

The Bidirectional Relationship Between Social Media Use and Adolescent Anxiety: Mechanisms and Future Directions

Xiyao Sun*

Department of Applied Psychology, Guangdong Peizheng College, Guangdong, China

**Corresponding author: Xiyao Sun.*

Abstract

This study focuses on the bidirectional relationship and underlying mechanisms between social media use and adolescent anxiety. Existing research largely focuses on the one-way influence, lacking integration of bidirectional pathways, core mediating mechanisms, and adolescent developmental vulnerability, and failing to explain the algorithm-driven social comparison effect. This paper integrates four psychological perspectives to confirm that the two are mutually causal, forming a self-reinforcing feedback loop; it clarifies that upward social comparison is a high-frequency, cross-cultural core mediating mechanism, and reveals that adolescents are in a sensitive period of social development, with an imbalance between the brain's reward and control systems and high sensitivity to peer evaluation, making them more susceptible to the influence of the digital environment. This research deepens the understanding of the mechanisms of adolescent mental health in the digital age, providing evidence-based directions for family parenting, school mental health education, clinical intervention, and platform optimization, helping to break the vicious cycle and promote healthy adolescent development.

Keywords

adolescent anxiety, social media use, bidirectional relationship, social comparison, youth mental health

1. Introduction

Globally, social media has achieved high penetration among adolescents, with data from multiple countries showing that over 95% of adolescents use it [1]. Meanwhile, a World Health Organization report indicates that one in seven adolescents aged 10 to 19 has a diagnosable mental health problem, with anxiety disorders being the most common. This dual backdrop of high adolescent anxiety prevalence and widespread social media use makes the correlation between the two a core issue in global public health and developmental psychology. Adolescents are the first group to experience a critical developmental stage entirely within a digital social environment, with social media platforms becoming their primary channels for peer communication, self-expression, and information acquisition. Empirical observations of adolescent dialogue behavior have revealed a significant paradox: many adolescents use social media to cope with stress and loneliness, but their use of these platforms often leads to increased anxiety and social isolation. This phenomenon suggests that the relationship between social media use and adolescent mental health is not a simple one-way street, but rather

involves a complex internal connection, prompting a systematic exploration of the two-way interaction mechanism between the two. Adolescents are at a critical developmental stage experiencing significant emotional, social, and psychological changes. The link between social media use and anxiety symptoms spans multiple disciplines and has significant guiding implications for clinical psychology practice and public health policy development. Unlike previous studies that only superficially explored single influencing factors of social media, this study not only focuses on the core link between social media use and adolescent anxiety symptoms, but also delves into the bidirectional interaction pathway. By differentiating specific usage dimensions such as daily usage time, passive content browsing versus active social interaction, and upward social comparison, it conducts an in-depth analysis of the intrinsic connections. Existing research indicates that unhealthy social media use increases the risk of anxiety, while existing anxiety may trigger more maladaptive social media use behaviors, creating a vicious cycle and continuously exacerbating adolescent psychological distress. However, the specific pathways and core mechanisms of this bidirectional relationship still need further clarification. Based on this, this study aims to address the following core research questions: First, how do different dimensions of social media use (usage time, passive/active usage patterns, and upward social comparison) predict the occurrence and development of later anxiety symptoms in adolescents? Second, how do existing anxiety symptoms in adolescents influence their social media use patterns, thereby leading to maladaptive digital use behaviors? Third, what key psychological and cognitive mechanisms can explain the bidirectional link between social media use and adolescent anxiety? Adolescent anxiety and social media use are major public health issues of global concern, and their importance is mainly reflected in three aspects: First, adolescent anxiety has become an increasingly serious health hazard. A World Health Organization report indicates that one in seven adolescents aged 10 to 19 has a diagnosable mental health problem, with anxiety disorders being the most common [1]. Furthermore, adolescent anxiety symptoms are a significant predictor of long-term negative mental health consequences, potentially leading to major depressive disorder, substance use disorders, academic difficulties, and social dysfunction. Secondly, social media has become a persistent element of the modern adolescent social environment, rather than a transient trend. Pew Research Center data shows that over 95% of American adolescents use social media daily, and nearly 60% report being almost constantly online [2]. Completely banning or universally discouraging adolescents from using social media is not feasible in reality; therefore, research on strategies for guiding safe and healthy digital interactions is needed. Thirdly, this research field has extremely high practical application value: research findings can be directly translated into evidence-based parenting advice, school mental health programs, clinical intervention protocols, and guidelines for optimizing social media platform design, thereby comprehensively reducing the risk of anxiety in adolescents.

2. Theoretical Foundations from Psychological Perspectives

Integrating this topic with the four key subfields of psychology can offer different but complementary perspectives, thus clarifying the link between social media engagement and adolescent anxiety.

2.1 Developmental Psychology Perspective

From a developmental psychology perspective, adolescence is a critical stage of highly sensitive socio-emotional development. During this period, adolescents exhibit unique vulnerabilities in neural development, self-construction, and social adaptation, making them more susceptible to the influence of the social media environment. From a brain development perspective, adolescence presents a typical developmental imbalance: the reward system matures prematurely, while the control system develops lagging behind. Reward circuits (such as the nucleus accumbens) are highly sensitive, responding strongly to social feedback, peer attention, and positive evaluations; while the prefrontal cortex, responsible for impulse control, emotion regulation, and rational decision-making, is not yet fully mature. This asynchronous neural development makes adolescents more inclined to seek immediate social feedback, more susceptible to the continuous stimulation of social media, and more difficult to regulate negative emotions caused by excessive comparison. Simultaneously, adolescents' sensitivity to peer evaluations increases significantly. This stage is crucial for the formation of self-identity, the perception of social status, and the reconstruction of peer relationships. Recognition, acceptance, and feedback from others directly affect self-esteem, sense of belonging, and self-worth. Social media further exacerbates this developmental vulnerability: unlike limited, brief, and relatively vague offline peer interactions, digital social media provides instant, public, quantifiable, and repeatedly viewable social

evaluations (such as likes, comments, follower counts, and others' activity), thereby continuously reinforcing the psychology of social comparison and the feeling of being evaluated. The aforementioned asynchronous neurodevelopment and sensitivity to social evaluation constitute the core mechanism by which social media induces anxiety in adolescents, and also provide clear potential targets for clinical intervention. For insufficient emotion regulation due to delayed prefrontal cortex development, emotion regulation training can be an important intervention direction to help adolescents improve their ability to regulate emotions in response to stimuli such as social comparison and negative feedback. For cognitive biases such as irrational cognition and excessive focus on others' evaluations caused by social media, cognitive behavioral therapy (CBT) can effectively correct maladaptive cognitions and break the vicious cycle between social media use and anxiety. Considering the reality that adolescents are deeply embedded in digital life, digital behavior interventions (such as social media usage time management, digital social desensitization training, and quantitative evaluation-dependent behavior correction) can directly target key risk factors, achieving precise intervention. These targeted intervention pathways not only align with the core characteristics of adolescent socio-emotional development but also provide actionable, practical directions for alleviating social media-related anxiety among teenagers.

2.2 Clinical Psychology Perspective

Clinical psychology frameworks clarify that social media use may play a dual role, acting as both a risk factor and a maintenance factor for anxiety-related symptoms. These frameworks view maladaptive digital behaviors as targets for evidence-based psychological intervention and explain how existing anxiety symptoms can lead to the persistence of avoidant coping mechanisms through social media use. Meanwhile, these frameworks also highlight significant differences between different groups, particularly emphasizing that adolescent girls are more susceptible to social media use-related anxiety due to higher rates of body image issues and social anxiety disorder in this group.

2.3 Social Psychology Perspective

Social psychology provides a crucial theoretical framework for understanding important mechanistic pathways, most notably Leon Festinger's social comparison theory. This theory posits that people assess their self-worth and social status by comparing themselves to others. However, it's important to note that traditional social comparison theories cannot fully explain the algorithm-driven exposure mechanisms of social media. In traditional offline environments, social comparisons primarily occur between real, limited, and natural social interactions; however, on algorithm-driven social media platforms, content is not presented randomly but is continuously pushed, filtered, beautified, and idealized as high-attention information, further amplifying, accelerating, and solidifying the process of upward social comparison. In this environment, adolescents often compare their unvarnished daily lives with the carefully crafted "highlights" of their friends and online celebrities. This systematically distorted comparison environment directly affects adolescents' self-worth judgments and emotional states, significantly increasing the risk of developing social anxiety.

2.4 Cognitive Psychology Perspective

Cognitive psychology reveals the intermediate cognitive processes involved in the use of social media that trigger anxiety symptoms, including: increased attentional tendency towards socially threatening cues, excessive worry about peer evaluation and rejection, and reduced attentional resources available for face-to-face social interaction. For example, frequent exposure to idealized content on social media may reinforce cognitive distortions, making individuals feel a lack in their lives, while passively browsing social media may exacerbate repetitive reflections on social status. Empirical research indicates that both of these are cognitive risk factors contributing to anxiety.

3. Existing Empirical Evidence on the Two-Way Relationship

Over the years, numerous empirical studies have elucidated the intricate two-way link between adolescent social media engagement and anxiety, yielding three main conclusions that have recurred in academic publications.

3.1 Longitudinal Association Between Inappropriate Social Media Use and Anxiety Risk

Long-term research has shown that even after considering important factors such as initial psychological state, past emotional problems, and family difficulties, excessive or unhealthy social media use still significantly increases the risk of adolescents developing anxiety symptoms later in life. This is because excessive social media use can cause adolescents to gradually avoid face-to-face social interaction in real life, reducing genuine interpersonal interaction and emotional support, thereby further exacerbating the generation and development of anxiety. A large-scale nationwide study conducted by Kelly's team in 2019 (including 12,395 American adolescents) showed that compared with adolescents who used social media for less than half an hour a day, those who used it for more than 3 hours a day were 37% more likely to develop anxiety and depressive symptoms one year later [3]. This association was more pronounced in adolescent girls, who were more susceptible to the influence of social media, experienced body image anxiety, and were more likely to be diagnosed with anxiety disorders.

3.2 Upward Social Comparison as a Core Mediating Mechanism

Existing empirical research consistently demonstrates that upward social comparison is a key mediating variable linking adolescent social media use and anxiety symptoms, and is the most stable and core mechanism explaining the relationship between the two. The pioneering research by Vogel et al. confirmed that adolescents who frequently engage in upward social comparisons on social media have significantly lower self-esteem and more severe social anxiety symptoms, while adolescents who engage in such comparisons less often have significantly higher levels of mental health. Subsequent longitudinal studies by Kelly's team further validated this, showing that the intensity of social media use indirectly predicts an increase in subsequent anxiety symptoms through upward social comparisons [4]. Mechanistically, upward social comparison acts as a strong mediator primarily due to two key characteristics: First, it is high-frequency and difficult to avoid. The immersive and fragmented use of social media exposes adolescents to idealized content, transforming social comparison from occasional offline behavior into an automated, high-frequency, habitual online response. Second, it has strong cross-cultural applicability. Regardless of Western or Eastern cultural backgrounds, adolescents share common developmental needs regarding peer evaluation, appearance, achievements, and popularity; therefore, upward social comparison is consistently present in global adolescent populations and consistently positively predicts anxiety levels.

3.3 Meta-analysis Confirming the Bidirectional Effect

Recent meta-analysis evidence strongly supports the two-way link between social media use and adolescent anxiety, as Houghton et al. conducted a systematic review and meta-analysis of 27 longitudinal studies, finding an interrelationship: increased social media use predicts the subsequent exacerbation of anxiety symptoms, while existing anxiety symptoms indicate that adolescents are more likely to exhibit maladaptive social media use behaviors [5]. Adolescents with higher anxiety levels are more likely to passively browse social media, i.e., unilaterally browsing others' content to escape reality. This behavior is associated with reduced face-to-face social interaction, increased loneliness, and worsening anxiety symptoms, thus forming a vicious cycle that is difficult to break.

4. Research Gaps and Future Directions

Although previous studies have confirmed a significant two-way link between social media participation and adolescent anxiety, some key gaps remain that require further exploration in future psychological research.

4.1 Improving the Measurement of Specific Social Media Behaviors

Most current research primarily uses overall social media engagement data, such as total daily usage time. However, this fails to differentiate the impact of specific usage patterns, content types, and platform functions. Therefore, future research should prioritize experimental methods and utilize precise real-time data collection tools, such as Ecological Ephemeral Assessments (EMAs), to identify which specific behaviors pose the highest risk to mental health and which may contribute to improving it [6]. For example, while positive two-way peer interaction may reduce anxiety risk, passively browsing content may exacerbate anxiety; however, these crucial details are often unclear in survey studies relying on general measurements.

4.2 Developing Targeted Evidence-Based Interventions

Future research should prioritize the development and empirical validation of evidence-based interventions to break the mutually reinforcing relationship between social media use and anxiety. While most current interventions focus on reducing overall screen time, more effective strategies should focus on the core cognitive processes that trigger risk (such as unhealthy upward social comparisons) and construct a multi-dimensional, integrated intervention system, emphasizing cognitive-behavioral interventions, digital literacy training, and mindfulness training. For example, school-based cognitive-behavioral interventions to help adolescents identify and reconstruct negative social comparisons can directly reduce anxiety susceptibility; simultaneously, promoting digital literacy training can enhance their critical interpretation and information filtering abilities regarding social media content; and combining this with mindfulness training can strengthen emotion regulation and present-moment awareness, reducing passive indulgence and excessive rumination. These interventions can significantly alleviate anxiety risk even if overall social media usage time remains unchanged. Furthermore, research should strengthen collaboration with social media platforms to systematically evaluate protective platform design optimizations, such as hiding competitive indicators like public likes, regulating usage time reminders, and optimizing algorithm recommendation logic to prioritize authentic social support content rather than content that easily triggers social comparisons.

4.3 Focusing on Heterogeneity and Equity in Adolescent Experiences

Future research must address the vast differences in how adolescents interact with social media. Existing literature largely focuses on white, middle-class adolescents in Western countries, leaving us with limited knowledge of how social media impacts the anxiety of marginalized groups such as LGBTQ+ adolescents, racial and minority groups, and low-income youth. For these groups, social media is both a crucial place to find community, recognition, and support, and a place where they are more likely to experience harassment, discrimination, and harm because of their identity [7]. Therefore, future research must focus on these diverse experiences to ensure that research findings and interventions are inclusive, equitable, and applicable to all adolescent groups.

5. Conclusion

This study, by integrating theories and empirical evidence from multiple fields, provides a systematic theoretical summary of the relationship between social media use and adolescent anxiety: social media acts as both a cause and a consequence in this relationship; that is, inappropriate social media use can induce or exacerbate anxiety, while anxiety, in turn, drives further adaptation to inappropriate social media use patterns. From a core mechanism perspective, the study elevates the concept: the two are not simply linearly correlated, but rather constitute a self-reinforcing feedback loop. Passive browsing, excessive use, and upward social comparison trigger anxiety; anxiety further prompts adolescents to adopt avoidant digital behaviors, reducing real-world social interaction, reinforcing cognitive biases and social comparisons, ultimately leading to a mutually reinforcing and escalating cycle of anxiety and inappropriate social media use. This conclusion transcends the traditional one-way influence perspective, more accurately revealing the core maintenance mechanism of adolescent emotional problems in the digital age. This research has significant future implications: theoretically, it provides a more integrated framework for understanding the intersection of adolescent development, digital behavior, and mental health; practically, it offers clear directions for family parenting, school mental health education, and clinical intervention—the focus of intervention should shift from "limiting time" to blocking feedback loops, reconstructing cognitive patterns, and improving digital literacy; at the societal level, it can provide scientific evidence for optimizing the design of social media platforms and formulating public health policies, ultimately helping to build a safer and healthier digital ecosystem and safeguard the mental health development of adolescents.

References

- [1] World Health Organization. (2021). Adolescent mental health. <https://www.who.int/news-room/fact-sheets/detail/adolescent-mental-health>

- [2] Houghton, S. J., Hunter, S. C., Rosenberg, M., & Wood, L. A. (2022). The reciprocal relationship between social media use and anxiety symptoms in adolescents: A systematic review and meta-analysis of longitudinal studies. *Computers in Human Behavior*, 134, 107310. <https://doi.org/10.1016/j.chb.2022.107310>
- [3] Kelly, Y., Zilanawala, A., Booker, C., & Sacker, A. (2019). Social media use and adolescent mental health: Findings from the Millennium Cohort Study. *JAMA Pediatrics*, 173(6), 602–609. <https://doi.org/10.1001/jamapediatrics.2019.0754>
- [4] Vogel, E. A., Rose, J. P., Roberts, L. R., & Eckles, K. (2014). Social comparison, social media, and self-esteem. *Psychology of Popular Media Culture*, 3(4), 206–222. <https://doi.org/10.1037/a0036866>
- [5] Pew Research Center. (2022). Teens, social media and technology 2022. <https://www.pewresearch.org/internet/2022/05/10/teens-social-media-and-technology-2022/>
- [6] Ding Qian, Wang Zhaoqi, Zhang Yongxin. (2020). Self-esteem and mobile phone addiction: the sequence mediating role of fear of missing out and problematic social network use. *Chinese Journal of Clinical Psychology*, 28(6), 1152-1156.
- [7] Ye Fengyun, Shen Si, Li Junjun. (2018). Characteristics of Missed Opportunity Anxiety among Adolescent Users in the Mobile Social Media Environment. *Library and Information Service*, 62(17), 96-103.

Funding

This research received no external funding.

Conflicts of Interest

The authors declare no conflict of interest.

Acknowledgment

This paper is an output of the science project.

Open Access

This chapter is licensed under the terms of the Creative Commons Attribution-NonCommercial 4.0 International License (<http://creativecommons.org/licenses/by-nc/4.0/>), which permits any noncommercial use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons license and indicate if changes were made.

The images or other third party material in this chapter are included in the chapter's Creative Commons license, unless indicated otherwise in a credit line to the material. If material is not included in the chapter's Creative Commons license and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder.

