

## Review Article

# An overview of attention-deficit hyperactivity disorder in the pediatrics

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## ABSTRACT

Attention-deficit hyperactivity disorder (ADHD), which is a disorder affecting children worldwide, has lasting effects on their behavior and cognitive functions. This review will explore the complexities of ADHD in children, including its classification, manifestations and management strategies. We will discuss the subtypes of ADHD and how they present challenges in various aspects of a child's life. From difficulties with attention to hyperactivity and impulsivity these subtypes have profiles that impact academic performance, social interactions and emotional regulation. The symptoms of ADHD intertwine inattentiveness, hyperactivity, impulsivity, emotional instability and academic struggles in patients. These symptoms significantly affect a child's functioning across areas such as schoolwork, social life and emotions. To effectively manage ADHD in children requires an approach that combines medication options with interventions, educational support systems tailored to individual needs and parental support programs that emphasize collaboration between healthcare professionals and families. This comprehensive approach seeks to address the requirements of children dealing with ADHD. Its goal is not to reduce symptoms but to improve their long-term outcomes and overall quality of life. By explaining the nature of ADHD in children, this analysis aims to provide an understanding of the disorder. It highlights the significance of customized interventions, early detection, and continuous support in order to enhance the well-being and developmental path of affected children.

**Keywords:** ADHD, Neurodevelopmental disorder, Hyperactivity, Impulsivity, Clinical manifestations

## INTRODUCTION

Attention-deficit hyperactivity disorder (ADHD) is a disorder that affects the behavioral and social development of individuals including both children and adults. It is characterized by patterns of inattention, hyperactivity and impulsivity that hinder functioning in settings. ADHD is,

among the diagnosed psychiatric disorders in children worldwide with prevalence estimates ranging from 5% to 7%.<sup>1,2</sup> However, there have been changes in the criteria and definition of ADHD over time, which has resulted in estimates and outcomes across studies and populations. The causes of ADHD are complex.<sup>3,4</sup> This involve a combination of environmental and neurobiological factors.

Scientists conducting research have discovered genes that are linked to ADHD. These genes mainly impact the control of chemicals that transmit signals, in the brain the growth of nerve cells and the operations of connections between them.<sup>5,6</sup> Furthermore, studies using brain imaging techniques have uncovered variations in how brain areas linked to managing attention, controlling impulses and carrying out tasks (such, as the cortex, basal ganglia and anterior cingulate cortex) function. Environmental factors such as exposure to alcohol or tobacco substances or lead exposure during pregnancy along with birth weight/prematurity or psychosocial challenges can increase the risk or worsen symptoms of ADHD. Managing ADHD in patients requires an approach that includes both medication-based treatments as well as psychosocial interventions. The first line of treatment, for ADHD typically involves medications such, as methylphenidate and amphetamines.<sup>7,8</sup> These medications function by regulating the levels of dopamine and norepinephrine in the brain thereby providing relief from ADHD symptoms. However, it's important to note that stimulant medications can have some effects, like suppressing appetite causing insomnia leading to irritability and posing risks. Additionally, there are cases where individuals may not effective or well tolerate these medications.<sup>9</sup> It's also worth mentioning that stimulant medications don't directly address the underlying deficits or the associated challenges of ADHD such as struggles, social difficulties and emotional issues. That's why it becomes essential to incorporate interventions alongside treatments to improve overall functioning and enhance the quality of life for children with ADHD.<sup>10,11</sup> Psychosocial interventions encompass approaches including therapy, parent training, educational accommodations and classroom interventions. The primary goal of these interventions is to help children with ADHD develop improved coping skills abilities, self-regulation capabilities and social aptitude. Psychosocial interventions that are based on evidence have shown to be effective, in reducing the severity of ADHD symptoms as improving performance and social outcomes for children.<sup>12</sup> These interventions can also offer support to parents and teachers. However, it's important to keep in mind that the availability and implementation of these interventions may differ across settings due to factors such as resources or specific policies, in place.<sup>13</sup> Early identification and intervention play a role in preventing or mitigating negative outcomes associated with untreated or undertreated ADHD. Children with ADHD are at risk of experiencing underachievement difficulties in forming social relationships as well as an increased vulnerability to substance abuse.<sup>14,15</sup> Furthermore, they may be more susceptible to developing comorbidities, like anxiety disorders, depression, conduct disorder or bipolar disorder. Moreover, it is worth noting that ADHD can continue to have an impact, on individuals, throughout their adult lives, affecting not their personal relationships but also their overall psychological well-being. To effectively support children, with ADHD, it is important to take an approach involving pediatricians, educators, mental health

professionals and families. By educating parents and teachers about ADHD, providing them with support and implementing tailored interventions, we can improve outcomes and enhance the quality of life for those affected. ADHD is a condition that impacts a number of children and adults globally. Its intricate nature, influenced by genetics, neurobiology and the environment highlights the need for a multimodal approach to both diagnosis and management. Early identification, diverse interventions and collaborative care models play a role in addressing the needs of children with ADHD and improving their long-term outcomes. While recent research has contributed to our understanding of ADHD's causes, prevalence, and treatment methods, questions and challenges still require further investigation and innovative approaches. This study aims to provide an overview of ADHD in care.

## METHODS

On 26 November 2023 a thorough investigation was conducted to analyze articles from Cochrane Library, PubMed and Scopus. The purpose was to gain an in-depth understanding of ADHD in children, including its causes, diagnosis, and treatment. This review specifically focused on studies since 2008 that prioritize the well-being of children with ADHD. Its goal was to shed light on assessment methods and early warning systems that can assist healthcare professionals in enhancing the safety of patients, with ADHD.

## DISCUSSION

ADHD, in children is a disorder that involves consistent patterns of inattention, hyperactivity and impulsivity. These symptoms can have an impact, on areas of a child's life. The disorder is divided into three subtypes: mainly showing signs of inattention, mainly showing signs of hyperactivity and impulsivity, or a combination of both, according to the diagnostic and statistical manual of mental disorders (DSM 5). This classification helps doctors understand the ways the symptoms can appear and allows them to customize treatments based on manifestations.

**Table 1: Types of ADHD.**

ADHD subtypes	Characteristics
Predominantly inattentive	Difficulty sustaining attention, organization issues
Predominantly hyperactive/impulsive	Excessive fidgeting, impulsivity
Combined presentation	Symptoms of both inattention and hyperactivity-impulsivity

The conversation revolving around ADHD in children's healthcare explores the complexities of categorizing it and the different ways it presents in affected kids. The main type characterized by lack of focus involves struggles with maintaining attention, forgetfulness, disorganization and an overall difficulty in concentrating. On the hand there's

another type marked by restlessness, impulsive behaviors and trouble controlling impulses. This is often seen as fidgeting and talking excessively. Then there's a combination of both types that includes symptoms from both categories such as attention deficits, hyperactivity and impulsivity altogether. Understanding these subtypes helps tailor treatment approaches based on each child's needs and symptomatology. For example, children predominantly showing signs of lack of focus might benefit from interventions focused on improving skills and exercises to enhance attention span.<sup>16,17</sup> On the other hand, those displaying hyperactivity-impulsivity symptoms might require strategies to manage excessive energy levels. The classification system assists healthcare providers in creating intervention plans that address the needs of children with ADHD. This promotes effective management strategies tailored to each child's unique symptom profile. Having an understanding of these subtypes improves our ability to provide personalized care that optimizes outcomes, for children diagnosed with ADHD.

### **Clinical manifestation**

ADHD presents itself in children with a range of symptoms that have an impact on their daily lives and development. These symptoms primarily include issues with paying attention, being overly active and acting impulsively which can be observed in situations. In terms, ADHD shows behavioral, cognitive and emotional aspects that greatly influence how affected children perform academically, interact socially and overall experience well-being.<sup>18</sup> One key aspect of ADHD is the presence of inattentiveness. Children with symptoms often struggle to stay focused, frequently lose track of tasks or make mistakes and may have difficulty organizing their activities. They find it challenging to concentrate on tasks and can easily become distracted or lose focus during conversations or when given instructions. Hyperactivity is another manifestation seen in children with ADHD. These children may exhibit motor restlessness by fidgeting or squirming and finding it difficult to remain seated when required. They often appear to be, on the move. Might have trouble engaging in quiet leisure activities. Impulsivity is another aspect where these children tend to make impulsive decisions or act without considering the potential consequences. Children diagnosed with ADHD often exhibit behavior, such, as acting without thinking interrupting conversations or games finding it challenging to wait their turn and frequently struggling to control behaviors or comments.<sup>19</sup> These impulsive tendencies can create difficulties in situations and disrupt interactions, with both peers and authority figures. ADHD goes beyond its core symptoms. Affects regulation and social functioning too. Kids, with ADHD often show ups and downs struggling to manage their feelings. They might have a time dealing with frustration which can lead to outbursts, irritability or emotional breakdowns when faced with tasks or situations. These emotional changes can make it more difficult for them to form relationships with others their age.

Furthermore, these clinical issues often create challenges in settings. Children with ADHD frequently struggle in school due to difficulties paying attention staying organized and controlling impulses. This can make it tough for them to complete tasks follow instructions and meet expectations. These struggles can result in performance and contribute to feelings of frustration, inadequacy and low self-esteem in affected children. The manifestations of ADHD in children vary greatly from person to person in terms of intensity and presentation. While some kids may primarily exhibit symptoms of being distracted or having trouble focusing on tasks others may be more hyperactive or impulsive. Additionally, the severity of symptoms can change during stages of development. Affect various aspects of a child's life. Recognizing and understanding these signs are crucial, for identification and intervention. Effective treatment plans, for children with ADHD involve a combination of interventions, medication and educational support. These personalized approaches aim to reduce the symptoms associated with ADHD improve functioning and enhance the child's quality of life. It is crucial to identify ADHD and implement comprehensive management strategies to provide support, for affected pediatric patients. This helps them overcome the challenges associated with ADHD and promotes their development.

### **Management**

The management of ADHD, in children involves an approach that includes interventions to address the different challenges associated with this condition. Foundational treatments for ADHD include medications like methylphenidate and amphetamines, which help improve attention reduce hyperactivity and manage impulsivity by affecting neurotransmitter activity in the brain.<sup>20,21</sup> Additionally, there are additional medication options such as atomoxetine or alpha 2 agonists for specific patients, which expand the range of treatment choices. In addition to medication behavioral interventions play a role in managing ADHD by focusing on improving coping skills and self-regulation in affected children. Behavioral therapy and parent training programs provide caregivers with strategies to effectively manage ADHD symptoms through techniques and consistent approaches that target behaviors ultimately helping children enhance their self-control. Studies have shown a link between ADHD and sleep disturbances indicating that sleep problems occur frequently in children with ADHD compared to those without the condition. These sleep problems primarily manifest as difficulties settling down for sleep taking longer to fall asleep duration of sleep feeling tired upon waking up or experiencing frequent night waking.<sup>22</sup> However further research is needed to determine the relationship, between ADHD and sleep issues. There is a possibility that having trouble sleeping can lead to an increase, in ADHD symptoms during the day as suggested by studies conducted on developing children. However, some studies have found that the sleep issues experienced by children, with ADHD are not directly linked to the

severity of their symptoms. This suggests that it is the disorder itself than disrupted sleep that contributes to problems with alertness during the day lack of focus and behavioral issues. For children behavioral therapy (CBT) can be beneficial as it focuses on cognitive skills and adaptive coping strategies. Implementing accommodations is crucial in ensuring success for children diagnosed with ADHD. Personalized plans like individualized education programs (IEPs) or 504 Plans provide support and modifications tailored to meet each child's learning style. These accommodations may include time for completing tasks seating arrangements or breaking down assignments into manageable segments to create an optimal learning environment. Education and support programs play a role in managing ADHD. Educating parents about symptoms and effective management strategies equips them with the skills to support their child's development. Support groups and counseling services offer support and practical guidance to help parents navigate the complexities of managing ADHD within the family dynamic. Collaborative care is an approach in ADHD management where a team comprising pediatricians, psychiatrists, psychologists, educators and other healthcare professionals work together to create individualized treatment plans. Continuously checking how the treatment is working, keeping an eye on any side effects, from the medication, and observing how the child is doing in situations are crucial for improving management techniques and making any needed changes, to our approach. The clinical management of ADHD, in children involves a variety of approaches, including medication, behavioral interventions, educational support and family involvement. These customized strategies, along with care and ongoing monitoring, play a role, in addressing the different symptoms and difficulties associated with ADHD. The ultimate goal is to enhance a child's functioning and improve their quality of life.

## CONCLUSION

In summary ADHD is an issue, in care that affects various aspects of children's lives, such as their academics, social interactions and emotional well-being. Understanding the subtypes of ADHD is crucial for tailoring intervention strategies based on individual symptoms. The clinical manifestations highlight the complexities surrounding difficulties in paying attention being behavior and managing emotions. It emphasizes the importance of identification and intervention. Additionally, managing ADHD involves an approach that includes medication, behavioral interventions, educational support, collaboration with healthcare providers, and programs to assist parents. This holistic approach aims to improve functioning and enhance the quality of life for children. Although there have been advancements in research regarding ADHD understanding there is still a need for exploration and innovation to address the evolving challenges faced by patients, with this neurodevelopmental disorder.

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## REFERENCES

1. Wilens TE, Spencer TJ. Understanding attention-deficit/hyperactivity disorder from childhood to adulthood. Postgrad Med. 2010;122(5):97-109.
2. Salari N, Ghasemi H, Abdoli N, Rahmani A, Shiri MH, Hashemian AH, et al. The global prevalence of ADHD in children and adolescents: a systematic review and meta-analysis. Ital J Pediatr. 2023;49(1):48.
3. Abdelnour E, Jansen MO, Gold JA. ADHD Diagnostic Trends: Increased Recognition or Overdiagnosis? Mo Med. 2022;119(5):467-73.
4. Sanders S, Thomas R, Glasziou P, Doust J. A review of changes to the attention deficit/hyperactivity disorder age of onset criterion using the checklist for modifying disease definitions. BMC Psychiatry. 2019;19(1):357.
5. Blum K, Chen AL, Braverman ER, Comings DE, Chen TJ, Arcuri V, et al. Attention-deficit-hyperactivity disorder and reward deficiency syndrome. Neuropsychiatr Dis Treat. 2008;4(5):893-918.
6. Yadav SK, Bhat AA, Hashem S, Nisar S, Kamal M, Syed N, et al. Genetic variations influence brain changes in patients with attention-deficit hyperactivity disorder. Transl Psychiatry. 2021;11(1):349.
7. Kolar D, Keller A, Golfinopoulos M, Cumyn L, Syer C, Hechtman L. Treatment of adults with attention-deficit/hyperactivity disorder. Neuropsychiatr Dis Treat. 2008;4(2):389-403.
8. Brown KA, Samuel S, Patel DR. Pharmacologic management of attention deficit hyperactivity disorder in children and adolescents: a review for practitioners. Transl Pediatr. 2018;7(1):36-47.
9. Stein MA, Weiss M, Hlavaty L. ADHD treatments, sleep, and sleep problems: complex associations. Neurotherapeutics. 2012;9(3):509-17.
10. Advokat C, Scheithauer M. Attention-deficit hyperactivity disorder (ADHD) stimulant medications as cognitive enhancers. Front Neurosci. 2013;7:82.
11. Currie J, Stabile M, Jones L. Do stimulant medications improve educational and behavioral outcomes for children with ADHD? J Health Econ. 2014;37:58-69.
12. Tourjman V, Louis-Nascan G, Ahmed G, DuBow A, Côté H, Daly N, et al. Psychosocial Interventions for Attention Deficit/Hyperactivity Disorder: A Systematic Review and Meta-Analysis by the CADDRA Guidelines Work GROUP. Brain Sci. 2022;12(8).
13. Das JK, Salam RA, Arshad A, Finkelstein Y, Bhutta ZA. Interventions for Adolescent Substance Abuse:

- An Overview of Systematic Reviews. *J Adolesc Health.* 2016;59(4s):S61-75.
- 14. Halperin JM, Bédard AC, Curchack-Lichtin JT. Preventive interventions for ADHD: a neurodevelopmental perspective. *Neurotherapeutics.* 2012;9(3):531-41.
  - 15. Sedgwick-Müller JA, Müller-Sedgwick U, Adamou M, Catani M, Champ R, Gudjónsson G, et al. University students with attention deficit hyperactivity disorder (ADHD): a consensus statement from the UK Adult ADHD Network (UKAAN). *BMC Psychiatry.* 2022;22(1):292.
  - 16. Drechsler R, Brem S, Brandeis D, Grünblatt E, Berger G, Walitza S. ADHD: Current Concepts and Treatments in Children and Adolescents. *Neuropediatrics.* 2020;51(5):315-335.
  - 17. Chacko A, Kofler M, Jarrett M. Improving outcomes for youth with ADHD: a conceptual framework for combined neurocognitive and skill-based treatment approaches. *Clin Child Fam Psychol Rev.* 2014;17(4):368-384.
  - 18. DuPaul GJ, Morgan PL, Farkas G, Hillemeier MM, Maczuga S. Academic and Social Functioning Associated with Attention-Deficit/Hyperactivity Disorder: Latent Class Analyses of Trajectories from Kindergarten to Fifth Grade. *J Abnorm Child Psychol.* 2016;44(7):1425-38.
  - 19. Gawrilow C, Kühnhausen J, Schmid J, Stadler G. Hyperactivity and Motoric Activity in ADHD: Characterization, Assessment, and Intervention. *Front Psychiatry.* 2014;5:171.
  - 20. Storebø OJ, Pedersen N, Ramstad E, Kielsholm ML, Nielsen SS, Krogh HB, et al. Methylphenidate for attention deficit hyperactivity disorder (ADHD) in children and adolescents - assessment of adverse events in non-randomised studies. *Cochrane Database Syst Rev.* 2018;5(5):Cd012069.
  - 21. Rubia K, Alegria AA, Cubillo AI, Smith AB, Brammer MJ, Radua J. Effects of stimulants on brain function in attention-deficit/hyperactivity disorder: a systematic review and meta-analysis. *Biol Psychiatry.* 2014;76(8):616-28.
  - 22. Spruyt K, Gozal D. Sleep disturbances in children with attention-deficit/hyperactivity disorder. *Expert Rev Neurother.* 2011;11(4):565-77.

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