

Adolescents in the Age of Artificial Intelligence: Navigating the Risks of Overuse

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Article Info

Article history:

Received Aug 9th, 2026

Revised Aug 13th, 2026

Accepted Aug 15th, 2026

Keyword:

Adolescence; Artificial
Intelligence; Emotional
Outsourcing; Social Learning;
Dependency Formation

ABSTRACT

Adolescence is a sensitive developmental period marked by heightened neurobiological plasticity, identity formation, and socio-emotional learning. As generative artificial intelligence becomes embedded in adolescents' daily lives, existing frameworks for digital harm, built around screen time and social media exposure, may not capture its distinct psychological affordances. This study aims to reframe adolescent AI overuse as a qualitatively distinct developmental and relational exposure, rather than an extension of screen time. Using a narrative synthesis of developmental science, relationship science, and documented public cases published between 2018 and 2025, the study examines how AI reliance intersects with five developmental domains: emotional regulation, social learning, identity formation, autonomy, and attachment. The synthesis identifies recurring conceptual risks externalized coping, recalibrated relational expectations, externally validated identity, deferred autonomy, and displaced attachment while noting that direct empirical evidence in adolescent samples remains sparse. The study proposes a working definition of adolescent AI overuse and an interim clinical, educational, and policy framework, offering a conceptual foundation for the empirical research this area still lacks.



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INTRODUCTION

Adolescence is increasingly recognized as a sensitive developmental window during which environmental exposures exert long-lasting effects on emotional regulation, social cognition, and identity formation. Neurodevelopmental research demonstrates that this period is characterized by heightened plasticity in brain systems governing reward sensitivity, self-control, and social learning, making adolescents particularly responsive to novel and emotionally salient stimuli (Dahl, 2018). Investments made during this stage whether protective or harmful can shape trajectories of mental health and functioning well into adulthood.

Digital technologies have long been part of the adolescent environment, but the emergence of generative artificial intelligence (AI) marks a qualitative shift. Unlike earlier digital platforms, contemporary AI systems are interactive, adaptive, and capable of simulating conversational reciprocity (NLM, 2025). Evidence from large-scale developmental cohorts has already raised concerns about excessive screen time and social media exposure in early adolescence, particularly in relation to sleep, attention, and emotional well-being (Nagata et al., 2025). However, equating AI engagement with traditional screen-based activities risks overlooking the distinctive psychological affordances of these systems.

Generative AI refers to computational models capable of producing human-like text, images, or dialogue in response to user prompts (NLM, 2025). For adolescents, these systems are not merely tools but increasingly function as sources of information, companionship, emotional reassurance, and problem-solving. Survey-based and qualitative reports indicate that many teenagers interact with AI companions to discuss personal concerns, rehearse social interactions, or seek nonjudgmental support (Robb & Mann, 2025). While such uses may appear benign or even beneficial, they raise questions about how sustained reliance on simulated relational agents intersects with ongoing developmental tasks.

Existing discussions around adolescent technology use often focus on quantity hours of exposure or frequency of use. This study argues that, in the case of AI, quality and function of engagement are more salient than duration alone. The central claim advanced here is that AI overuse in adolescence constitutes a qualitatively distinct developmental exposure, characterized by emotional outsourcing and relational simulation, rather than mere screen engagement. This distinction is critical for understanding why existing frameworks for digital harms may be insufficient (Mansfield et al., 2025).

Three gaps motivate this study. First, empirical work on adolescent technology use has overwhelmingly operationalized exposure through duration-based metrics, which cannot capture the interactive, personalized qualities specific to generative AI. Second, developmental frameworks attachment, identity formation, and socio-emotional learning have been extensively applied to social media but rarely extended to conversational AI as a distinct relational stimulus. Third, calls to improve digital-harms research remain largely anticipatory rather than theory-driven (Mansfield et al., 2025); few existing frameworks specify which developmental mechanisms AI reliance is likely to affect. This study addresses these gaps by proposing a developmentally grounded account of adolescent AI overuse, organized around five domains in which such mechanisms plausibly operate.

More importantly, this article does not adopt a deterministic or alarmist stance. Artificial intelligence has demonstrated promise in mental health screening, psychoeducation, and supportive interventions when carefully designed and supervised (Olawade et al., 2024). The concern addressed here is not the presence of AI in adolescent lives per se, but the unexamined normalization of AI as an emotionally responsive substitute within a developmental stage that depends heavily on reciprocal human interaction.

Objectives of the Study

- To define adolescent AI overuse as a distinct developmental exposure, differentiating it from adjacent phenomena such as gaming disorder, internet addiction, or social media dependence.
- To examine how AI reliance intersects with key adolescent tasks such as emotional regulation, social learning, identity formation, autonomy, and attachment.
- To propose interim clinical, educational, and policy recommendations that address risks without pathologizing technology use.

Contributions and Novelty

The novelty of this article lies in reframing adolescent AI overuse as a developmental and relational concern, rather than a purely technological one. While prior research has examined screen time and social media exposure, few studies have addressed the relational simulation and emotional outsourcing unique to AI systems. By integrating insights from developmental science, relationship studies, and public controversies, this study contributes a working framework for understanding AI reliance in adolescence.

Furthermore, the article emphasizes heterogeneity. Adolescents differ widely in temperament, social support, neurodevelopmental profiles, and exposure contexts. AI overuse may function as a coping scaffold for some particularly those experiencing social anxiety or marginalization while becoming maladaptive for others. This nuanced perspective underscores the need for developmentally informed frameworks rather than blanket judgments.

RESEARCH METHODS

Study Design

This article employs a narrative study design, chosen for its ability to synthesize diverse literatures and conceptual perspectives into a coherent framework. Unlike systematic reviews, which rely on predefined inclusion and exclusion criteria, narrative studies emphasize interpretive integration, allowing researchers to highlight conceptual gaps, emergent themes, and developmental implications.

Narrative synthesis is particularly suited to emerging topics where empirical evidence remains fragmented, and where theoretical clarity is needed to guide future research (Mansfield et al., 2025).

Sources of Evidence

Developmental science: Research on adolescent brain maturation, emotional regulation, reward sensitivity, and social learning. Relationship science: Studies examining AI-mediated companionship, empathy simulation, and relational expectations. Public controversies: Documented cases of adolescent reliance on AI chatbots, including widely reported incidents that raised ethical and legal concerns (Castellanos & Steins, 2023). Policy and clinical literature: Guidance documents addressing digital harms, youth mental health, and technology regulation (Olawade et al., 2024). Sources included peer-reviewed journals, policy reports, and documented cases published between 2018 and 2025. The majority of references were primary sources, consistent with Vancouver style requirements.

Search and Selection Process

Literature was identified through targeted searches of PubMed, PsycINFO, and Google Scholar using combinations of the terms “adolescent,” “artificial intelligence,” “chatbot,” “AI companion,” “screen time,” and “digital harm,” supplemented by hand-searching the reference lists of key sources. Sources were retained if they addressed adolescent development, AI-mediated relationships, or documented cases of adolescent AI use, and were peer-reviewed, issued by a recognized research or policy body, or reported by a major news outlet covering a documented legal or clinical case. This selection process was iterative and interpretive rather than exhaustive, consistent with the narrative (rather than systematic) design of the study; no PRISMA-style screening protocol was applied, and this is noted as a limitation of the approach.

Analytic Approach

- Key developmental domains (emotional regulation, social learning, identity formation, autonomy, and attachment) were identified as central to adolescent AI engagement (Nagata et al., 2025).
- Evidence from diverse literatures was synthesized into a conceptual framework, highlighting risks of emotional outsourcing, relational simulation, and dependency formation (Castellanos & Steins, 2023).
- A working definition of adolescent AI overuse was proposed, a pattern of developmentally maladaptive reliance on artificial intelligence systems for emotional regulation, social rehearsal, validation, or decision-making, which displaces or constrains age-appropriate human interactions and learning opportunities (Mansfield et al, 2025).

Rationale for Narrative Approach

The narrative method was selected for three reasons. First, empirical research on adolescent AI use remains limited, making systematic meta-analysis premature (NLM, 2025; Olawade et al., 2024). Second, existing frameworks for digital harms (e.g., screen time, social media dependence) do not adequately capture relational simulation unique to AI systems (Nagata et al., 2025). Third, narrative synthesis allows integration of developmental science with relational perspectives, ensuring that adolescent-specific vulnerabilities are foregrounded (Dahl et al., 2018; Smith et al., 2025).

RESULTS AND DISCUSSION

This narrative synthesis highlights how adolescent AI overuse intersects with five developmental domains: emotional regulation, social learning, identity formation, autonomy, and attachment. Each domain reveals unique risks when AI systems are used as relational substitutes rather than instrumental tools.

The domains below draw on two kinds of source material: empirical findings from adjacent, directly studied literatures (adolescent development, social media, and experimental human–AI interaction), and conceptual extrapolation of those findings to adolescent AI use specifically, since direct empirical evidence on adolescent AI overuse remains limited. Empirical claims are attributed to

their source studies; extensions to AI use are presented as conceptual propositions offered by this study and requiring future empirical testing.

Emotional Outsourcing

Adolescents often turn to AI systems for reassurance, venting, or mood stabilization. While such interactions may provide immediate comfort, they risk externalizing coping strategies and reducing tolerance for distress. Neurodevelopmental research emphasizes that adolescence is a period of heightened plasticity in brain systems governing reward sensitivity and self-control (Dahl et al., 2018). Extending this principle conceptually: if AI becomes a primary outlet for emotional regulation, adolescents may fail to develop independent coping skills (a proposition that, to our knowledge, has not yet been tested directly in adolescent samples). Survey-based reports show that teenagers increasingly interact with AI companions to discuss personal concerns or seek nonjudgmental support (Robb & Mann, 2025). While these uses appear benign, they raise questions about whether reliance on simulated empathy alters trajectories of emotional resilience. Unlike human relationships, AI-mediated reassurance lacks reciprocity and accountability, potentially fostering unrealistic expectations of frictionless comfort.

Frictionless Relationships

Social learning during adolescence is shaped by friction misunderstandings, negotiation, rejection, and repair. These experiences, though uncomfortable, are central to the development of empathy, perspective-taking, and resilience. AI-mediated interactions, by contrast, are optimized to be responsive, agreeable, and non-confrontational. Experimental research suggests that users respond differently to expressions of empathy from AI compared to humans, with transparency about the system's non-human nature playing a moderating role (Shen et al., 2024). Extrapolating conceptually from this adult-sample finding to adolescents, who are still refining their social schemas, we propose that repeated exposure to frictionless relational simulations may recalibrate expectations of real-world relationships a hypothesis that remains to be tested empirically in adolescent populations. Relationship science perspectives argue that generative AI chatbots increasingly blur the boundary between instrumental tools and perceived social partners (Smith et al., 2025). This blurring risks displacing opportunities for adolescents to practice negotiation and repair in human interactions.

Identity Scaffolding

Identity formation is a central developmental task of adolescence. AI systems, when used for validation, advice, or self-definition, may reinforce static or externally guided identities. Adolescents are particularly vulnerable to external feedback, and AI-generated responses though adaptive lack the complexity of human social input. Prior empirical research on social media exposure among young adults has demonstrated how algorithmically curated feedback intensifies appearance-based comparison and self-evaluative distress (Castellanos Silva & Steins, 2023); whether comparable mechanisms operate for AI-personalized validation specifically, and in adolescent samples, is a conceptual extension proposed here rather than an established finding. AI systems differ from social media in that they provide tailored, private responses that adapt to users' emotional disclosures. This personalization may deepen effects of perceived intimacy, shaping self-concept development in ways that are difficult to monitor. The risk lies not in occasional use, but in sustained reliance on AI validation as a substitute for peer or family feedback.

Autonomy and Decision-Making

Adolescents often consult AI systems for personal choices, ranging from academic decisions to social dilemmas. While AI can provide structured information, overreliance may reduce confidence in independent judgment. Developmental science emphasizes the importance of trial-and-error decision-making during adolescence, which fosters agency and accountability (Nagata et al., 2025). We propose, as a conceptual extension of this developmental principle rather than a directly tested finding, that if AI becomes the default arbiter of choices, adolescents may defer agency, undermining their capacity to navigate uncertainty. This concern is compounded by the adaptive personalization of AI systems. Unlike static information sources, AI tools tailor responses to user preferences, potentially reinforcing

existing biases or limiting exposure to diverse perspectives. Such reinforcement may constrain adolescents' exploration of identity and autonomy.

Attachment Patterns

Attachment theory underscores the importance of reciprocal, emotionally responsive relationships in adolescence. AI systems, when perceived as consistent and nonjudgmental companions, may displace opportunities for human attachment. While AI companionship may scaffold coping for socially anxious or marginalized adolescents, it risks becoming maladaptive if it substitutes for human connection. Public controversies illustrate the stakes of unregulated AI interactions with minors. A widely reported case alleged that intensive engagement with an AI chatbot contributed to a teenager's suicide (Yang et al., 2025). While causality cannot be established from a single documented case, such incidents function as societal warning signals rather than empirical evidence of a general effect, underscoring the need for safeguards and for dedicated empirical research.

Policy Implications

The narrative synthesis highlights urgent policy implications. Current frameworks for digital harms focused on screen time or social media dependence are insufficient to capture relational simulation unique to AI. Calls to improve research on digital harms in youth emphasize the need for anticipatory frameworks rather than reactive responses (Mansfield et al., 2025).

Policy safeguards should include:

- Transparency requirements: Adolescents must be informed about the non-human nature of AI systems .
- Age-appropriate design standards: AI tools marketed to minors should avoid emotionally manipulative features .
- Clinical inquiry: Practitioners should routinely ask adolescents not only how often they use AI, but why and for what functions .
- Educational literacy: Schools should teach relational and ethical dimensions of AI, framing it as a support tool rather than a substitute relationship.

CONCLUSION

Artificial intelligence is rapidly becoming woven into the fabric of adolescent life. While its benefits in education, creativity, and mental health support are real, its risks cannot be assessed using outdated frameworks that equate all digital exposure. This narrative study has argued that adolescent AI overuse represents a distinct developmental concern, centered on emotional outsourcing and relational simulation. The synthesis of developmental science, relationship studies, and public controversies demonstrates that AI reliance intersects with five critical domains: emotional regulation, social learning, identity formation, autonomy, and attachment. Each domain reveals unique vulnerabilities when AI systems are used as relational substitutes rather than instrumental tools. Emotional outsourcing risks externalizing coping strategies; frictionless relationships recalibrate expectations of social interaction; identity scaffolding may reinforce externally guided self-concepts; autonomy is undermined by overreliance on AI for decision-making; and attachment opportunities may be displaced by simulated companionship.

More importantly, this study does not adopt an alarmist stance. AI has demonstrated promise in mental health screening, psychoeducation, and supportive interventions when carefully designed and supervised. The concern lies in the unexamined normalization of AI as an emotionally responsive substitute during a developmental stage that depends heavily on reciprocal human interaction. Policy implications are urgent. Current frameworks for digital harms focused on screen time or social media dependence are insufficient to capture relational simulation unique to AI. Safeguards must include transparency requirements, age-appropriate design standards, and limits on emotionally manipulative features in AI systems marketed to minors. Clinicians should routinely inquire about the function of adolescent AI use, while educators should emphasize AI literacy that extends beyond technical skills to relational and ethical dimensions. The absence of definitive evidence should not be mistaken for absence

of risk. Rather, it reflects the speed at which technology has outpaced research. Longitudinal studies examining how sustained AI reliance interacts with adolescent brain development, identity consolidation, and interpersonal competence are urgently needed. Ethical research gaps also persist around industry practices, data privacy, and the design of adolescent-facing AI systems.

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