. Adolescence represents a developmental stage characterised by increased sensitivity to social evaluation, peer acceptance, and belongingness. During this period, relationships shift from family-centred interactions toward peer-oriented networks, and adolescents begin to form deeper emotional bonds, social identities, and self-concepts.^[6] The heightened importance of peer relationships makes adolescents especially vulnerable to

feelings of rejection, exclusion, or social disconnection, all of which may contribute to loneliness.^[6]

Loneliness during adolescence has been consistently associated with a range of negative psychological outcomes, including depression, anxiety, low self-esteem, emotional dysregulation, and reduced life satisfaction.^[6] Persistent loneliness has also been linked to cognitive biases such as negative social expectations, hypervigilance to social threat, and maladaptive coping strategies.^[5] These cognitive and emotional patterns may further perpetuate loneliness by impairing the ability to form and maintain meaningful relationships. Importantly, loneliness is not merely an emotional experience but also a developmental risk factor that can influence long-term mental health trajectories. Adolescents who experience chronic loneliness may carry these patterns into adulthood, increasing the risk of mood disorders, social anxiety, and impaired interpersonal functioning.^[5] Furthermore, loneliness may lead adolescents to seek alternative forms of connection, including digital interactions, which may not always provide the depth or emotional fulfilment required for healthy social development.

Relationship Between Smartphone Addiction and Loneliness

1 Bidirectional Association

The relationship between smartphone addiction and loneliness is widely recognised as bidirectional and mutually reinforcing.^[8] Adolescents experiencing loneliness may increasingly rely on smartphones as a coping mechanism to alleviate feelings of isolation, boredom, or emotional distress. Digital platforms such as social media, messaging applications, and online gaming provide immediate access to social interaction, offering a perceived sense of connection and belonging. Conversely, excessive smartphone use may reduce opportunities for face-to-face interaction, weaken real-life social skills, and diminish the quality of interpersonal relationships.^[7] Over time, this may intensify feelings of loneliness, creating a self-perpetuating cycle in which loneliness drives smartphone use, and smartphone use further exacerbates loneliness.^[8]

2 Psychological Mechanisms

Several psychological mechanisms may explain the association between smartphone addiction and loneliness among adolescents. One of the most frequently discussed mechanisms is fear of missing out (FoMO), which refers to the apprehension that others may be having rewarding experiences

without one's involvement. Adolescents experiencing FoMO may feel compelled to check their smartphones repeatedly to remain socially informed and emotionally connected, thereby increasing dependency and reinforcing compulsive usage patterns.^[3] Another important mechanism is social comparison, whereby adolescents are continuously exposed to idealised and selectively curated online portrayals of peers, lifestyles, and achievements. Such exposure may contribute to reduced self-esteem, perceived social inadequacy, and dissatisfaction with one's own social life.^[3] In addition, smartphones may serve as a tool for emotional avoidance, allowing adolescents to escape feelings of boredom, sadness, rejection, or interpersonal discomfort rather than confronting or processing these emotions in adaptive ways.^[3] Over time, this coping pattern may strengthen emotional reliance on digital interaction.

Furthermore, excessive dependence on online communication may contribute to reduced social competence, as overreliance on mediated interactions can limit opportunities to develop and practice face-to-face interpersonal skills, emotional responsiveness, and meaningful social engagement.^[7] Collectively, these psychological mechanisms help explain why adolescents experiencing loneliness may be particularly vulnerable to problematic smartphone use, and why excessive smartphone use may, in turn, sustain or worsen feelings of loneliness.

3 Behavioural and Social Consequences

Problematic smartphone use has been associated with several behavioural and social consequences that may contribute to loneliness and reduced psychosocial well-being among adolescents. One of the most notable consequences is a reduction in face-to-face social interaction, as excessive time spent on smartphones may displace opportunities for direct communication with peers, family members, and the wider social environment.^[1] Adolescents with problematic smartphone use may also exhibit increased social withdrawal, preferring digital engagement over participation in real-world social or recreational activities. This pattern may gradually weaken interpersonal relationships and reduce opportunities for emotional support and social bonding.

In addition, excessive smartphone use may negatively affect the quality of communication, as interactions mediated through screens may lack the emotional depth, nonverbal cues, and immediacy that characterise meaningful in-person

exchanges.^[3] Another commonly reported consequence is sleep disturbance, particularly when smartphone use extends into late-night hours, leading to poor sleep quality, delayed sleep onset, and daytime fatigue.^[2] These effects may indirectly impair mood, concentration, and emotional regulation. Furthermore, problematic smartphone use has been associated with academic impairment, including reduced attention, procrastination, lower classroom engagement, and diminished academic performance.^[1,2] Taken together, these behavioural and social consequences may significantly interfere with healthy adolescent development and contribute to increased feelings of loneliness and emotional distress.

Associated Psychosocial and Behavioural Factors

Smartphone addiction and loneliness do not occur in isolation but are embedded within a broader network of psychosocial and behavioural influences that may shape their onset, maintenance, and severity. Adolescents who experience problematic smartphone use often present with a range of co-occurring emotional, cognitive, and social difficulties, suggesting that smartphone addiction may be both a contributing factor to and a consequence of underlying psychosocial vulnerability.^[2,4] These associated factors may operate as risk factors, mediators, or reinforcing elements in the relationship between smartphone addiction and loneliness, making the association more complex than a simple one-directional effect. Understanding these broader correlates is essential for developing a more comprehensive and clinically meaningful interpretation of adolescent smartphone behaviour.

1 Mental Health Factors

Among the most consistently reported psychosocial correlates of smartphone addiction and loneliness are depression, anxiety, stress, and low self-esteem. Adolescents who experience depressive symptoms may be more likely to engage in excessive smartphone use as a means of distraction, emotional escape, or passive social connection, while prolonged problematic use may further intensify negative mood and emotional dysregulation.^[2] Similarly, anxiety, particularly social anxiety, may contribute to a preference for digital communication over face-to-face interaction, as smartphones may offer a more controllable and less emotionally demanding mode of social engagement.^[3] Stress is another important factor, as adolescents may turn to smartphones to cope with academic pressure, interpersonal

conflict, or emotional overload, thereby reinforcing maladaptive patterns of use. In addition, low self-esteem may increase vulnerability to both loneliness and problematic smartphone use, particularly in digital environments that encourage social comparison and external validation.^[3] These mental health factors are closely interconnected and may collectively heighten adolescents' susceptibility to both emotional loneliness and compulsive smartphone engagement. These conditions may act as both predictors and outcomes of smartphone addiction and loneliness.^[2]

2 Sleep Disturbance

Excessive smartphone use, particularly at night, is strongly associated with poor sleep quality, delayed sleep onset, and

daytime fatigue.^[2] Sleep deprivation may further worsen emotional regulation and increase vulnerability to loneliness.

3 Family and Environmental Factors

Family dynamics play a critical role. Poor parental monitoring, weak emotional support, and dysfunctional family environments are associated with higher smartphone addiction and loneliness levels.^[9]

4 Social Withdrawal

Adolescents with excessive smartphone use may gradually disengage from real-world interactions, leading to reduced participation in social and extracurricular activities, thereby reinforcing loneliness.^[7]

Evidence Synthesis

Table 1. Summary of Key Studies on Smartphone Addiction and Loneliness

Author (Year)	Population	Study Design	Key Findings
Sohn et al. (2019)	Children & adolescents	Systematic review	Smartphone overuse linked to mental health issues
Zhao et al. (2024)	Adolescents	Longitudinal	Bidirectional relationship between loneliness and smartphone addiction
Kabadayi (2024)	Adolescents	Cross-sectional	Strong association with depression, sleep disturbance, and loneliness
Maftai et al. (2026)	Adolescents	Mediation analysis	Loneliness predicts problematic smartphone use
Yogesh et al. (2024)	Indian adolescents	Cross-sectional	Parenting style influences addiction and well-being

Table 2. Mechanisms Linking Smartphone Addiction and Loneliness

Mechanism	Description
FoMO	Drives compulsive checking behaviour
Social comparison	Leads to reduced self-worth
Emotional avoidance	Escaping negative feelings
Reduced interaction	Less real-world engagement

Challenges and Limitations in Current Research

Despite the growing body of literature on smartphone addiction and loneliness among adolescents, several methodological and conceptual limitations remain. Most studies rely on cross-sectional designs, limiting the ability to establish causal relationships between loneliness and problematic smartphone use.^[2,8] The heavy dependence on self-reported measures introduces potential biases, including recall inaccuracies and social desirability effects. Additionally, the lack of a standardised definition and diagnostic criteria for smartphone addiction, along with

variability in measurement tools, complicates comparisons across studies.^[11,12] Many studies also fail to consider the qualitative aspects of smartphone use, such as purpose and emotional context, focusing instead on duration alone.^[13] Furthermore, moderating factors such as gender, family dynamics, and cultural differences are often underexplored, and there is a notable lack of longitudinal and intervention-based research. These limitations highlight the need for more rigorous, multidimensional, and culturally sensitive investigations in this field.

Future Directions and Implications

Future research should prioritise longitudinal and experimental designs to better understand the directionality and underlying mechanisms of the relationship between smartphone addiction and loneliness among adolescents.^[14] There is a need to move beyond self-report measures by incorporating objective digital usage data alongside psychological assessments.^[15] Greater emphasis should be placed on identifying mediating factors such as emotional regulation, fear of missing out, self-esteem, and social anxiety. From a practical perspective, intervention-based studies are

essential, particularly those focusing on school-based programs, digital well-being education, and family-centred approaches that promote healthy technology use and emotional resilience.^[9] Importantly, future work should adopt a balanced perspective by recognising both the potential risks and benefits of smartphone use, while also ensuring cultural diversity and contextual relevance in research. Such efforts will be crucial for developing effective strategies to support adolescent mental health in the digital age.

CONCLUSION

In conclusion, smartphone addiction and loneliness among adolescents represent a complex and interrelated public health concern influenced by psychological, behavioural, and social factors. Evidence suggests a bidirectional relationship, wherein loneliness may drive excessive smartphone use, while maladaptive use patterns may further exacerbate social disconnection and emotional distress.^[1,2,7,8] Rather than being solely a consequence of technology overuse, smartphone addiction should be understood as a multidimensional phenomenon reflecting underlying psychosocial vulnerabilities. While smartphones can facilitate communication and social engagement, excessive and compulsive use may negatively impact real-world relationships and overall well-being. Therefore, a balanced and context-sensitive approach is essential, emphasising prevention, early identification, and interventions that promote healthy digital habits, emotional regulation, and meaningful social connections. Continued research is necessary to better understand this relationship and to inform strategies that support adolescent development in an increasingly digital world.

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