J Compr Ped. 2025 February; 16(1): e154208 https://doi.org/10.5812/jcp-154208

Published Online: 2024 November 30 **Review Article**

High Cognitive Functioning ADHD: A Veterinary Student's Perspective and Literature Review

Nazanin Medghalchi [1], Afagh Hassanzadeh Rad [1], Maryam Zavar Mousavi [2,*]

[1] Pediatric Diseases Research Center, Guilan University of Medical Sciences, Rasht, Iran

[2] Department of Psychiatry, Kavosh Cognitive Behavior Sciences and Addiction Research Center, School of Medicine, Guilan University of Medical Sciences, Rasht, Iran

[*] ***Corresponding Author:*** Department of Psychiatry, Kavosh Cognitive Behavior Sciences and Addiction Research Center, School of Medicine, Guilan University of Medical Sciences, Rasht, Iran. Email: maryamzavarmousavi@gmail.com

Received: 30 August, 2024; **Revised:** 22 October, 2024; **Accepted:** 2 November, 2024

Abstract

This study provides a comprehensive review of attention deficit hyperactivity disorder (ADHD), discussing its historical background, prevalence, symptoms, subtypes, comorbidities, and treatment options. ADHD, characterized by inattention, hyperactivity, and impulsivity, affects an estimated 5 - 10% of children and 4% of adults worldwide, with a higher diagnosis rate in boys. However, underdiagnosis in girls due to less overt symptoms is a growing concern. The study begins with the case of a girl diagnosed with ADHD, using her experiences to highlight the specific challenges faced by individuals with high cognitive functioning ADHD. This case serves as an entry point to examine how ADHD impacts those who, despite intellectual or academic strengths, struggle with focus, organization, and impulse control. These insights are further explored through the perspective of a veterinary student managing ADHD, offering a unique view on how the disorder interacts with high academic and professional demands. The review examines the various subtypes of ADHD—predominantly inattentive, predominantly hyperactive-impulsive, and combined—and discusses common comorbidities such as anxiety, depression, learning disabilities, and sleep disorders. Current treatment approaches, including behavioral interventions, pharmacotherapy, and cognitive-behavioral therapy, are evaluated for their effectiveness in managing ADHD symptoms. A key theme of this study is the importance of societal awareness in reducing stigma, which can facilitate early diagnosis and access to appropriate treatment. The findings emphasize the need for individualized, holistic approaches to care that address the unique needs and strengths of each person with ADHD. Early intervention and a personalized treatment plan can significantly improve outcomes, leading to better academic performance, emotional regulation, and overall quality of life for individuals with ADHD.

Keywords: Attention Deficit Hyperactivity Disorder, Child, Developmental Disorder

1. Context

Attention deficit hyperactivity disorder (ADHD) was first described by German physician Melchior Adam Weikard in the late 18th century and was formally recognized as attention deficit disorder (ADD) in the DSM during the 1980s. Since then, ADHD has become a well-understood disorder with a robust neurobiological basis (1). Scottish physician Sir Alexander Crichton also documented an attention deficit syndrome in 1798, emphasizing the role of attention in learning (2). In 1902, British pediatrician Sir George Frederic Still provided one of the first modern descriptions, noting significant impulsivity and poor self-control in children without visible brain injury (3). Initially termed "an abnormal defect of moral control," ADHD evolved through various names, with the DSM-III-R in 1987 refining it to "ADHD," a designation still in use today with added subtypes (4, 5).

The prevalence and demographic characteristics of ADHD indicate that an estimated 5 - 10% of school-aged children have ADHD. The lower prevalence in girls may be attributed to diverse symptom presentations (6). Approximately 4% of adults may encounter ADHD, which could persist from childhood or emerge in adulthood (7).

Gender differences in ADHD diagnosis show that boys are diagnosed more frequently than girls. This difference is thought to be due to the more overt hyperactive behaviors in boys, while girls may exhibit

subtler inattentive symptoms, leading to underdiagnoses (8). A comprehensive analysis suggested that, globally, the prevalence of ADHD in children and adolescents is around 8% (9). Inattention, hyperactivity-impulsivity, and combined presentation are common symptoms of ADHD (10). In the inattentive subtype of ADHD, clinicians often encounter significant challenges in academic settings, as these children are at higher risk for learning disabilities (10).

Comorbidities of ADHD, such as anxiety disorders, depression, learning disabilities, and conduct disorders, can complicate diagnosis and treatment (10). Neuroimaging studies indicate that ADHD has a neurological basis, with differences in brain function and structure, particularly in regions involved in attention, impulse control, and executive functioning (11, 12). Most ADHD cases that remain stable throughout childhood and adolescence may be linked to genetic factors (13). Children with ADHD, especially those with high-functioning ADHD, are at increased risk for academic failure, social rejection, and behavioral problems, which can persist into adolescence and adulthood (14).

Evidence-based treatments include behavioral interventions, psychoeducation, and pharmacological treatments. Stimulant medications such as methylphenidate and amphetamines are commonly used and have been shown to be effective, while non-stimulant medications are also available and beneficial for some individuals (15). Outcomes for children with ADHD vary widely; some may experience a reduction in symptoms as they grow older, while others continue to face challenges. High-functioning ADHD describes individuals with undiagnosed ADHD symptoms that do not significantly impair their day-to-day activities. Although real, high-functioning ADHD is often misunderstood (16).

A key focus of this study is high cognitive functioning ADHD, a concept often overlooked in research and clinical practice. High cognitive functioning ADHD refers to individuals with ADHD who demonstrate exceptional intellectual abilities or academic achievements yet struggle with attention, impulsivity, and organization. These individuals often go undiagnosed because their achievements mask their symptoms, leaving their challenges unaddressed (16). This study explores ADHD through the lens of a veterinary student with high cognitive functioning ADHD. The veterinary field, known for its rigorous academic and practical demands, provides a unique perspective on how high-functioning individuals navigate their ADHD challenges. By presenting the case of a girl with ADHD and reviewing current literature on ADHD prevalence, comorbidities, and treatment approaches, this study underscores the importance of recognizing and addressing the complexities of high cognitive functioning ADHD.

1.1. Personal Background

Growing up in an environment focused on providing consistent support to patients, the professional stress experienced within the family setting may have impacted my health. With an IQ of 130, classified as highly intelligent, I demonstrated early literacy skills, reading and writing by the age of four. However, this early cognitive development did not always align with educational expectations. Teachers often found it difficult to fully understand my learning patterns, as my academic performance fluctuated significantly—ranging from excellent to lower-than-expected results. While I grasped concepts quickly, I faced challenges with written tasks. Over time, the ongoing pressure to achieve consistently high grades contributed to the onset of stuttering.

1.2. Struggles with Mental Health

As I approached my entrance exams, I sought help from a psychiatrist due to my struggles with focus and the overwhelming stress I was experiencing. I was prescribed Ritalin, sometimes taking up to six doses a day. While the medication enhanced my attention, it hindered my ability to express my true self effectively. Eventually, I began experiencing panic attacks, which further complicated my situation. I often felt a bittersweet mix of joy from my occasional successes and frustration from my struggles with problem solving.

After consulting with another psychiatrist, I received a diagnosis of bipolar disorder. This time, I chose not to rely on medication due to the challenges I faced. The veterinary entrance exams, known for their difficulty, were incredibly demanding. I was fortunate to be accepted into veterinary school, although my exam scores were often inconsistent, reflecting the ongoing challenges I faced.

With a final diagnosis of ADHD, I continued my academic journey using various coping strategies and accommodations. Reflecting on my experiences, I am dedicated to raising awareness about ADHD and its impact on education and personal life. By exploring the

complexities of ADHD, especially in diverse cultural contexts, I hope to promote understanding and empathy for those facing similar challenges.

2. Evidence Acquisition

To achieve the objectives of this study, a comprehensive literature review on ADHD was conducted. The literature search focused on ADHD, with particular attention to high-functioning individuals, including children and young adults. The searches were performed using the following databases: PubMed, ISI Web of Science, and Google Scholar, covering publications from 2000 to 2023. Search terms included combinations of keywords such as “ADHD,” “high-functioning ADHD,” “cognitive functioning,” “children,” “adolescents,” “treatment,” “early diagnosis,” and “comorbidities”.

Inclusion criteria for the review were:

(1) Original research articles, systematic reviews, and meta-analyses.

(2) Studies published in peer-reviewed journals.

(3) Articles focusing on ADHD in children or adolescents, with particular emphasis on high-functioning individuals (i.e., those with above-average intelligence or academic performance).

(4) Research discussing treatment approaches, cognitive aspects, and societal perceptions of ADHD.

Studies that exclusively covered ADHD in adults without focusing on cognitive functioning were excluded. Additionally, non-peer-reviewed sources or articles lacking a clear methodology were filtered out.

The review sought to address the following aspects of high-functioning ADHD:

- Treatment approaches: Evaluating evidence-based treatments such as behavioral interventions, cognitive therapy, and pharmacological treatments.

- Alleviating difficulties: Exploring how different interventions can help high-functioning individuals manage their ADHD-related challenges.

- The role of cognitive sciences: Understanding the cognitive processes involved in ADHD and how these influence treatment strategies.

- Primary causes and risk factors: Investigating genetic, environmental, and neurobiological factors contributing to ADHD.

- Early diagnosis: Highlighting the importance of timely diagnosis in managing ADHD in high-functioning children to prevent academic and social challenges.

- Perception and awareness: Examining how societal attitudes toward ADHD influence diagnosis, treatment, and support for high-functioning children.

This approach allowed for a comprehensive understanding of the current state of research on ADHD in high-functioning individuals.

3. Results

3.1. Treatment Approaches in High-Functioning Attention Deficit Hyperactivity Disorder

High-functioning children with ADHD face unique challenges that affect their cognitive abilities. For these children, individualized strategies such as organizational skills training, time management coaching, and goal setting can be highly effective. These interventions are designed to improve the child’s cognitive abilities and enhance daily functioning (17).

Educating children about their condition is crucial. High-functioning children benefit from detailed discussions about ADHD, which helps them develop self-awareness and self-advocacy skills. This empowerment fosters better self-management and a more proactive approach to their challenges (18).

Medication is used similarly to other children with ADHD but with careful monitoring to ensure it does not negatively impact academic performance or social interactions. High-functioning children may be more sensitive to side effects, so adjustments are often necessary to balance efficacy with minimal adverse effects (19, 20).

Cognitive behavioral therapy (CBT) is particularly effective for high-functioning children with ADHD as it helps them develop coping strategies, enhance problem-solving skills, and manage comorbid conditions such as anxiety or depression. Cognitive behavioral therapy focuses on modifying negative thought patterns and behaviors, which can significantly improve overall functioning (21).

Tailored social skills training helps high-functioning children navigate complex social situations. This training leverages their cognitive strengths to better understand social cues and develop effective communication strategies. Programs often involve role-playing and real-life practice scenarios to build social competence (22).

Overall, these treatment approaches are designed to address the specific needs of high-functioning children with ADHD, ensuring that their cognitive strengths are utilized to overcome their challenges and improve their quality of life (23, 24).

3.2. Improve the Difficulties

There are several strategies that individuals with high-functioning ADHD can use to address and improve their difficulties. Establishing consistent daily routines can help manage time effectively and reduce anxiety by providing predictability. These routines may include specific times for waking up, meals, homework, and bedtime. Visual aids, such as charts and calendars, can reinforce routines and help children understand what to expect throughout the day. Managing tasks and responsibilities can also be facilitated through planners, calendars, and to-do lists (25).

Notably, visual aids and reminders can make completing homework and assignments easier. Organizational tools, such as color-coded folders and labeled bins, can help keep workspaces tidy and reduce distractions. Encouraging children to set specific and achievable goals can provide a sense of accomplishment. Breaking tasks into smaller steps with clear milestones can make larger projects more manageable (26). Visual checklists can be used to track progress and celebrate each completed step, reinforcing a sense of achievement.

Consistent positive reinforcement for desired behaviors can motivate children and encourage focus and sustained effort. Reward systems, such as tokens or privileges, can effectively promote positive behavior and reinforce task completion (27). Teaching children strategies for self-monitoring their behavior and attention can also foster self-awareness. Tools like self-checklists or reflection journals can help track progress and identify areas for improvement, particularly when combined with regular feedback from parents and teachers (28).

3.3. The Role of Cognitive Sciences in Understanding and Treating High-Functioning Attention Deficit Hyperactivity Disorder

Cognitive sciences play a crucial role in understanding and treating high-functioning ADHD by offering deep insights into the cognitive processes and brain functions involved in the disorder. Cognitive sciences help identify specific cognitive deficits associated with ADHD, such as impairments in working memory, processing speed, and executive functions. These insights enable the development of targeted interventions to address these deficits directly (29).

Research in cognitive neuroscience has revealed differences in brain structure and function in individuals with ADHD, particularly in regions like the prefrontal cortex, which is involved in attention and executive functioning. Neuroimaging studies have shown altered connectivity and activity in these brain areas, guiding the development of treatments that target specific neural pathways (30).

Cognitive sciences also contribute significantly to designing evidence-based interventions. Cognitive behavioral therapy is a prime example, helping individuals with high-functioning ADHD develop coping strategies, improve problem-solving skills, and manage symptoms effectively. Cognitive behavioral therapy leverages an understanding of cognitive processes to create practical tools for managing ADHD (31).

Advances in cognitive science have led to the creation of sophisticated assessment tools that can accurately diagnose ADHD and differentiate it from other conditions with similar symptoms. These tools are essential for identifying high-functioning individuals who might otherwise be overlooked due to their ability to compensate for some ADHD symptoms (32).

Insights from cognitive science inform educational practices and accommodations that support high-functioning students with ADHD. Techniques such as scaffolding, chunking information, and using multisensory approaches enhance learning and academic performance, making education more accessible and effective for these students (33).

Overall, the integration of cognitive sciences into understanding and treating high-functioning ADHD offers a comprehensive approach. It addresses both the cognitive deficits and the strengths of individuals with the disorder, leading to more effective and personalized treatment strategies (34).

3.4. The Primary Causes and Risk Factors

Attention deficit hyperactivity disorder has several causes and risk factors. A strong genetic component plays a key role, with children of high intelligence equally likely to inherit genetic predispositions to ADHD as those with average intelligence. Family history remains a significant risk factor for developing ADHD, as

it influences brain structure and function regardless of intelligence level (35).

Environmental factors, such as prenatal exposure to toxins (e.g., lead, alcohol, and smoking), low birth weight, and early life stressors, also contribute to the development of ADHD. These factors interact with genetic predispositions to increase the likelihood of developing ADHD in children with high intelligence, similar to the general population (36-38).

High-functioning children with ADHD often present with comorbid conditions such as anxiety, depression, or learning disabilities. These comorbidities can complicate the manifestation of ADHD symptoms, requiring comprehensive assessment and tailored intervention strategies.

High intelligence may sometimes act as a protective factor, allowing children to develop compensatory strategies that can mask ADHD symptoms. However, this masking effect can lead to delayed diagnosis and intervention, highlighting the need for careful evaluation (39, 40).

3.5. The Role of Early Diagnosis in Managing Attention Deficit Hyperactivity Disorder in High-Functioning Children

Early diagnosis is essential in managing ADHD in high-functioning children. Research indicates that children with high intelligence and ADHD can sometimes leverage their cognitive abilities to compensate for deficits in executive functions, such as planning and organizing tasks. This adaptability can result in underdiagnoses or delayed diagnosis, as their symptoms may be less noticeable compared to their peers (41, 42).

While high intelligence may offer certain protective benefits, it is crucial to recognize and address the specific needs of high-functioning children with ADHD to ensure effective management and support (43).

The Perception and Awareness of ADHD in Society Affecting Treatment Approaches Treatment approaches for ADHD are significantly influenced by societal perception and awareness of the condition. Greater awareness and understanding of ADHD help reduce the stigma associated with the disorder. This reduction in stigma encourages individuals to seek diagnosis and treatment without fear of judgment or discrimination. Research has indicated that stigma can negatively impact treatment adherence and overall well-being for those with ADHD (44).

Increased societal awareness also enables parents, teachers, and healthcare providers to recognize ADHD symptoms earlier. Early recognition facilitates timely diagnosis and intervention, which are crucial for improving long-term outcomes for individuals with ADHD (43).

Awareness campaigns and advocacy efforts can influence public policy and educational practices, resulting in increased funding for special education services, the implementation of school accommodations, and broader support for ADHD-related initiatives. These policy changes are critical in creating supportive environments for individuals with ADHD (45).

Public interest in ADHD can also drive funding for research into its causes, treatment, and management. Enhanced research funding contributes to the development of more effective interventions and a better understanding of ADHD, ultimately improving treatment approaches (46).

Awareness efforts provide families with resources and information about ADHD, helping them navigate associated challenges. Support groups and community programs offer valuable assistance to parents and children, enhancing the support network available to them (47).

As societal awareness of ADHD increases, treatment approaches can become more individualized and holistic, addressing the unique needs of each person with ADHD through a combination of medication, therapy, educational support, and lifestyle modifications. Understanding cultural differences in the perception and treatment of ADHD is also essential for providing culturally competent care (34).

4. Conclusions

In conclusion, societal perception and awareness of ADHD play a pivotal role in shaping how the condition is treated, affecting everything from stigma and early diagnosis to research funding and policy development. This comprehensive approach is essential for improving the lives of individuals with ADHD and their families (48).

High-functioning children with ADHD encounter distinct challenges that significantly impact their cognitive abilities and daily functioning. These children often develop compensatory strategies that can mask their symptoms, resulting in underdiagnoses or delayed diagnosis. Effective treatment for this subgroup

requires individualized interventions, such as organizational skills training, time management coaching, and self-education about ADHD. Medication remains a vital component of treatment, but it requires careful monitoring due to high-functioning children's heightened sensitivity to side effects. Cognitive Behavioral Therapy and tailored social skills training are also critical in helping these children develop coping strategies, enhance problem-solving skills, and navigate complex social situations, ultimately improving their overall functioning.

Addressing the needs of high-functioning children with ADHD involves understanding the interplay of genetic and environmental risk factors, as well as the presence of comorbid conditions. Early diagnosis is essential for implementing targeted interventions that leverage their cognitive strengths and improve executive functions. Additionally, societal perceptions and awareness of ADHD can greatly influence treatment approaches by reducing stigma and encouraging timely interventions. Advocacy efforts to promote understanding of ADHD are vital for creating supportive environments, shaping public policy, and increasing research funding.

A comprehensive approach that integrates these elements is crucial for improving the quality of life for high-functioning children with ADHD.

Footnotes

Authors' Contribution: Study concept and design: N. M., A. H. R., and M. Z. M.; Acquisition of data: N. M., A. H. R., and M. Z. M.; Drafting of the manuscript: N. M., A. H. R., and M. Z. M.; Critical revision of the manuscript for important intellectual content: N. M., A. H. R., and M. Z. M.; Administrative, technical, and material support: N. M., A. H. R., and M. Z. M.; Study supervision: N. M., A. H. R., and M. Z. M.

Conflict of Interests Statement: The authors declared no conflict of interests.

Data Availability: The dataset presented in the study is available on request from the corresponding author during submission or after publication.

Funding/Support: The authors declared that they have no funding/support.

References

1. Kousha M, Dalili S, Kiani SA, Zare M, Karambin MM, Heidarzadeh A, et al. BMI Changes in Children and Adolescents with Attention Deficit Hyperactivity Disorder Before and After Treatment with Methylphenidate. *Iranian Journal of Pediatrics*. 2018;**28**(2). https://doi.org/10.5812/ijp.7954.
2. Mishab AK. Characterising Attention Deficit Hyperactivity Disorder. *Bio-Inspired Algorithms and Devices for Treatment of Cognitive Diseases Using Future Technologies*. 2022. p. 117-35. https://doi.org/10.4018/978-1-7998-9534-3.ch008.
3. Kaur A. *Challenges in Diagnosing ADHD: Discrepancies Between Behavioral and Executive Functioning Indicators [Dissertation]*. Brooklyn, United States: Long Island University; 2025.
4. Joseph SL. *A Bioecological Approach to Treating Attention Deficit/Hyperactivity Disorder: Assessing Data from the 2016 National Children's Health Survey [Dissertation]*. Chicago, USA: The Chicago School of Professional Psychology; 2021.
5. Black RH. *A Narrative Enquiry into the Experiences of Women with a Late Diagnosis of Attention Deficit Hyperactivity Disorder (ADHD)[Thesis]*. Chester, United Kingdom: University of Chester; 2023.
6. Gul N, Tiryaki A, Kultur SC, Topbas M, Ak I. Prevalence of Attention Deficit Hyperactivity Disorder and Comorbid Disruptive Behavior Disorders Among School Age Children in Trabzon. *Klinik Psikofarmakoloji Bülteni-Bulletin of Clinical Psychopharmacology*. 2016;**20**(1):50-6. https://doi.org/10.1080/10177833.2010.11790634.
7. Sibley MH, Mitchell JT, Becker SP. Method of adult diagnosis influences estimated persistence of childhood ADHD: a systematic review of longitudinal studies. *Lancet Psychiatry*. 2016;**3**(12):1157-65. [PubMed ID: 27745869]. https://doi.org/10.1016/S2215-0366(16)30190-0.
8. Fraticelli S, Caratelli G, De Berardis D, Ducci G, Pettorruso M, Martinotti G, et al. Gender differences in attention deficit hyperactivity disorder: an update of the current evidence. *Riv Psichiatr*. 2022;**57**(4):159-64. [PubMed ID: 35856315]. https://doi.org/10.1708/3855.38380.
9. Ayano G, Yohannes K, Abraha M. Epidemiology of attention-deficit/hyperactivity disorder (ADHD) in children and adolescents in Africa: a systematic review and meta-analysis. *Ann Gen Psychiatry*. 2020;**19**:21. [PubMed ID: 32190100]. [PubMed Central ID: PMC7071561]. https://doi.org/10.1186/s12991-020-00271-w.
10. de la Pena IC, Pan MC, Thai CG, Alisso T. Attention-Deficit/Hyperactivity Disorder Predominantly Inattentive Subtype/Presentation: Research Progress and Translational Studies. *Brain Sci*. 2020;**10**(5). [PubMed ID: 32422912]. [PubMed Central ID: PMC7287898]. https://doi.org/10.3390/brainsci10050292.
11. Carucci S, Narducci C, Bazzoni M, Balia C, Donno F, Gagliano A, et al. Clinical characteristics, neuroimaging findings, and neuropsychological functioning in attention-deficit hyperactivity disorder: Sex differences. *J Neurosci Res*. 2023;**101**(5):704-17. [PubMed ID: 35293009]. https://doi.org/10.1002/jnr.25038.
12. Firouzabadi FD, Ramezanpour S, Firouzabadi MD, Yousem IJ, Puts NAJ, Yousem DM. Neuroimaging in Attention-Deficit/Hyperactivity Disorder: Recent Advances. *AJR Am J Roentgenol*. 2022;**218**(2):321-32. [PubMed ID: 34406053]. https://doi.org/10.2214/AJR.21.26316.
13. Drechsler R, Brem S, Brandeis D, Grunblatt E, Berger G, Walitza S. ADHD: Current Concepts and Treatments in Children and Adolescents. *Neuropediatrics*. 2020;**51**(5):315-35. [PubMed ID: 32559806]. [PubMed Central ID: PMC7508636]. https://doi.org/10.1055/s-0040-1701658.
14. Deault LC. A systematic review of parenting in relation to the development of comorbidities and functional impairments in children with attention-deficit/hyperactivity disorder (ADHD). *Child*

Psychiatry Hum Dev. 2010;**41**(2):168-92. [PubMed ID: 19768532]. https://doi.org/10.1007/s10578-009-0159-4.

15. Mechler K, Banaschewski T, Hohmann S, Hage A. Evidence-based pharmacological treatment options for ADHD in children and adolescents. *Pharmacol Ther*. 2022;**230**:107940. [PubMed ID: 34174276]. https://doi.org/10.1016/j.pharmthera.2021.107940.
16. Lesch KP. 'Shine bright like a diamond!': is research on high-functioning ADHD at last entering the mainstream? *J Child Psychol Psychiatry*. 2018;**59**(3):191-2. [PubMed ID: 29442378]. https://doi.org/10.1111/jcpp.12887.
17. Miranda A, Berenguer C, Rosello B, Baixauli I, Colomer C. Social Cognition in Children with High-Functioning Autism Spectrum Disorder and Attention-Deficit/Hyperactivity Disorder. Associations with Executive Functions. *Front Psychol*. 2017;**8**:1035. [PubMed ID: 28690570]. [PubMed Central ID: PMC5481358]. https://doi.org/10.3389/fpsyg.2017.01035.
18. Hosseinnia M, Mazaheri MA, Heidari Z. Knowledge, attitude, and behavior of elementary teachers regarding attention deficit hyperactivity disorder. *J Educ Health Promot*. 2020;**9**:120. [PubMed ID: 32642476]. [PubMed Central ID: PMC7325758]. https://doi.org/10.4103/jehp.jehp_696_19.
19. Ten W, Tseng CC, Chiang YS, Wu CL, Chen HC. Creativity in children with ADHD: Effects of medication and comparisons with normal peers. *Psychiatry Res*. 2020;**284**:112680. [PubMed ID: 31806402]. https://doi.org/10.1016/j.psychres.2019.112680.
20. Coles EK, Pelham WE, Fabiano GA, Gnagy EM, Burrows-MacLean L, Wymbs BT, et al. Randomized Trial of First-Line Behavioral Intervention to Reduce Need for Medication in Children with ADHD. *J Clin Child Adolesc Psychol*. 2020;**49**(5):673-87. [PubMed ID: 31411903]. [PubMed Central ID: PMC7018583]. https://doi.org/10.1080/15374416.2019.1630835.
21. Hotton M, Johnson D, Kilcoyne S, Dalton L. Evaluating the effectiveness and acceptability of information and therapy guides for improving the psychosocial well-being of people with facial palsy. *J Plast Reconstr Aesthet Surg*. 2022;**75**(9):3356-64. [PubMed ID: 35623976]. https://doi.org/10.1016/j.bjps.2022.04.022.
22. Powell LA, Parker J, Weighall A, Harpin V. Psychoeducation Intervention Effectiveness to Improve Social Skills in Young People with ADHD: A Meta-Analysis. *J Atten Disord*. 2022;**26**(3):340-57. [PubMed ID: 33666104]. [PubMed Central ID: PMC8785297]. https://doi.org/10.1177/1087054721997553.
23. Puka K, Conway L, Smith ML. Quality of life of children and families. *Handb Clin Neurol*. 2020;**174**:379-88. [PubMed ID: 32977894]. https://doi.org/10.1016/B978-0-444-64148-9.00028-4.
24. Ramji AV, Foster J. The strengths of Attention-Deficit/Hyperactivity Disorder in university students: A qualitative investigation. *Journal of Educational Sciences & Psychology*. 2023;**13 (75)**(2):152-65. https://doi.org/10.51865/jesp.2023.2.12.
25. Stein DJ, Craske MG, Rothbaum BO, Chamberlain SR, Fineberg NA, Choi KW, et al. The clinical characterization of the adult patient with an anxiety or related disorder aimed at personalization of management. *World Psychiatry*. 2021;**20**(3):336-56. [PubMed ID: 34505377]. [PubMed Central ID: PMC8429350]. https://doi.org/10.1002/wps.20919.
26. Breitwieser J, Nobbe L, Biedermann D, Brod G. Boosting self-regulated learning with mobile interventions: Planning and prompting help children maintain a regular study routine. *Computers & Education*. 2023;**205**. https://doi.org/10.1016/j.compedu.2023.104879.
27. Naveed K, Anjum ML, Hussain W, Lee D. Deep introspective SLAM: deep reinforcement learning based approach to avoid tracking failure in visual SLAM. *Autonomous Robots*. 2022;**46**(6):705-24. https://doi.org/10.1007/s10514-022-10046-9.
28. McKenna K, Bray MA, Fitzmaurice B, Choi D, DeMaio E, Bray CR, et al. Self-monitoring with goal-setting: Decreasing disruptive behavior in children with attention-deficit/hyperactivity disorder. *Psychology in the Schools*. 2023;**60**(12):5167-88. https://doi.org/10.1002/pits.23026.
29. Maurya R, Khan MF. Effects of Cognitive Training Program in children with Autism Spectrum Disorder. *International Journal of Special Education (IJSE)*. 2022;**37**(1):75-84. https://doi.org/10.52291/ijse.2022.37.28.
30. Sutcubasi B, Metin B, Kurban MK, Metin ZE, Beser B, Sonuga-Barke E. Resting-state network dysconnectivity in ADHD: A system-neuroscience-based meta-analysis. *World J Biol Psychiatry*. 2020;**21**(9):662-72. [PubMed ID: 32468880]. https://doi.org/10.1080/15622975.2020.1775889.
31. Hagner M. *The Relationship Between Impulsivity, Avoidance, and Overly Positive Maladaptive Thinking in Adults with ADHD[Dissertation]*. Philadelphia, USA: Philadelphia College of Osteopathic Medicine; 2024.
32. Quilty-Dunn J, Porot N, Mandelbaum E. The language-of-thought hypothesis as a working hypothesis in cognitive science. *Behav Brain Sci*. 2023;**46**. e292. [PubMed ID: 37766639]. https://doi.org/10.1017/S0140525X23002431.
33. McDougal E, Tai C, Stewart TM, Booth JN, Rhodes SM. Understanding and Supporting Attention Deficit Hyperactivity Disorder (ADHD) in the Primary School Classroom: Perspectives of Children with ADHD and their Teachers. *J Autism Dev Disord*. 2023;**53**(9):3406-21. [PubMed ID: 35776263]. [PubMed Central ID: PMC10465390]. https://doi.org/10.1007/s10803-022-05639-3.
34. Alfonso L. *Holistic Treatment Models for Persons Diagnosed with ADHD: A Grounded Theory Study[Dissertation]*. Miami Shores, United States: Barry University; 2023.
35. Chen Y, Miao M, Wang Z, Ji H, Zhou Y, Liang H, et al. Prenatal bisphenol exposure and intelligence quotient in children at six years of age: A prospective cohort study. *Chemosphere*. 2023;**334**:139023. [PubMed ID: 37230300]. https://doi.org/10.1016/j.chemosphere.2023.139023.
36. Popa E UMSAPMPA. The Influence of Prenatal Environmental Factors on the Risk and Development of ADHD: Insights from Epidemiological and Neurodevelopmental Research - Review. *Family Medicine and Primary Care: Open Access*. 2024;**8**(1). https://doi.org/10.29011/2688-7460.100258.
37. Farmani R, Mehrpour O, Kooshki A, Nakhaee S. Exploring the link between toxic metal exposure and ADHD: a systematic review of pb and hg. *J Neurodev Disord*. 2024;**16**(1):44. [PubMed ID: 39090571]. [PubMed Central ID: PMC11292919]. https://doi.org/10.1186/s11689-024-09555-8.
38. Kadlaskar G, Piergies A, Miller M. Environmental Risk Factors for Attention-Deficit/Hyperactivity Disorder. In: Matson JL, editor. *Clinical Handbook of ADHD Assessment and Treatment Across the Lifespan*. Cham: Springer International Publishing; 2023. p. 209-42. https://doi.org/10.1007/978-3-031-41709-2_9.
39. Lien K, Kuo C, Pan H. Improving Concentration and Academic Performance of a Mathematically Talented Student with ASD/ADHD: An Enrichment Program. *Education Sciences*. 2023;**13**(6). https://doi.org/10.3390/educsci13060588.
40. Lerner RE. *Motivation and Mindsets in Children With ADHD: Relations With Parenting Style and Academic Performance[Dissertation]*. Worcester, USA: Clark University; 2023.

41. Rommelse N, Antshel K, Smeets S, Greven C, Hoogeveen L, Faraone SV, et al. High intelligence and the risk of ADHD and other psychopathology. *Br J Psychiatry*. 2017;**211**(6):359-64. [PubMed ID: 29051177]. https://doi.org/10.1192/bjp.bp.116.184382.
42. Cadenas M, Hartman C, Faraone S, Antshel K, Borges A, Hoogeveen L, et al. Cognitive correlates of attention-deficit hyperactivity disorder in children and adolescents with high intellectual ability. *J Neurodev Disord*. 2020;**12**(1):6. [PubMed ID: 32039694]. [PubMed Central ID: PMC7008522]. https://doi.org/10.1186/s11689-020-9307-8.
43. Young S, Hollingdale J, Absoud M, Bolton P, Branney P, Colley W, et al. Guidance for identification and treatment of individuals with attention deficit/hyperactivity disorder and autism spectrum disorder based upon expert consensus. *BMC Med*. 2020;**18**(1):146. [PubMed ID: 32448170]. [PubMed Central ID: PMC7247165]. https://doi.org/10.1186/s12916-020-01585-y.
44. Bussing R, Koro-Ljungberg M, Noguchi K, Mason D, Mayerson G, Garvan CW. Willingness to use ADHD treatments: a mixed methods study of perceptions by adolescents, parents, health professionals and teachers. *Soc Sci Med*. 2012;**74**(1):92-100. [PubMed ID: 22133584]. [PubMed Central ID: PMC3253014]. https://doi.org/10.1016/j.socscimed.2011.10.009.
45. Mezzanotte C. *Policy approaches and practices for the inclusion of students with attention-deficit hyperactivity disorder (ADHD)*. 2020. Available from: https://www.oecd-ilibrary.org/docserver/49af95e0-en.pdf?expires=1732870707&id=id&accname=guest&checksum=A683437F2341A8E1DFAFE55587A4BEAE.
46. Barkley RA. *Attention-deficit hyperactivity disorder: A handbook for diagnosis and treatment*. New York, US: Guilford Publications; 2014.
47. French B, Perez Vallejos E, Sayal K, Daley D. Awareness of ADHD in primary care: stakeholder perspectives. *BMC Fam Pract*. 2020;**21**(1):45. [PubMed ID: 32111169]. [PubMed Central ID: PMC7047346]. https://doi.org/10.1186/s12875-020-01112-1.
48. Becker SP. ADHD in Adolescents: Commentary on the Special Issue of Ripple Effects in Self-Perceptions and Social Relationships. *Canadian Journal of School Psychology*. 2020;**35**(4):311-22. https://doi.org/10.1177/0829573520954584.