

REVIEW ARTICLE

Parent and Teacher Education Strategies, Wise Use of Gadgets in Children With Attention Deficit Hyperactivity Disorder

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ABSTRACT

Children with Attention Deficit Hyperactivity Disorder (ADHD) are increasingly exposed to digital gadgets in their daily routines. While technology can enhance learning, creativity, and communication, unregulated and excessive use may have detrimental effects, particularly among children with difficulties in attention, hyperactivity, and impulse control. Numerous studies have reported that excessive gadget use is associated with a higher risk of gadget addiction, which may further exacerbate ADHD symptoms, disrupt sleep, and interfere with cognitive and emotional development. Emerging evidence suggests a bidirectional relationship between ADHD and gadget addiction: children with ADHD are more vulnerable to problematic gadget use, while prolonged and uncontrolled screen exposure can intensify inattention, impulsivity, and behavioral challenges. Given these risks, preventive and educational strategies are crucial. Parents and teachers play a central role in guiding children toward responsible and balanced gadget use through structured routines, positive reinforcement, and consistent supervision. At home, parents can model appropriate technology habits, set clear limits, and provide alternative activities that promote focus and self-control. In school, teachers can implement classroom management strategies and integrate technology in ways that support attention and learning rather than distraction. Collaborative educational programs that involve both caregivers and educators have demonstrated promising outcomes in reducing excessive gadget use and promoting healthier digital habits. This review summarizes current evidence on gadget use in children with ADHD and highlights effective parent- and teacher-based educational interventions to support better self-regulation and well-being.

Key Words: *Attention deficit hyperactivity disorder, Technology addiction, Education, Parenting.*

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INTRODUCTION

Attention Deficit Hyperactivity Disorder (ADHD) is a neurodevelopmental disorder, defined as a pattern of persistent inattention and/or hyperactivity-impulsivity that interferes with functioning or development and negatively

impacts academic, work, and social activities according to Diagnostic and Statistical Manual of Mental Disorders 5th edition (DSM-5) classification.¹ As one of the most common neurodevelopmental disorders in children, ADHD affects a considerable proportion of the global population, with prevalence rates reported

between 2% and 18% across studies.² A meta-analysis of 13 studies have indicated a global prevalence of attention deficit hyperactivity disorder (ADHD) in children and adolescents reaching 8.0%, with a prevalence approximately twice as high in males (10.0%) compared to females (5.0%).³

The core characteristics of ADHD, including impulsivity, inattention, and heightened sensitivity to immediate rewards, may be particularly salient to affected individuals, who may be drawn to digital media environments that provide rapid feedback and constant stimulation. Consequently, a higher proportion of individuals diagnosed with ADHD has been observed in groups characterized by internet addiction compared to control groups.^{4,5}

Gadgets are electronic or mechanical devices with advanced technology and practical functions.⁶ Gadgets are now used by almost all age groups, especially teenagers, for various activities such as accessing the Internet, recording, listening to music, and navigating. They have become an integral part of everyday life, serving both educational and recreational purposes by providing instantaneous feedback that effectively mitigates feelings of boredom and sustains user engagement.^{7,8}

The risk of addiction is inevitable due to the integration of gadgets into human daily life. The Indonesian Internet Service Provider Association (APJII) survey reported that 11% of children aged 4-6 in Indonesia have personal gadgets and 26% show signs of gadget addiction. As many as 28% of children use gadgets for learning, 22% for playing, and 50% for both, with an average use of 6.2 hours per day.⁹

The use of gadgets has positive impacts, such as facilitating education, entertainment, and communication, especially for adolescents who utilize social media and games to enhance cognitive skills and neural training. Gadgets also support health monitoring, psychotherapy, and online education that are beneficial for users⁹⁻¹¹ however, this instant gratification potentially harms mental health.⁷ Excessive use can lead to negative impacts, including obesity, developmental disorders, decreased academic performance, as well as disruptions in social functioning and mental health, such as anxiety and depression. This is particularly risky for children with developing brains, as they do not yet

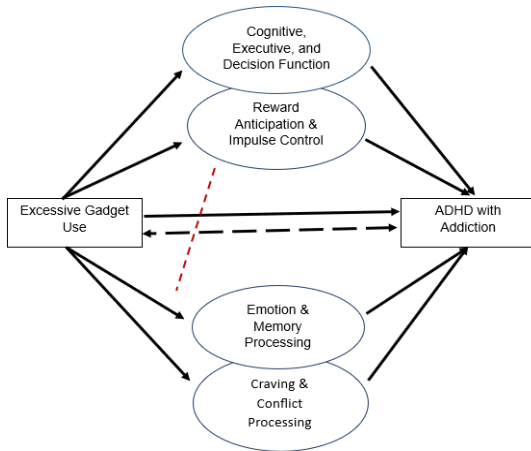
possess mature self-control.^{9,10} Excessive use is also associated with adverse outcomes like obesity, developmental delays, and poor academic performance. These risks are heightened in children, whose self-regulation abilities are still developing.

Addiction was previously defined as a consequence of excessive drug use leading to tolerance, withdrawal symptoms, and an inability to stop. Current addiction also encompasses behaviors such as gaming, internet use, or gambling.¹² As ADHD significantly increases risk factors and is strongly associated with various substance and behavioral addictions, including internet addiction.¹³

In the context of the digital era, children with ADHD tend to spend more time engaging with gadgets, increasing their vulnerability to gadget addiction. Studies have demonstrated that individuals with ADHD are more prone to developing gadget addiction and that excessive gadget use is positively correlated with greater symptom severity.¹⁴ Furthermore, this overuse exacerbates core ADHD symptoms, reinforcing a reciprocal cycle between ADHD and digital addictive behaviors.^{15,16}

The role of parents in preventing gadget addiction in children is of paramount importance. This role can be achieved by providing adequate attention to their children and by ensuring that they do not use gadgets in front of their children when they are with them.¹² It is essential to thoroughly understand and examine the literature regarding the use and risks of gadget addiction in patients with ADHD, including how to provide appropriate education to parents and teachers to support the wise use of gadgets among children with ADHD.¹⁷

Pathophysiology of addiction in ADHD: Dysfunction of the dopaminergic system plays a crucial role in ADHD and gadget addiction. Digital activities such as playing video games provide dopamine stimulation, enhancing focus but also increasing the risk of addiction.¹⁸ Prolonged gadget use raises the threshold for stimulation, making it difficult for individuals to concentrate on activities that require focus. Consequently, gadgets are often used as a coping strategy, creating a vicious cycle between ADHD and gadget addiction.⁷



Pathophysiology of addiction in ADHD source⁵

There exists a bidirectional association between excessive use of gadgets and ADHD accompanied by addictive behaviors. This interplay is mediated by multiple neuropsychological functions and domains of brain activity, operating through complex and interrelated mechanisms.¹²

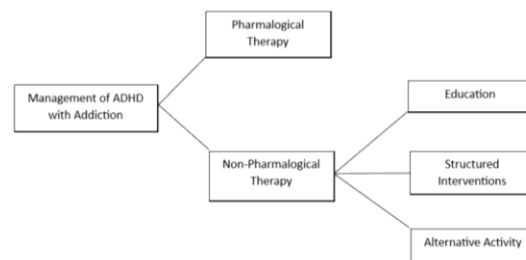
- Cognitive, executive, and decision-making functions:** Excessive engagement with gadgets has been shown to further impair cognitive flexibility, executive control, and decision-making-domains that are already vulnerable in individuals with ADHD. Conversely, dysfunctions in these areas heighten the propensity for compulsive gadget use, creating a feedback loop.
- Reward processing and impulse regulation:** Both excessive gadget use and ADHD are characterized by dysregulation in reward anticipation and diminished impulse control. Children with ADHD often exhibit heightened sensitivity to immediate rewards, making them more susceptible to the instant gratification offered by digital media. Repeated exposure, in turn, exacerbates deficits in impulse regulation.
- Emotional and memory functioning:** Difficulties in emotional regulation and memory processing are shared features of both conditions. These impairments may intensify addictive patterns of behavior and contribute to the persistence and aggravation of ADHD symptomatology.

- Craving and conflict processing:** Heightened craving responses and impaired conflict resolution further sustain the cycle of addictive engagement with digital technology, reinforcing maladaptive behaviors in both contexts.

This reciprocal and mutually reinforcing relationship highlights the urgent need for comprehensive, multidimensional interventions that aim to break the cycle of excessive gadget use and ADHD addiction. These interventions should target both behavioral symptoms and the underlying neuropsychological dysfunction.

Importance of education in digital detox for managing gadget addiction in ADHD: The idea of “digital detox” has developed as a way to counter the potential negative effects of constant digital use on mental health. This concept is based on the understanding that intentional breaks from technology are necessary to support psychological well-being. Digital detox practices may include setting specific times to avoid screens, reducing time spent on social media, and adopting more mindful use of technology. Through these approaches, individuals seek to regain control over their digital behaviors, ease the mental burden of constant connectivity, and cultivate a more balanced and healthy interaction with technology.^{19,20}

Studies show that taking a break from digital media can significantly impact an individual’s health and overall well-being. In treating gadget addiction among individuals with ADHD, both pharmacological and non-pharmacological approaches are recommended, with an emphasis on behavioral therapy.^{21,22} As part of non-pharmacological treatment, digital detox strategies include education, structured interventions, and alternative activities.



Management of gadget addiction in ADHD Source:^{21,22}

Parental education: Parents serve as the primary caregivers during a child's early years, and their responsiveness and engagement play a critical role in fostering early childhood development (ECD). Evidence from recent studies indicates that parenting programs designed to strengthen parent-child interactions or directly support early learning are particularly effective in enhancing children's cognitive, language, motor, and socioemotional skills.²³

Education: Parental supervision plays a vital role in managing gadget use, as the family serves as the primary educational environment that shapes a child's social development.²⁴ A significant proportion of caregivers, particularly those with limited educational attainment, frequently employ gadgets as "electronic nannies" to minimize disruptions, often without comprehending the long-term implications.²⁵ This phenomenon has been linked to an increase in excessive and unsupervised screen time, a concern that is particularly salient in the context of children diagnosed with ADHD. Consequently, targeted educational interventions are imperative to enhance awareness among parents regarding the risks of screen addiction and its correlation with ADHD symptoms.²⁶

An effective educational program for parents must address three fundamental dimensions: reactive management, proactive management, and monitoring.²⁷ Reactive management entails the establishment and consistent enforcement of guidelines aimed at mitigating the adverse effects of gadget usage. Research has identified a correlation between excessive use, particularly during the morning hours, and an increased propensity for dependency. Proactive management is predicated on the principles of transparent communication and the cultivation of robust parent-child relationships. These practices have been demonstrated to diminish dependency risk by engendering trust and promoting voluntary self-regulation. Finally, the term "monitoring" refers to the awareness that parents have regarding the digital content to which their children are exposed. It is important to note that problematic engagement with games and social media has been demonstrated to heighten the risk of addiction. Therefore, the importance of

professional support in the strengthening of monitoring strategies is reinforced.

Structured interventions: Greater emphasis on behavioral interventions by involving parents in their children's treatment plans may lead to greater adherence to treatment.²²

a) **Role modelling:** Research shows that children tend to imitate parental behavior rather than follow verbal instructions. Children's interest in parental behavior is due to their reflective nature. Modeling good gadget use by being a responsible digital parent is very important. Parental use of gadgets should not take place in the presence of children. If gadgets are given to children, they need to be taught how to use technology wisely.¹² Sharing gadget use with parents can help adolescents, including those with ADHD, improve communication, motivation, and awareness to reduce smartphone addiction through mutual support.²⁸

b) **Establish the rules:** Some areas of the home, such as the dining room and living room, should be restricted from gadget use to support family time. Permissive parenting may increase the risk of aggression, especially in adolescents with ADHD who have difficulty with emotion management.²⁹ The use of gadgets in rooms increases the risk of addiction, so parents need to regulate the use of gadgets in certain areas. Monitoring the content, such as games and cartoons, that is appropriate for children's psychological state can reduce the risk of addiction and teach moral values to prevent social decline. Children aged 2-5 years are advised to limit the use of gadgets to one hour per day, while children over five years should be limited to 2-3 hours per day with a consistent schedule.¹²

Alternative activity: Behavioral intervention strategies for children include scheduling physical activities such as puzzles, mazes, or coloring, and sharing care responsibilities to keep children engaged.³⁰ The World Health Organization recommends physical activity, sedentary time, and sleep guidelines for children under five years of age, regardless of background, which are associated with improved motor development,

cognitive, psychosocial, and cardiometabolic health.³¹

Physical activity such as tummy time of at least 30 minutes per day for infants supports motor development and prevents plagiocephaly, while sedentary, non-screen activities such as building blocks, singing, or reading together promote cognitive and motor development. Getting enough

sleep is important, as short sleep duration is associated with obesity, emotional disturbance, and increased risk of injury. The combination of longer sleep, less screen time, and more physical activity provides maximum benefits for children's development. Recommended sedentary activities for children with ADHD include Lego play, pretend play, and singing.^{31,32}

TABLE 1: Recommendations on physical activity, sedentary behavior, and sleep for children under 5 years of age.³³

Age	Physical Activity	Sedentary Activity	Sleep Duration
<1 year	Physically active for at least 30 minutes in the prone position (tummy time)	Not physically restrained for more than 1 hour. Screen time is not recommended. Sedentary activities may include reading or storytelling.	For ages 0–3 months: sleep duration of 14–17 hours. For ages 4–11 months: sleep duration of 12–15 hours, including quality sleep and naps.
1–2 years	Physically active for at least 180 minutes with a variety of physical activities.	Not restrained for more than 1 hour. Screen time is not recommended for 1-year-olds, but for 2-year-olds, screen time should not exceed 1 hour. Sedentary activities may include reading or storytelling.	Includes quality sleep, including naps, with a consistent sleep-wake routine, totaling 11–14 hours.
3–4 years	Physically active for at least 180 minutes, with at least 60 minutes of moderate-to-vigorous intensity activities.	Not restrained for more than 1 hour. Screen time should not exceed 1 hour. Sedentary activities may include reading or storytelling.	Sleep, including naps, with a consistent sleep-wake routine, totaling 10–13 hours.

Teacher education: Teachers serve as integral partners in a child's educational and behavioral development, providing structured learning environments and reinforcing positive habits that complement parental guidance in managing gadget use among children with ADHD.

Education: Educating teachers about gadget dependence in students with ADHD is a critical component of effective intervention and support.²² Key strategies include increasing teacher awareness of challenges related to gadgets in ADHD, implementing structured classroom interventions, and introducing alternative, engaging activities to reduce reliance on screens. The efficacy of teacher training programs in enhancing educators' understanding of ADHD has been demonstrated, thereby equipping them with the necessary skills to foster supportive learning environments and manage disruptive behaviors with greater confidence.³⁴ This knowledge is associated with enhanced classroom inclusivity

and behavioral management, empowering educators to respond effectively to challenges related to ADHD.

It is imperative to understand the cognitive and behavioral triggers that students experience, such as sensory overload, feelings of exclusion, or physical restlessness. By recognizing and addressing these triggers, we can identify and minimize the barriers that students encounter in the classroom.³⁵ Furthermore, educators should be cognizant of the fact that some children may be prescribed medication, which may ameliorate symptoms but not eradicate all challenges.³⁶ In the contemporary digital landscape, characterized by an abundance of technology, educators must acknowledge the augmented vulnerability of children diagnosed with ADHD to addictive use of gadgets.³⁷ The instantaneous stimulation provided by gadgets has the potential to reinforce impulsivity and inattention. In the absence of effective monitoring and consistent routines,

excessive screen time may exacerbate ADHD symptoms and impede both academic and social development.

Structured intervention: Structured, targeted interventions, public education campaigns, and ongoing research initiatives help to prevent and manage gadget dependency in children with ADHD. Interventions that can be provided in the form of teacher training include

a) The digital literacy curriculum: Children diagnosed with ADHD encounter several challenges in the context of online learning, particularly with unlimited access to gadgets, which frequently results in technology addiction.³⁸ Promoting digital literacy and well-being through curricula for teachers and students empowers individuals to use technology responsibly, develop critical thinking and media literacy skills to distinguish between productive and harmful smartphone use, and foster a balanced relationship with technology through strategies like digital detox, mindfulness, and offline activities to prioritize real-world connections.³⁹

b) Establishing school rules: The identification of gadget time management strategies as a pivotal component in supporting the educational requirements of children diagnosed with attention and learning disorders has been well-documented.⁴⁰ Healthcare professionals, educators, and policymakers should work together to develop evidence-based screen time guidelines for smartphone use, particularly for vulnerable populations such as children, adolescents, and those with pre-existing mental health conditions. These guidelines should balance the benefits of technology with the need for screen-free activities and rest.³⁹

Alternative activities: Children need to be encouraged to stop and think before starting a task, including planning what is needed and what will be done. The difficulty in avoiding automatic responses to distractions often leads them to skip this process, resulting in a lack of focus on the main task.³²

TABLE 2: Alternative activities in school.³⁶

No.	Strategy	Explanation	Primary Benefit
1	Encourage Movement	Providing children with opportunities for purposeful movement, such as assisting with classroom tasks or working in a standing position, and explaining rules about appropriate times and situations for movement.	Addresses children's physical needs without disrupting the learning process.
2	Play with Objects	Offering suitable objects for children to manipulate as aids, provided they do not distract other children or detract from the task at hand.	Helps manage the need for movement while maintaining focus on the task.
3	Take Regular Breaks from Sensory Stimulation	Providing 'brain breaks', which are short periods of respite from seated learning activities, to assist children experiencing overstimulation in staying alert, focused, and completing tasks.	Helps children remain attentive, focused, and productive, particularly those requiring more rest.
4	Practice Concentration through Play	Engaging in games such as snakes and ladders, tic-tac-toe, and memory games to train children's attentional flexibility, understand the challenges of shifting focus between tasks, and develop strategies for task completion.	Enhances children's concentration and attentional flexibility.
5	Active Learning	Employing active learning techniques, such as manipulating numerals with Lego bricks, drawing rainbows, or vocalizing numerical and alphabetical values.	Fosters greater engagement in learning, particularly among children facing memory-related challenges.

CONCLUSION

A comprehensive and collaborative approach involving both parents and teachers is essential to effectively support children with Attention Deficit Hyperactivity Disorder (ADHD) in managing gadget use. Parents serve as the primary agents of behavioral regulation at home and are encouraged to implement consistent and age-appropriate guidelines for technology use. These may include establishing daily time limits, designating specific tech-free zones such as bedrooms or dining areas, monitoring the content and duration of screen exposure, and modeling healthy digital habits through their own behavior. Parental education about the neurobiological and behavioral vulnerabilities associated with ADHD, particularly impulsivity, reward-seeking tendencies, and difficulties in self-regulation, is also critical to foster understanding and empathy in managing technology-related challenges.

Teachers, on the other hand, play a pivotal role in reinforcing these efforts within the school environment. They can support attention and learning by setting structured classroom technology policies, integrating digital tools purposefully into lessons, and recognizing early signs of gadget overuse or distraction. Active collaboration between parents and teachers ensures continuity of behavioral expectations across home and school settings. Additionally, participation in professional training programs can equip educators with strategies to address gadget addiction, enhance focus, and promote adaptive coping mechanisms in students with ADHD. Continued monitoring, individualized interventions, and school-based awareness campaigns can further strengthen these efforts. Future longitudinal and interventional studies are warranted to evaluate the long-term impact of these multidisciplinary strategies and to guide evidence-based policy development.

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Authors' contribution

MZNA: Methodology, data collection, manuscript writing, literature review & referencing

YS: Proposed topic, basic study design and quality insurer

All the authors have approved the final manuscript draft and accept the responsibility of research integrity.