

Dopamine, Development, and the Digital Child: A Therapeutic Framework for Healthy Screen Use

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Abstract

The rapid integration of digital technologies including video games, smartphones, tablets, streaming services, and social media, has reshaped children's development and created important considerations for mental health practice. Although digital platforms can support connection, creativity, learning, and problem-solving, problematic or developmentally inappropriate use may interfere with emotional regulation, attention, sleep, executive functioning, and identity development. Reward-based design features can reinforce repeated engagement, particularly for children with ADHD, anxiety, depression, trauma histories, or other vulnerabilities. This article synthesizes research on digital engagement, dopamine and reward circuitry, gaming, parental mediation, and sleep, while emphasizing the need to distinguish adaptive from maladaptive use. A therapeutic framework is presented that includes developmentally informed assessment, psychoeducation, ESRB-informed content review, collaborative family technology planning, CBT and mindfulness strategies, sleep hygiene, and intentional offline activities. The goal is balanced, purposeful technology use that supports resilience, relationships, and long-term well-being.

Keywords: Technology, Children, Addiction, Academic Performance, Behavior

1. Introduction

The rapid evolution of digital technology, including video games, smartphones, tablets, streaming services, and social media, presents a growing set of complex challenges and opportunities for child development. As these technologies become increasingly embedded in daily life, children's exposure begins earlier, lasts longer, and occurs with less monitoring than ever before. Research by Chaarani et al. (2022) and Rao et al. (2022) emphasizes the importance of approaching this issue through a therapeutic lens, considering how different children interact with digital media and how these interactions shape behavior, motivation, and emotional development.

Purpose and Scope

The purpose of this article is to provide child and adolescent mental health professionals with a developmentally informed framework for understanding and addressing digital technology use in clinical practice. The article synthesizes literature on reward circuitry and dopamine, emotional and behavioral

functioning, depression, parental mediation, gaming, ADHD, and sleep, and then organizes these findings within an Integrated Technology and Well-Being Framework. Rather than treating screen exposure as uniformly harmful, the framework emphasizes the function, developmental appropriateness, context, and consequences of technology use and translates these considerations into assessment, psychoeducation, family collaboration, skills-based intervention, sleep protection, and intentional offline engagement.

The discussion first considers the developmental and neurobehavioral mechanisms that can make digital experiences especially reinforcing. It then examines clinically relevant patterns of use and vulnerability before defining the therapeutic framework and applying it to gaming, ADHD, sleep, and family intervention.

From a neurodevelopmental standpoint, repeated exposure to stimulating or violent content can have a measurable effect on the brain's reward system, particularly in young children whose cognitive and emotional regulatory systems are still maturing. Many digital platforms, including video games and social media apps, are intentionally designed to trigger engagement through fast-paced rewards such as achievement badges, likes, and autoplay features. These mechanisms activate dopaminergic pathways in the brain, particularly in the nucleus accumbens, reinforcing the cycle of engagement and conditioning children to seek stimulation through screen-based rewards (Chaarani et al., 2022; Rao et al., 2022).

Recent research has highlighted how these repeated dopamine surges contribute to a form of digital dependency that resembles behavioral addiction (Moghaddas et al., 2023). As children become accustomed to instant gratification, they may struggle with the ability to delay gratification, tolerate frustration, or remain focused on tasks that lack immediate payoff, such as academic work or chores (Shumaker & Manning, 2022). Over time, repeated high-intensity digital stimulation may be associated with changes in reward sensitivity and with difficulties in emotional regulation, attention, impulse control, and executive functioning (Lee et al., 2021; Dong et al., 2021; Mohammadi et al., 2020).

The behavioral consequences of these neurological shifts are significant. Mental health professionals increasingly report that children who engage heavily with screens often exhibit signs of emotional dysregulation, irritability, restlessness, sleep disruption, and social withdrawal (Bradt et al., 2024). In many cases, excessive digital use may serve as a coping mechanism for underlying conditions such as anxiety, depression, trauma, or attachment-related difficulties. When screen time becomes a substitute for emotional connection or real-world coping strategies, it can further complicate diagnosis and treatment planning. Moreover, digital behavior can mask symptoms or mimic clinical presentations, leading to underdiagnosis or misinterpretation of a child's core needs (Gallegos et al., 2023; Sachan et al., 2022).

Behavioral addictions such as gaming disorder or compulsive screen use are now recognized as legitimate concerns with real consequences. These patterns can erode motivation for effort-based tasks and impair developmental processes such as empathy, persistence, and social problem-solving (Amudhan et al., 2022). Children conditioned by digital environments to expect quick feedback and continuous stimulation often show decreased interest in non-digital activities like creative play, reading, or collaborative games that promote executive functioning and social skills (Bansal & Kranti, 2022).

Clinicians working with children and families must be equipped to assess and address digital behavior within the therapeutic context. A critical starting point is providing psychoeducation about how

overstimulation affects the brain's reward system and contributes to behavioral and emotional challenges (Bradt et al., 2024). Incorporating screen-use assessments during intake helps identify the extent to which technology is being used for emotional regulation, distraction, or escape. Therapists should also help families develop structured interventions, such as collaborative screen-time contracts and family technology plans that set clear expectations around when, where, and how screens are used. Establishing screen-free routines, such as device-free dinners, bedtime routines, and outdoor activities, can reintroduce connection and calm into the child's daily rhythm (Rao et al., 2022; Chen, 2024).

Therapeutic work should also prioritize skill-building strategies aimed at increasing frustration tolerance, strengthening emotional regulation, and fostering delayed gratification (Lopez-Fernandez et al., 2022). In some cases, therapists may introduce "dopamine detox" practices, structured reductions in digital exposure, to rebuild a child's ability to engage with lower-stimulation tasks and embrace boredom as a creative and developmental space (Verywell Mind, 2023). These interventions are most effective when accompanied by caregiver support, open family communication, and emotionally attuned modeling from adults.

Mental health professionals must help families redefine the role of technology in their children's lives. Technology should not serve as the primary source of comfort, validation, or social connection. Instead, therapists can guide families to use digital tools intentionally and mindfully, as part of a broader framework that supports resilience, emotional insight, and real-world engagement. By addressing the intersection of technology, neurodevelopment, and behavior with nuance and clarity, clinicians can help children and their families create healthier, more balanced relationships with digital media that support long-term growth, well-being, and mental health. These skill-building and family-centered strategies form the foundation for healthier engagement with digital media. Yet, to truly support long-term growth, mental health professionals must also step back and examine how technology functions within children's broader psychological and developmental landscape.

Literature Identification Approach

This article uses a targeted narrative review to integrate current research relevant to children's and adolescents' digital technology use and mental health. The literature emphasized peer-reviewed work published primarily from 2020 through 2025, while authoritative diagnostic and practice resources without publication dates were retained when directly relevant (e.g., the World Health Organization and Entertainment Software Rating Board). Searches focused on combinations of terms such as child or adolescent, digital media, screen time, video gaming, gaming disorder, social media, dopamine, reward circuitry, executive functioning, ADHD, depression, anxiety, sleep, parental mediation, CBT, mindfulness, and technology use. The review also prioritized systematic reviews, longitudinal studies, neurobiological research, and clinically relevant studies appearing in counseling, psychology, psychiatry, child development, behavioral health, addiction, and pediatric journals.

Database and Journal Search Parameters

A comprehensive literature search was conducted using PsycINFO, PubMed/MEDLINE, PubMed Central, Web of Science, Scopus, EMBASE, CINAHL, ScienceDirect, Springer, Wiley, and JAMA Network, along with relevant publisher and individual journal databases to identify peer-reviewed literature related to the topic of study.

Because the purpose of the article is clinical synthesis rather than estimation of a pooled effect, the search was not designed as a systematic review or meta-analysis. Sources were selected for their direct relevance to the developmental, neurobehavioral, family, and therapeutic questions addressed in the article. This search description is provided to clarify the scope of the evidence base and to support readers who wish to extend or replicate the literature search.

Understanding Technology Use Through a Mental Health Lens

Clinical Context and Function

Understanding the impact of technology on mental health is a complex endeavor that requires a nuanced appreciation of how digital engagement affects individuals based on their personality traits, mental health diagnoses, environmental context, and behavioral tendencies. This encompasses not only video gaming, but also the pervasive use of smartphones, tablets, streaming services, social media platforms, and interactive digital apps (Bogiannidis et al., 2023; Bradt et al., 2024). These technologies, while offering opportunities for relaxation, learning, and peer connection, can also be misused or overused, leading to emotional dysregulation, social withdrawal, sleep disruption, and patterns of behavioral addiction (Gallegos et al., 2023). For video games specifically, developmental appropriateness should include review of the Entertainment Software Rating Board (ESRB) rating category, content descriptors, and interactive elements. ESRB categories identify age guidance from Everyone (E) and Everyone 10+ (E10+) through Teen (T), Mature 17+ (M), and Adults Only 18+ (AO), allowing clinicians and caregivers to consider not only time spent gaming but also whether the content and online features are appropriate for the child's developmental level (Entertainment Software Rating Board, n.d.).

Developmental Displacement and Emotional Avoidance

From a therapeutic standpoint, concerns arise when digital consumption begins to displace developmentally essential activities such as academic work, imaginative play, physical activity, restorative sleep, and emotionally rich face-to-face interactions (Rao et al., 2022). Research has shown that excessive or emotionally compensatory screen use, particularly in children and adolescents, can interfere with the development of self-regulation, empathy, frustration tolerance, and real-world coping mechanisms (Tian et al., 2023). While certain children, particularly those with social anxiety, autism spectrum traits, or learning disabilities, may find comfort and support in digital social spaces, such engagement should supplement rather than replace offline interpersonal relationships that are critical for emotional development and relational resilience (Saleem et al., 2024).

Assessment of Purpose and Quality

Therapists are encouraged to examine not just the amount of screen time, but the *purpose* and *quality* of that engagement. Is the child using a video game to decompress after a stressful school day, or are they using it to avoid unresolved anxiety or academic frustration? Are social media platforms providing connection, or are they intensifying feelings of inadequacy, comparison, or exclusion? (Kakul & Javed, 2023). These distinctions matter deeply in clinical assessment and treatment planning. Excessive or avoidant digital engagement often signals underlying emotional distress such as trauma, depression, attachment disruptions, or a lack of relational support in the child's environment (Moghaddas et al., 2023).

In clinical settings, technology use should be a routine part of intake interviews, treatment formulation, and family consultation (Lopez-Fernandez et al., 2022). Therapists must remain attuned to how digital platforms are meeting, or undermining, children's emotional needs. For instance, streaming platforms and social media are often used as numbing tools to suppress uncomfortable emotions or escape relational challenges, creating an overreliance on dissociative behaviors that can hinder long-term emotional growth and insight (Shumaker & Manning, 2022). As a result, children may become less equipped to tolerate boredom, sit with discomfort, or problem-solve interpersonally without a digital buffer.

Neurodevelopmental Vulnerability

Moreover, recent neurological studies indicate that constant engagement with fast-paced digital content can overstimulate the brain's reward pathways, leading to dopamine dysregulation and a decline in executive functioning, particularly in areas related to impulse control, working memory, and decision-making (Chaarani et al., 2022; Tian et al., 2023). This neurochemical sensitivity is especially concerning for children with ADHD, trauma histories, or existing emotional vulnerabilities, who may already struggle with delayed gratification and emotional regulation (Pengyu et al., 2023).

In sum, clinicians must adopt a developmentally informed, emotionally attuned, and family-systems-based approach when addressing children's technology use. The goal is not to demonize digital engagement, but to help families establish mindful boundaries and foster emotionally meaningful alternatives that prioritize real-world engagement, self-regulation, and interpersonal connection. Therapists can play a pivotal role in guiding caregivers to ask not just how much technology is being used, but why, when, and in response to what emotional need, thereby positioning technology within a broader therapeutic framework that honors each child's developmental trajectory, relational needs, and long-term mental health. To fully appreciate why thoughtful boundaries and emotionally attuned guidance are so essential, it is important to examine the neurological mechanisms that make digital technologies so compelling for children. Understanding the reward circuitry behind these behaviors sheds light on why simple restriction is rarely effective without deeper therapeutic support.

Therapeutic Framework

Integrated Technology and Well-Being Framework

The therapeutic framework applied throughout this article is the Integrated Technology and Well-Being Framework, a developmentally informed, family-centered approach for assessing how digital technology functions in a child's life and translating that assessment into individualized intervention. The framework does not assume that technology is inherently beneficial or harmful. Instead, it asks whether digital engagement supports or interferes with developmental needs, emotional regulation, relationships, sleep, learning, identity, and participation in offline life.

Core Elements of the Framework

The framework includes seven interrelated elements: (1) developmentally informed assessment of frequency, duration, timing, content, context, and function of technology use; (2) clinical formulation that considers neurodevelopment, temperament, co-occurring concerns, family context, and whether technology is functioning as recreation, connection, regulation, or avoidance; (3) psychoeducation about

reward circuitry, dopamine, sleep, attention, and emotional regulation; (4) content and environmental review, including ESRB ratings and interactive features when gaming is involved; (5) collaborative caregiver mediation through clear, warm, age-appropriate boundaries and family technology planning; (6) skills-based intervention using strategies such as CBT, mindfulness, distress tolerance, delayed gratification, and alternative coping; and (7) restoration of developmental balance through sleep hygiene, physical activity, relationships, creative or unstructured play, and other rewarding offline experiences.

Clinical Decision-Making Within the Framework

These elements are intended to function as a clinical sequence rather than as isolated recommendations. Assessment identifies what the technology use is doing for the child; formulation clarifies the developmental and emotional mechanisms maintaining the pattern; psychoeducation creates shared understanding; family and skills-based interventions reduce reliance on digital regulation; and sleep and offline activities broaden the child's sources of reward, competence, and connection. The sections that follow apply this framework to reward sensitivity, depression, parental mediation, problematic gaming, ADHD, and sleep.

Reward Circuitry and Dopamine Dysregulation

With the framework established, the next step is to examine the reward processes that often maintain high-intensity digital engagement and inform both assessment and psychoeducation.

Immediate Reward and Reinforcement

The neurological underpinnings of digital technology's appeal are increasingly understood through the lens of the brain's reward system. Research consistently shows that technology use, especially video gaming, social media engagement, and exposure to fast-paced streaming content, triggers significant dopamine release in the nucleus accumbens, the brain's core pleasure and motivation center (Chaarani et al., 2022; Zhang et al., 2023; Tian et al., 2023). This neurochemical surge reinforces the desire to repeat the behavior, forming potent cycles of positive reinforcement that make digital experiences feel instantly gratifying and difficult to disengage from. Unlike traditional play, which requires effort and patience, these technologies offer immediate rewards, stimulating the dopaminergic system in ways that are particularly powerful for the developing brain.

Desensitization and Executive Functioning

Over time, frequent engagement with highly reinforcing digital stimulation may contribute to altered reward sensitivity, with some individuals seeking increasingly intense or prolonged engagement to achieve a similar emotional payoff (Pengyu et al., 2023). These reward-related patterns share some features described in behavioral and substance-use research and is particularly concerning for children and adolescents, who may not yet have developed the executive functioning skills to self-regulate or moderate their digital consumption (Tian et al., 2023). Behaviorally, this often manifests as compulsive technology engagement, irritability when screens are restricted, and a noticeable decline in interest toward offline activities that once brought joy, such as imaginative play, reading, or outdoor recreation (Gallegos et al., 2023).

Clinical and Developmental Consequences

From a clinical perspective, the long-term consequence of this overstimulation is a disruption in core developmental tasks. Children may exhibit delayed growth in frustration tolerance, weakened internal motivation, and impaired executive functions like planning, impulse control, and sustained attention (Hong et al., 2023). These disruptions can directly impact academic performance, interpersonal relationships, and emotional regulation. Furthermore, such children are more likely to be mislabeled as oppositional or inattentive, when digital-use patterns may instead be contributing to or complicating symptoms of inattention and behavioral dysregulation. In addition to reward-seeking, many children use digital platforms as tools for emotional regulation. Screens offer distraction, stimulation, and temporary relief from stress, sadness, boredom, or anxiety. While occasional digital engagement for mood management is not inherently problematic, persistent reliance on screens to soothe negative emotions can prevent children from learning and practicing essential coping skills. Mohammadi et al. (2020) found that excessive engagement with gaming and social media may reduce opportunities for emotional processing, thereby interfering with the development of self-awareness, distress tolerance, and interpersonal problem-solving abilities.

Children with existing vulnerabilities, such as anxiety, depression, ADHD, or trauma histories, are at heightened risk of using technology as an emotional crutch (Coutelle et al., 2024; Hong et al., 2023). For these children, screen time may become a form of avoidance-based coping that, while offering short-term relief, ultimately exacerbates their symptoms. It often leads to diminished self-efficacy, disrupted sleep cycles, and increased isolation from peers and caregivers. This sets up a bidirectional cycle wherein emotional distress increases screen use, and that screen use, in turn, worsens emotional dysregulation and detachment from real-world supports (Saleem et al., 2024; Shumaker & Manning, 2022). This cycle of distress and digital reliance is particularly evident in the context of depression. As studies have shown, depressive symptoms not only heighten the likelihood of technology overuse but are also deepened by it, creating a uniquely challenging pattern for both children and clinicians to address.

Depression and Technology Dependence

Reward sensitivity alone does not explain problematic use. The framework also requires clinicians to consider the emotional function of technology, particularly when digital engagement becomes intertwined with depressive symptoms and avoidance.

Reciprocal Risk

The link between depression and problematic technology use has been well documented, particularly among adolescents. Recent systematic reviews indicate that problematic social media use is associated with depressive and anxiety symptoms in children and adolescents, while also emphasizing that the strength and direction of these relationships vary according to the type and function of digital engagement (Saleem et al., 2024). Depressive symptoms may increase reliance on digital environments for escape, distraction, or reassurance, while problematic use can also intensify sleep disruption, social comparison, avoidance, and reduced participation in protective offline experiences. For some children, digital environments therefore become part of a reciprocal pattern in which emotional distress increases screen use and screen use can further complicate emotional functioning (Rao et al., 2022; Saleem et al., 2024).

Clinical Presentation and Differential Assessment

Pathological use, also referred to as internet gaming disorder or compulsive digital behavior, is characterized by a loss of control over screen use, prioritization of digital interaction over offline obligations, and continued use despite adverse consequences (Moghaddas et al., 2023). Clinically, children demonstrating these patterns often present with symptoms such as fatigue, irritability, hopelessness, poor academic motivation, and a marked withdrawal from previously enjoyed activities (Verma et al., 2022). These signs may overlap with depressive or anxiety-related disorders, complicating diagnosis and underscoring the importance of comprehensive assessments that include both emotional health and digital behavior.

Treatment Implications

In therapy, it is critical to screen for depressive symptoms alongside technology use habits, as one may be masking or exacerbating the other. Children who show signs of emotional numbness, chronic disengagement, or difficulty accessing feelings may, in fact, be overusing technology to suppress emotional discomfort. When screen time is used as a substitute for real emotional processing, children lose the opportunity to develop core intrapersonal skills necessary for long-term psychological health. Identifying depressive symptoms and technology use patterns at the individual level is only part of the clinical picture. Equally important is how caregivers respond, set boundaries, and model emotional regulation, since parental involvement plays a decisive role in children's digital habits. When gaming is part of the child's routine, clinicians can also encourage caregivers to review ESRB ratings, content descriptors, and interactive elements as one practical component of developmentally appropriate limit-setting (Entertainment Software Rating Board, n.d.).

Parental Mediation

Because children's digital habits develop within a relational environment, individual assessment must be paired with attention to caregiver responses, family rules, and parental modeling.

Parenting Style and Digital Boundaries

Parental involvement has been shown to play a critical therapeutic role in moderating problematic technology use. Bradt et al. (2024) emphasize that parenting style, authoritarian, permissive, or authoritative, significantly influences how children internalize boundaries and develop self-regulation skills. Authoritarian parenting, marked by strict rules, high demands, and low responsiveness, often enforces compliance but may foster secrecy or rebellion in children's digital behaviors. Permissive parenting, in contrast, is high in warmth but low in structure, allowing children substantial freedom with limited guidance, which can increase vulnerability to excessive or unmonitored technology use. By comparison, authoritative parenting, characterized by warmth, emotional support, consistent monitoring, and clear expectations, consistently emerges as the most effective in reducing problematic digital engagement. This style not only establishes healthy boundaries but also models balanced self-regulation, making it the most protective against technology overuse (Rosales-Navarro & Torres Pérez, 2025).

Temperament and Reward Sensitivity

At the same time, children's temperamental styles shape their risk and responsiveness to parental strategies. For instance, children high in Behavioral Activation System (BAS) sensitivity, often associated with impulsivity, novelty-seeking, and a strong attraction to rewards, are especially drawn to digital stimulation and immediate gratification. These children are more prone to excessive technology use, gaming disorder, and even risk-oriented digital behaviors such as online gambling (Rosales-Navarro & Torres Pérez, 2025). Conversely, children with stronger Behavioral Inhibition System (BIS) sensitivity tend to be cautious, risk-averse, and highly responsive to parental guidance and structure. For these children, emotionally supportive and consistent interventions are particularly effective, as they align with their preference for predictability and reassurance (Kohls et al., 2022).

Adding another layer, children with flexible and resilient personalities may adapt well across parenting approaches, while those with reactive or emotionally sensitive dispositions may require more finely tuned strategies that blend warmth, clear boundaries, and developmentally appropriate explanations that support the child's understanding of expectations. Similarly, highly introverted children may use digital spaces for comfort and social connection, whereas extroverted children might be more prone to overuse due to the social opportunities technology affords (Kohls et al., 2022).

Clinical Implications for Caregivers

Taken together, these findings reinforce the need for clinicians to guide parents in adopting balanced, developmentally appropriate practices that account for both parenting style and child temperament. A one-size-fits-all approach is rarely effective; instead, digital engagement must be moderated through strategies that simultaneously address parental style and the child's unique personality sensitivities (Kohls et al., 2022).

For clinicians, a comprehensive and therapeutic framework for addressing technology use should integrate assessment, prevention, and intervention across all levels of care. Best practices include conducting screen-use assessments during intake sessions to establish a baseline, providing psychoeducation on dopamine and the brain's reward pathways, and identifying maladaptive coping patterns linked to digital overuse (Lopez-Fernandez et al., 2022). Additionally, clinicians are encouraged to promote balanced daily routines that emphasize offline relationships, physical activity, and play (Nagata et al., 2022). Caregiver collaboration is equally essential. Working with parents to set consistent, age-appropriate technology boundaries while modeling healthy digital habits helps foster resilience and regulation (Bradt et al., 2024). Incorporating CBT and mindfulness-based strategies can further enhance distress tolerance, improve impulse control, and strengthen emotional regulation among children and adolescents (Park et al., 2025). Beyond regulation, therapeutic goals should also focus on supporting youth in developing autonomy, emotional literacy, and identity that extends beyond their digital personas. By situating technology management within a broader therapeutic framework that prioritizes mental health and developmental growth, clinicians can help families approach digital use with greater resilience and intentionality.

Gaming Addiction

When digital engagement progresses from high involvement to impaired control and functional consequences, the framework shifts from prevention and balance toward more focused assessment of problematic gaming and co-occurring concerns.

Diagnostic Context

The emergence of Gaming Disorder in the ICD-11 marks the formal recognition of gaming addiction as a legitimate clinical condition, moving beyond public debate to professional consensus (World Health Organization, n.d.). Similarly, the DSM-5 includes Internet Gaming Disorder (IGD) in Section III as a condition warranting further study. These diagnostic frameworks outline features such as impaired control over gaming, prioritization of gaming over other life responsibilities, and continuation despite negative consequences—symptoms that mirror those observed in substance and behavioral addictions (American Psychiatric Association, 2022). Neurobiological research further substantiates the classification of gaming addiction as a disorder. Zhang et al. (2023) identified structural and functional changes in the right superior frontal gyrus, a brain region involved in impulsivity and cognitive control, among individuals with IGD. These neurological alterations have been linked to impaired decision-making and emotional regulation, underscoring that excessive gaming reflects more than habit—it represents measurable dysfunction in brain systems regulating reward and inhibition.

Risk, Function, and Warning Signs

Clinicians should recognize that while many young people use digital platforms to self-soothe, excessive gaming can mask underlying emotional distress and disrupt offline functioning (Verma et al., 2022). Children who face environmental stressors, academic challenges, or social rejection may turn to gaming's structured feedback and predictable rewards as coping mechanisms. Multiplayer online games, in particular, may intensify dependence by offering peer validation and a sense of belonging that compensates for offline deficits (Coutelle et al., 2024). Vulnerability to problematic gaming is heightened among individuals with ADHD, depression, or trauma histories, where gaming becomes a maladaptive tool for identity construction and emotional escape (Coutelle et al., 2024). These risks reinforce the need for early therapeutic identification. Warning signs may include withdrawal symptoms such as irritability when not gaming, lying about gaming frequency, loss of interest in offline activities, academic decline, disrupted sleep, and social withdrawal (Zhang et al., 2023). These concerns do not imply that stricter or more authoritarian restrictions are preferable; rigid limits without warmth, explanation, and collaboration may increase secrecy or resistance. Consistent with the parental-mediation literature, limits are most therapeutic when they are clear, developmentally appropriate, and paired with responsiveness and open communication (Bradt et al., 2024).

Therapeutic Intervention

Effective intervention relies on integrating evidence-based approaches. CBT and mindfulness help clients build awareness of triggers, enhance impulse control, and develop healthier coping mechanisms (Park et al., 2025). Family therapy is often essential to address enabling dynamics, reinforce consistent boundaries, and foster parent-child attunement. Research consistently shows that authoritative parenting—marked by warmth, firm limits, and open dialogue—is especially protective for adolescents with high

BAS sensitivity, supporting their autonomy while minimizing problematic gaming behaviors (Bradt et al., 2024). Therapeutic support should prioritize psychoeducation for both clients and families, functional assessments of gaming behavior, value-based goal setting, and the intentional reintroduction of rewarding offline experiences (Nagata et al., 2022). When appropriate, shared parent-child gaming can also be used intentionally as a relational activity: caregivers can enter the child's digital world, model balanced play, discuss content and online interactions, and use the experience to strengthen connection rather than treating all gaming as inherently problematic. Importantly, not all gaming is pathological. For many, gaming remains a healthy form of recreation, stress relief, and social connection. The therapeutic task is to distinguish between adaptive and maladaptive patterns and to intervene when gaming shifts from enrichment to avoidance. The recognition of gaming addiction as a clinical condition underscores the importance of equipping therapists, families, and youth with tools to build healthier digital habits. By fostering emotional resilience, addressing co-occurring concerns, and promoting offline identity development, clinicians can support children and adolescents in navigating both digital and real-world challenges with balance and resilience

Framework Application: Gaming and ADHD

ADHD provides a particularly important example of framework-based case formulation because reward sensitivity, boredom intolerance, impulsivity, and executive-function challenges can alter both the appeal and the function of gaming.

Reward Sensitivity in ADHD

Children and adolescents with attention deficit hyperactivity disorder (ADHD) often demonstrate a heightened attraction to video games and other forms of digital technology. This relationship is tied to neurobiological vulnerabilities, particularly dysregulation in the brain's dopamine system. Because individuals with ADHD naturally gravitate toward activities that deliver high levels of stimulation and immediate reward, the design of most video games—fast-paced action, continuous feedback loops, and clear achievement markers—aligns directly with their reward-seeking tendencies. These features can temporarily enhance focus, boost dopamine release, and create a sense of mastery that may be elusive in traditional academic or social contexts (Thorell et al., 2024; Chaarani et al., 2022).

Gaming as Self-Regulation

For many children with ADHD, gaming becomes more than just entertainment; it often serves as a self-regulatory mechanism. Immersive digital environments provide structure and feedback that help regulate attention and emotion, offering temporary relief from the disorganization, frustration, and boredom experienced in less stimulating settings. This form of engagement can also strengthen self-esteem and motivation when success in gaming offsets perceived failures in academics or peer relationships (Bogiannidis et al., 2023; Amudhan et al., 2022).

Risk of Dysregulation

The therapeutic concern arises when gaming becomes the primary or exclusive source of gratification. Excessive or unregulated use can reinforce dependence on constant stimulation, making it increasingly difficult for children to sustain focus in environments lacking immediate rewards. This can hinder classroom functioning, disrupt relationships, and impair the development of long-term executive

functioning skills (Bansal & Kranti, 2022; Chen, 2024). Children with ADHD, already at higher risk due to impulsivity and difficulty with self-monitoring, may develop problematic gaming patterns or Gaming Disorder. Research highlights that altered brain networks and connectivity, particularly in executive function regions, further increase vulnerability to compulsive gaming (Zhang et al., 2023).

Framework-Guided Assessment

From a therapeutic standpoint, gaming must be viewed as both a potentially adaptive outlet and a source of dysregulation. Clinicians should evaluate whether gaming supports skill development and social connection or instead functions as avoidance and digital escapism (Verma et al., 2022). Assessment should focus on how games interact with the child's broader emotional and behavioral profile.

Balanced Intervention

Video games are not inherently detrimental for children with ADHD. When moderated and integrated into a broader treatment and developmental plan, gaming can provide opportunities for stimulation, focus, and connection (Coutelle et al., 2024). The therapeutic goal is not to eliminate gaming, but to position it as one of many tools within a balanced developmental environment. Through intentional planning, psychoeducation, and emotionally responsive caregiving, children with ADHD can learn to use technology in ways that foster resilience, attention control, and social-emotional competence, equipping them for long-term success across both digital and real-world contexts (Nagata et al., 2022; Coutelle et al., 2024). Just as video games can be reframed as supportive rather than inherently harmful for children with ADHD, other areas of digital engagement require a similar lens. One of the most critical domains where balance must be struck is sleep, a cornerstone of healthy development that is highly sensitive to technology use.

Framework Application: Technology and Sleep

The framework also treats sleep as a central developmental outcome and treatment target because nighttime digital habits can intensify emotional and attentional difficulties regardless of whether gaming itself reaches a disordered level.

Sleep as a Developmental Treatment Target

Digital engagement, including video games, streaming, smartphones, tablets, and social media, has a significant impact on children's sleep, which is foundational for emotional regulation, cognitive development, and daily functioning. Although much of the early research focused on adolescents and young adults, recent studies highlight similar implications for school-aged children, raising important therapeutic considerations. The pervasive use of digital media exposes children to both physiological and psychological factors that interfere with sleep regulation.

Circadian and Physiological Effects

A central physiological concern remains the blue light emitted by screens, which suppresses melatonin production and disrupts circadian rhythms. This effect is particularly pronounced in children because of their larger pupils and clearer ocular lenses, making them more vulnerable to delayed sleep onset and irregular sleep cycles (Zhong et al., 2025). Chen (2024), in a longitudinal study of school-aged children, found that consistent evening screen use contributed to later bedtimes and approximately 50

minutes less total sleep per week. Similar findings show that excessive pre-bedtime engagement with technology is linked to shorter sleep duration, decreased sleep efficiency, and greater variability in sleep onset (Bansal & Kranti, 2022). Moreover, irregular light exposure patterns—particularly exposure to artificial light late at night—destabilize sleep architecture, leading to fragmented rest and frequent nighttime awakenings (Yao & Booth, 2025).

Content, Arousal, and Sleep

Beyond light exposure, evidence increasingly points to the role of digital content in shaping sleep outcomes. While blue light and brightness influence circadian processes, emotionally arousing or cognitively stimulating content—such as high-intensity video games or dramatic media—can elevate arousal and delay the transition into sleep more than passive screen exposure (Gradisar, 2025). For example, adolescents who engaged in interactive media multitasking before bed demonstrated impaired sleep quality and reduced next-day attention performance, underscoring the link between screen-based stimulation and cognitive functioning (Chaarani et al., 2022).

Developmental Consequences

The developmental implications of poor sleep tied to digital engagement are substantial. Hartstein et al. (2024) found that children with lower evening screen exposure exhibited more consistent circadian rhythms, fewer night wakings, less daytime sleepiness, and stronger academic performance compared to peers with high screen time. Bansal and Kranti (2022) similarly observed that heavy digital use correlated with disrupted sleep cycles, increased stress, and diminished self-esteem in youth populations. In addition, children struggling with problematic gaming behaviors often experience late-night play that encroaches on rest, reinforcing a cycle of sleep disruption, emotional dysregulation, and academic decline (Amudhan et al., 2022; Bradt et al., 2024). Neurobiological studies also reveal that excessive nighttime gaming is associated with disrupted executive functioning, further exacerbating attentional deficits and emotion regulation difficulties (Zhang et al., 2023).

Sleep-Focused Intervention

From a therapeutic perspective, disrupted sleep due to technology use frequently presents as irritability, difficulty with emotion regulation, academic struggles, and heightened anxiety or mood disorders (Verma et al., 2022). Clinicians must integrate sleep hygiene into broader treatment goals, recognizing that digital habits intersect with both mental health and developmental outcomes. Recommended interventions include establishing a screen-free period of at least one hour before bedtime, encouraging calming and non-digital activities such as reading or mindfulness, dimming lights or using blue-light filters in the evening, and reinforcing consistent sleep–wake schedules (Bansal & Kranti, 2022). Psychoeducation is critical, as families may not recognize the neurophysiological effects of digital use on melatonin suppression, arousal, and circadian misalignment.

Family-Centered Implementation

At the same time, therapists should approach these issues with empathy rather than restriction alone. Children's attachment to digital technology is often rooted in social connection and self-regulation needs, and punitive restrictions may increase resistance or secrecy (Coutelle et al., 2024). Instead, clinicians can support parents in implementing bedtime rituals that are predictable, warm, and emotionally

safe, gradually reshaping the child's association between screens and rest. Integrating parental mediation strategies—particularly those characterized by authoritative warmth and collaborative limit-setting—has been shown to reduce both problematic gaming behaviors and sleep disruption, especially in children with heightened sensitivity to rewards or avoidance (Bradt et al., 2024; Kohls et al., 2022).

The therapeutic response must be tailored not only to screen timing and brightness but also to the type of digital content consumed, the child's individual temperament, and the family's broader routines. By addressing both environmental and relational dimensions of sleep hygiene, therapists can help children and families develop healthier digital practices that protect rest while supporting emotional resilience and cognitive development

Integrated Clinical Application

Taken together, these applications illustrate how the framework moves from isolated concerns about screen time toward a coordinated clinical formulation that connects development, function, family context, coping, and daily routines.

Integrating Assessment and Intervention

Digital technologies, including gaming, streaming, smartphones, and social media, are central to children's lives, offering opportunities for learning and connection but also posing risks when overused (Bogiannidis et al., 2023; Coutelle et al., 2024). One of the most clinically relevant outcomes is disrupted sleep, which undermines emotional regulation, attention, and long-term mental health (Chen, 2024; Zhong et al., 2025). Screen exposure delays melatonin release, overstimulates the brain, and reduces sleep quality, leading to daytime fatigue, impaired executive functioning, and poorer academic outcomes (Gradisar, 2025; Hartstein et al., 2024; Zhang et al., 2023).

Children with ADHD, anxiety, or depression are especially vulnerable, often using technology to cope with distress in ways that reinforce dependency and avoidance (Amudhan et al., 2022; Bradt et al., 2024). Neurobiological findings further suggest that heavy use alters brain networks linked to impulse control and executive functioning (Zhang et al., 2023). The distinction between healthy and problematic engagement lies in function: technology supports development when it fosters regulation, creativity, and social growth but becomes harmful when it perpetuates avoidance or dysregulation (Alho et al., 2022; Chaarani et al., 2022; Verma et al., 2022).

Family and Skills-Based Supports

Therapists, parents, and educators play a crucial role in guiding balanced use. Family-centered approaches, such as consistent routines, screen-free periods before bed, and authoritative limit-setting, help protect sleep, emotional regulation, and healthy routines (Bansal & Kranti, 2022; Bradt et al., 2024; Kohls et al., 2022). Clinically, technology use should be a regular treatment focus, with interventions that combine psychoeducation, CBT, mindfulness, and family training to build diversified coping skills (Verma et al., 2022). Prioritizing sleep health as both a symptom and treatment target is essential, as improved sleep strengthens emotional well-being and attentional capacity (Chen, 2024; Zhong et al., 2025).

Clinical Goal: Balanced Use

Technology is neither inherently harmful nor beneficial; its impact depends on context, moderation, and purpose. Mindful, balanced engagement allows children to benefit from digital tools without compromising core developmental needs, particularly restorative sleep, resilience, and meaningful human connection (Bansal & Kranti, 2022; Gradisar, 2025).

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