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Prolonged social media use, loneliness, and psychological distress in adolescence: a necessary reflection

Abstract

Prolonged social media use has been linked to increased psychological distress among adolescents, with the experience of loneliness acting as a key mediating factor in this relationship. This study aims to reflect on the connections between prolonged social media use, loneliness, and psychological distress during adolescence by integrating psychosocial and neurobiological evidence. It is a reflective literature review based on cross-sectional and longitudinal studies, meta-analyses, and neuroimaging research published in both national and international literature. Findings indicate a bidirectional relationship between loneliness and compulsive platform use, creating a feedback loop associated with outcomes such as anxiety, depression, low self-esteem, and in severe cases suicidal ideation. Neuroscientific evidence suggests that the digital environment affects brain regions associated with social reward and behavioral control, rendering adolescents particularly vulnerable. The study concludes that interventions focused solely on reducing screen time tend to have limited effectiveness; instead, integrated approaches are required to promote quality social bonds, emotional regulation, sleep hygiene, and psychoeducation regarding the functioning of digital platforms.

Keywords: social media, adolescence, loneliness, psychological distress, mental health

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Introduction

Data from various cross-sectional, longitudinal, and empirical studies indicate that young people are increasingly using mobile phones and other forms of media extensively, resulting in chronic sleep deprivation and negatively affecting cognitive ability, academic performance, and socio-emotional functioning.[1,2] Concurrently, over the past decade, smartphone and social media use among adolescents has been linked to rising levels of mental distress, self-harming behaviors, and suicidal ideation.[3,4] Despite growing evidence regarding the negative impact of social media on adolescent mental health, there remains a lack of empirical research on how young people perceive social media particularly as a source of knowledge or how they might leverage broader modern media discourses to express themselves.[5]

From a global perspective, the World Health Organization (WHO) estimates that 14% of adolescents worldwide live with a mental disorder and that half of all mental health conditions begin before the age of 14.[6] Against this backdrop, there is growing concern regarding the role of social media in the development of mental health issues among youth, particularly when considering loneliness as a mediating factor in this relationship. Loneliness defined as the subjective perception that available social bonds are insufficient in quantity or quality[7] is a key predictor of psychological distress during adolescence.[8,9]

The literature highlights a paradox: adolescents who are highly connected online may simultaneously feel profoundly lonely, suggesting that the quantity of digital connections does not guarantee the quality of social bonds.[10,11] Furthermore, recent neuroimaging studies suggest that habitual social media use may alter the development of brain regions associated with social reward, emotional regulation, and behavioral control.[12,13] These findings indicate that the effects of the digital environment are not merely psychological but may also have lasting neurobiological repercussions. It is through the interplay between the psychosocial and neurobiological dimensions that this research project aims to investigate the mechanisms involved in prolonged social media use and its interactions with behavior and social isolation during adolescence.

This study seeks to foster discussion and reflection on the triad of irrational social media use, loneliness, and psychological distress among adolescents, focusing on psychosocial and behavioral repercussions. To this end, the theoretical framework is structured into five subsections discussing adolescence as a stage of human development, as well as prolonged social media use and its psychosocial and neurobiological impacts. The study addresses characteristics of adolescent development, the relationship between social media, loneliness, and mental health, and relevant neuroscientific evidence. This structure enables an integrated understanding of the phenomenon under investigation, linking the psychosocial and neurobiological dimensions that underpin the study's objective.

Discussion

Adolescence as a stage of human development

Adolescence is described as a phase of intense biopsychosocial reorganization marking the transition from childhood to adulthood, generally spanning the ages of 11 to 19 or 20.[14] This period is characterized by rapid physical changes associated with puberty, the emergence of formal operational thought, and the growing centrality of peer relationships. Peer approval carries significant weight in young people's lives, making them particularly sensitive to situations involving belonging, acceptance, and social rejection.

Beyond physical and psychological transformations, adolescence is also a critical period for brain development. The prefrontal cortex responsible for planning, behavioral control, and decision-making is

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still maturing during this phase, whereas the limbic system, linked to emotions and reward-seeking, is already functioning at an accelerated pace.[15] This disparity in the maturation rates of different brain regions is widely recognized in the neuroscience literature.[12,16] This helps explain why adolescents tend to be more impulsive, more sensitive to peer opinion, and more vulnerable to environments offering immediate rewards, such as social media.

It is precisely within this context that digital platforms have come to play a central role in the lives of young people, influencing fundamental adolescent processes such as identity formation, the search for belonging, and emotional regulation.[14,17]

Digital social networks and adolescent relationships

Social networks have transformed the nature of adolescent interactions changing them qualitatively, not merely quantitatively.[17] These platforms amplify demands for status and popularity, encourage the constant display of one's personal image, and intensify peer surveillance dynamics. Likes, comments, and views have evolved beyond simple forms of interaction to serve as public, quantifiable indicators of social acceptance or rejection; this creates ongoing pressure on young people's self-image and fosters the development of anxiety and depressive symptoms.

Digital platforms are particularly impactful during this stage because they tap into sensitive aspects of adolescent development, such as the need for peer validation, heightened reactivity to social stress, and sensitivity to peer feedback.[16] From this perspective, the most relevant issue is not merely how much time young people spend online, but how they participate in digital circuits of belonging and evaluation. This shift in perspective has significant implications for both research and clinical practice.

In the Brazilian context, a qualitative study involving adolescents aged 10 to 19 in Rio Grande do Norte found that the young people themselves recognize and describe the negative impacts of social media on their mental health, reporting feelings of addiction and embarrassment, as well as exposure to disturbing content.[18] This finding is significant because it demonstrates that adolescents are not passive in the face of these experiences and that their subjective perspectives must be taken into account in analyses within the field.

Loneliness and prolonged social media use

Loneliness can be defined as a subjective experience of not belonging, arising when an individual perceives their emotional bonds as insufficient in either quantity or quality.[7] This distinction is relevant because objective isolation understood as the concrete absence of social contacts or relationships does not always correspond to the loneliness experienced subjectively. Understanding this difference helps explain why adolescents with numerous digital connections can still feel profoundly lonely.

The number of contacts on social networks does not guarantee the quality of the bonds that sustain a genuine sense of belonging. From an epidemiological perspective, the problem is significant. A meta-analysis using data from 113 countries estimated the prevalence of loneliness among adolescents to range from 9.2% to 14.4%.[19] Furthermore, a systematic review comprising 292 studies and over 290,000 participants aged 10 to 24 showed that loneliness is consistently associated with social anxiety, stress, negative affect, and excessive internet use.[8]

A study involving Brazilian university students found that compulsive social media use is positively associated with loneliness and negatively associated with self-esteem.[10] Another study found that high levels of internet dependence are linked to feelings of isolation and family conflict among young people, indicating that the effects of problematic use are not confined to the virtual realm.[20]

Recent longitudinal studies have further explored this issue. Independent meta-analyses have confirmed that the relationship between loneliness and digital dependence is bidirectional: compulsive use may stem from a pre-existing state of loneliness but also tends to exacerbate it over time.[9,21] This creates a cycle that warrants attention in both theoretical research and clinical intervention strategies.

Prolonged social media use and mental health

The association between prolonged social media use and mental health issues is well-documented in recent scientific literature. A systematic review with meta-analysis found significant correlations between excessive social media use and symptoms of depression, anxiety, and stress in adolescents.[22] Another meta-analysis confirmed this association in both clinical and community samples and highlighted that the mechanisms underlying this link remain poorly understood, pointing to a significant gap in the literature.[23] Among the most studied processes, social comparison stands out. Social media platforms offer a continuous stream of images and narratives regarding others' lives often filtered and idealized which tends to foster unfavorable comparisons and negatively impact young people's self-esteem.

Another relevant mechanism is FoMO (Fear of Missing Out).[17] A systematic review identified that FoMO shows the strongest association with social media addiction among all the outcomes studied, indicating that the fear of social exclusion is a primary driver of compulsive use.[24] Concurrently, a literature review focusing on Brazilian youth gathered evidence linking excessive social media use to anxiety, depression, low self-esteem, and impaired social well-being, underscoring the topic's relevance to public health within the national context.[25]

Neurobiological aspects: the adolescent brain and the digital environment

Insights from neuroscience are essential to understanding why social media affects adolescents so intensely. A functional magnetic resonance imaging (fMRI) study simulating Instagram use demonstrated that images with high numbers of "likes" triggered heightened activity in brain regions associated with reward, social cognition, and attention—such as the ventral striatum and the anterior cingulate cortex.[13] The study also revealed that when viewing risky images that had garnered many "likes," adolescents showed reduced activation in cognitive control networks; this suggests that the digital social context may compromise young people's self-regulation capabilities precisely when they are most needed.

Building on this, a longitudinal study of 169 adolescents published in *JAMA Pediatrics* showed that the habit of frequently checking social media was associated with distinct trajectories of brain development over time, particularly in regions such as the amygdala, insula, ventral striatum, and dorsolateral prefrontal cortex.[12] These areas are central to emotional processing, the anticipation of social consequences, and behavioral control. There is evidence that platform algorithms exploit neurobiological vulnerabilities through intermittent reinforcement schemes, keeping users in a cycle of compulsive checking associated with changes in the brain's dopaminergic pathways.[26]

Another study demonstrated that individual sensitivity in brain regions linked to social rejection moderates the impact of digital

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experiences on adolescent mood, indicating that not everyone is equally vulnerable to the digital environment.[27] Taken together, these findings show that excessive social media use is a complex phenomenon involving the interaction between brain development, platform social dynamics, and neurobiological vulnerabilities inherent to adolescence.[16] This reinforces the need for integrated approaches that consider both psychosocial and biological aspects when studying and intervening in this field.

Key challenges identified in the literature

Among the central challenges identified, the so-called "passive scrolling trap" stands out; this is defined as the continuous consumption of content on social media feeds without creating posts or directly interacting with others, effectively limiting the user to observing the lives of others. The trap lies in the fact that this pattern offers a sense of social participation without the emotional rewards of real-world contact, exposing adolescents to curated, idealized lives that fuel unfavorable comparisons. In this regard, the literature suggests that passive use tends to be associated with greater social comparison and lower well-being, indicating that the mod of use matters just as much as the duration of exposure.[2]

Another significant challenge is the bidirectional cycle between loneliness and problematic digital media use a two-way relationship in which loneliness acts simultaneously as both a cause and a consequence of excessive use. Adolescents who feel lonely turn to platforms seeking connection but find only superficial ties and miss out on opportunities for face-to-face interaction. Longitudinal evidence supports this view, demonstrating that loneliness predicts a subsequent increase in problematic use, which in turn intensifies loneliness over time.[21] Consequently, intervening at only one end of this cycle tends to be insufficient.

Regarding the severity of the psychological distress involved, outcomes can reach critical levels manifesting as clinical conditions that go beyond transient emotional discomfort and significantly impair the adolescent's functioning, such as depression, self-harming behaviors, and suicidal ideation. A three-year cohort study involving adolescents and young adults found that cyberbullying victimization on social media was associated with increased depression and suicidal ideation.[4] This highlights that the risks extend beyond fleeting discomfort and necessitate early screening and clinical attention.

Finally, circadian dysregulation constitutes an additional challenge. It involves an alteration to the approximately 24-hour biological rhythm regulating the sleep-wake cycle triggered, in this context, by screen use during times intended for rest resulting in delayed sleep onset and reduced sleep duration and quality. This is an underestimated mechanism, as the harm stems not only from the content accessed but also from the timing of use itself. A systematic review of the interplay between social media use, sleep, and mental health in young people found that using these platforms particularly at night is associated with poorer sleep quality and, consequently, increased symptoms of depression and anxiety.[28] Thus, sleep impairment represents one pathway to mental health issues, justifying the inclusion of sleep hygiene as a target for intervention.

Final considerations

Evidence from the literature regarding the relationship between prolonged social media use, loneliness, and psychological distress in adolescents indicates that this relationship is complex and bidirectional; excessive use of digital platforms can stem from pre-existing feelings of loneliness while simultaneously intensifying them. These processes are associated with outcomes such as anxiety, depression, and low self-esteem, demonstrating that the quantity of digital connections does not necessarily correspond to the quality of the emotional bonds adolescents form.[9,21–23] The "connectivity paradox" is a key finding, as highly connected adolescents may experience profound feelings of isolation and a lack of belonging. In this context, the pursuit of approval, popularity metrics, and the fear of missing out (FoMO) can foster compulsive patterns of social media use.[17,24] Furthermore, characteristics of brain development during adolescence make young people particularly sensitive to the social rewards and evaluations found on digital platforms. Thus, understanding this phenomenon requires integrating psychosocial, behavioral, and neurobiological factors.[12,13,16]

From clinical and public health perspectives, the findings suggest that interventions focused solely on reducing screen time may have limited effectiveness. It is necessary to develop initiatives that promote secure emotional bonds, emotional regulation skills, family guidance, school support, and psychoeducation regarding how digital platforms operate. These strategies should involve health professionals, educators, and family members, taking into account the social and cultural specificities of adolescents; it is crucial to create both in-person and digital environments that foster high-quality connections and protect healthy adolescent development. Regarding the necessary adjustments to the proposed solutions, it is suggested that interventions move beyond a sole focus on reducing screen time and instead address the specific mechanisms linking social media to psychological distress such as social comparison, peer feedback, and nighttime platform use while adapting strategies to each adolescent's developmental stage.[16] Addressing this issue requires coordination among families, schools, health services, and the digital platforms themselves, in order to reduce patterns of passive and nighttime use, break the cycle linking loneliness to compulsive use, and identify severe cases of distress at an early stage. It is hoped that this reflection will contribute to the planning of empirical research and clinical and educational interventions aimed at promoting healthier social media use during adolescence.

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Conflcits of interest

The authors declare there is no conflcit of interest.

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