Review Article

The Impact of Using ChatGPT on Improving Focus in Students with High Cognitive Functioning Attention Deficit Hyperactivity Disorder

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

Abstract

This article explores my personal experiences as a veterinary student diagnosed with attention deficit hyperactivity disorder (ADHD), focusing on how ChatGPT has figsignificantly helped me manage my symptoms and improve concentration, particularly during preparation for the IELTS exam. Despite my high cognitive abilities and early literacy, ADHD has posed challenges in sustaining focus during intensive study periods. As a high-functioning individual with ADHD, incorporating ChatGPT into my study routine has been instrumental in enhancing both focus and productivity. This study underscores the positive impact of ChatGPT as a digital tool for improving concentration and managing ADHD symptoms, demonstrating its potential as an effective supplement to traditional interventions.

Keywords: Attention Deficit Hyperactivity Disorder, Child, Developmental Disorder, Artificial Intelligence

1. Context

Attention deficit hyperactivity disorder (ADHD) is a common neurodevelopmental disorder marked by inattention, hyperactivity, and impulsivity ([1]). Traditional treatments, such as behavioral interventions and pharmacological therapies, have long been used to manage ADHD symptoms, yet many individuals, especially those with high-functioning ADHD, continue to struggle with focus and sustained attention ([2]). High-functioning ADHD refers to individuals who manage their symptoms well enough to succeed in daily life, often achieving success in areas like academics or work ([3]). Although they may still experience symptoms like inattention, impulsivity, or hyperactivity, these individuals develop effective coping strategies to compensate. Despite this, they frequently face challenges in organization, time management, and focus, often depending on routines and external aids to maintain productivity. While not a formal diagnosis, the term highlights how some individuals with ADHD function effectively despite ongoing challenges associated with the condition ([4]).

High-functioning individuals with ADHD encounter unique difficulties in academic environments, where maintaining attention on complex tasks is critical for success ([5]). Although they experience significant symptoms of ADHD, they often achieve a level of academic, professional, or social functioning that appears relatively typical or successful. These individuals generally possess average to above-average cognitive abilities and may have developed compensatory strategies or skills that allow them to manage symptoms effectively. However, they still face challenges with attention regulation, impulse control, and executive functioning, which can impact their everyday lives and performance in various contexts. The term "high-functioning" acknowledges that, while these individuals may perform well in certain areas, they continue to face ADHD-related challenges that affect their overall well-being and productivity ([3]).

Digital tools, such as apps and video game-based therapies, have shown promise in managing ADHD symptoms, supported by clinical trials and research. For instance, EndeavorRx, an FDA-approved video game for children with ADHD, demonstrated improvements in attention, with 68% of participants in a clinical trial reporting significant symptom reduction after a month of use ([6]). Additionally, apps incorporating cognitive behavioral therapy (CBT), like MindShift, have been

effective in helping manage impulsivity and executive dysfunction in ADHD patients (7), particularly in adults. These digital interventions provide an accessible, non-pharmaceutical option for symptom management, complementing traditional treatments (8).

In recent years, advancements in artificial intelligence (AI) and digital tools have opened new avenues for supporting individuals with ADHD. Among these tools, ChatGPT, an AI-driven language model, has shown potential in helping users maintain focus, providing personalized support, and offering cognitive reinforcement through real-time interactions (9). ChatGPT's ability to engage students in dialogue, provide reminders, and break down tasks into manageable steps may offer an innovative approach to ADHD management, especially in academic settings (10).

This paper aims to explore the impact of using ChatGPT as a digital aid to enhance focus in students with high-functioning ADHD. By examining the potential benefits and limitations of AI-driven tools like ChatGPT, this study seeks to contribute to the growing body of research on the role of technology in supporting individuals with ADHD, helping them navigate academic challenges, and fostering greater success in their educational pursuits.

2. Case Study

I learned to read and write at the age of four, but the challenges associated with ADHD have always been part of my life. Despite being a high-functioning individual with an IQ of 130, maintaining focus has been a constant struggle, particularly during prolonged study sessions. Preparing for the IELTS exam, which demands sustained concentration, was especially challenging. However, after incorporating ChatGPT into my study routine, I noticed a marked improvement in my ability to concentrate. The interactive nature of the tool kept me engaged and helped alleviate the cognitive fatigue that typically sets in during extended periods of studying. This experience suggests that ChatGPT can be an effective resource for managing ADHD symptoms, providing personalized support that traditional study methods may lack.

3. Methods

To investigate the impact of digital tools, with a particular focus on ChatGPT, in managing ADHD, a comprehensive search was conducted from January 2010 to August 2024. This search aimed to identify and analyze studies exploring how AI and other digital tools have been used to enhance focus and manage symptoms in individuals diagnosed with ADHD. The increasing integration of technology into daily life has raised questions about its potential therapeutic benefits, particularly for those facing cognitive and attentional challenges. By examining AI's role in this context, researchers sought to understand how tools like ChatGPT could support improved concentration and reduce the impact of distractions.

The search strategy involved querying prominent academic databases, including PubMed, Google Scholar, and Scopus, chosen for their extensive coverage of literature on health, technology, and cognitive sciences. Keywords used in the search included combinations such as "ADHD" and "Digital Tools," "Artificial Intelligence" and "Attention Deficit Hyperactivity Disorder," "ChatGPT" and "Focus Improvement," as well as "Technology" and "ADHD Management." These terms were selected to ensure a broad yet targeted approach for finding relevant studies on how technological interventions, especially AI, could assist in ADHD symptom management. The search focused not only on existing digital tools but also highlighted newer innovations like ChatGPT, which offer real-time assistance in maintaining attention.

The inclusion criteria for this review targeted studies providing empirical or theoretical insights into using digital tools or AI in managing ADHD symptoms. Selected studies addressed the potential benefits of these tools in enhancing concentration, reducing distractions, or providing structured support to individuals with ADHD. Both qualitative and quantitative research was included if it explored the application of these digital interventions in various settings, such as education, personal development, or clinical environments. This focus aimed to create a comprehensive understanding of how technology, particularly AI-driven tools like ChatGPT, could positively impact those experiencing difficulties with attention and focus.

Conversely, studies were excluded if they solely discussed pharmacological treatments for ADHD without referencing digital interventions or AI applications. This exclusion ensured that the review concentrated on the emerging role of technology in ADHD management rather than traditional medical approaches. By narrowing the scope, the review aimed to highlight the relevance and potential of AI-driven tools like ChatGPT in supporting individuals with ADHD. These tools present novel ways to navigate challenges related to focus and attention, offering an innovative approach to non-pharmacological ADHD management in the digital age.

4. Results

Attention deficit hyperactivity disorder is a neurodevelopmental disorder that primarily affects neural pathways responsible for attention regulation, impulse control, and executive functioning [11]. It involves dysregulation in the brain's dopaminergic and noradrenergic systems, particularly within the prefrontal cortex—a region critical for managing cognitive tasks like decision-making, planning, and inhibitory control [12]. This neurochemical imbalance impacts the brain's ability to maintain focus, filter out distractions, and control impulses, leading to difficulties in sustaining attention and regulating behaviors. These disruptions often manifest as challenges in completing tasks that require prolonged mental effort or involve complex problem-solving [13].

Beyond attention deficits, ADHD is characterized by broader executive functioning impairments, including difficulties with task organization, time management, and emotional regulation. Such impairments can lead to struggles in academic, occupational, and social settings, as individuals with ADHD may find it challenging to stay on track with long-term goals or manage emotional responses effectively [14]. Additionally, genetic predispositions and environmental factors contribute to the development of ADHD, influencing the severity and presentation of symptoms. This combination of neurobiological and external influences highlights the complexity of ADHD and its impact on daily functioning [15].

The use of tools like ChatGPT may positively impact ADHD management through various neurocognitive mechanisms [16]. One potential effect is that ChatGPT provides an interactive and responsive environment that could serve as a cognitive stimulant, potentially increasing activity in the prefrontal cortex [17]. This brain region is essential for executive functioning, encompassing attention regulation, working memory, and impulse control. By offering real-time feedback and personalized responses, ChatGPT may engage and reinforce the neural pathways involved in these processes, helping to strengthen connections responsible for maintaining focus and self-regulation [18]. This form of cognitive engagement could complement traditional interventions, enhancing the ability of individuals with ADHD to stay on task and manage distractions effectively [19].

Additionally, ChatGPT's ability to break down complex tasks into smaller, manageable steps could help alleviate some of the executive functioning challenges often experienced by individuals with ADHD.

By providing prompts, reminders, and step-by-step guidance, ChatGPT may reduce the cognitive load on the prefrontal cortex, making it easier to stay organized and on track [20]. This structured approach could help mitigate impairments in working memory and task initiation, which are commonly associated with ADHD. Furthermore, AI-driven tools like ChatGPT can personalize support to meet specific cognitive needs, potentially facilitating the development of more efficient and adaptive executive functioning strategies over time [21]. Through repeated interactions, such tools may help condition the brain to improve attention control and task completion, thus influencing the underlying neural pathways that contribute to ADHD symptoms [22].

While further research is needed to confirm the long-term effects of ChatGPT on ADHD, early observations and personal experiences suggest that this tool could be a valuable addition to existing ADHD management strategies [9]. ChatGPT creates an interactive environment where users can engage in focused activities, practice task management, and receive immediate feedback. This dynamic interaction has the potential to reinforce neural pathways involved in attention regulation and executive control, areas often impaired in individuals with ADHD [9]. By helping users stay organized, break tasks into manageable steps, and maintain focus for longer periods, ChatGPT could complement traditional approaches like medication and behavioral therapy, potentially improving academic performance and overall quality of life [9].

The growing interest in digital interventions for ADHD management highlights the potential of tools like ChatGPT to meet the specific cognitive and emotional needs of individuals with this disorder [23]. One of ChatGPT's most significant benefits is its ability to provide personalized, real-time support adaptable to each user's unique challenges. This is especially valuable for individuals with ADHD, as the disorder often requires tailored strategies for effective symptom management [24]. Additionally, ChatGPT offers an accessible and consistent form of support, available whenever needed, which can be particularly helpful for those who may lack regular access to professional therapy or structured guidance. By integrating ChatGPT into daily routines, individuals with ADHD can develop more effective coping strategies, enhance their focus, and ultimately improve their ability to navigate daily demands [25].

Despite its promise as a digital tool for ADHD management, ChatGPT does present some potential challenges and limitations. One concern is its reliance

on a stable internet connection and access to devices, which may not be feasible for all users. Individuals from lower socioeconomic backgrounds or those with limited access to technology may face barriers to utilizing tools like ChatGPT effectively. Additionally, over-reliance on digital tools could reduce opportunities for real-world problem-solving and interpersonal interactions, both crucial for developing coping strategies and executive function skills in individuals with ADHD. Another challenge is the limited personalization for more complex cognitive needs. While ChatGPT can help by breaking tasks into manageable steps, it may not adequately address emotional regulation challenges or nuanced social difficulties that individuals with ADHD often face. This could lead to incomplete support for those requiring a more holistic approach that integrates emotional and behavioral strategies. Without fully tailored interventions, AI-driven tools like ChatGPT may fall short in managing the broad spectrum of ADHD symptoms.

5. Conclusions

In conclusion, using ChatGPT as a supportive tool in ADHD management holds substantial potential for improving the lives of individuals dealing with attention and executive functioning challenges. By leveraging artificial intelligence to create personalized, interactive environments, ChatGPT offers a unique approach to helping individuals with ADHD enhance focus, minimize distractions, and strengthen cognitive functioning. Its capacity to engage users in real-time, provide immediate feedback, and adapt to specific needs enables a tailored and flexible form of support that can integrate seamlessly into various aspects of daily life. This digital tool can act as an adjunct to traditional ADHD treatments, offering consistent guidance and structure that may help alleviate the cognitive difficulties associated with the disorder.

However, further research is essential to deepen our understanding of the underlying mechanisms by which ChatGPT influences ADHD symptoms and to evaluate the long-term efficacy of this intervention. While preliminary observations are promising, comprehensive studies are needed to determine how ChatGPT can be optimized for individual needs, how it can complement other interventions, and the sustainability of its benefits over time. To explore the long-term impact of ChatGPT on ADHD management, future research should examine its effects on executive functioning, emotional regulation, and social skills. Additionally, studies should compare the efficacy of AI

tools with traditional interventions, such as behavioral therapy and medication, to assess technology's broader role in ADHD treatment. Investigating how ChatGPT can be customized to address the diverse cognitive needs of individuals with ADHD, particularly across different age groups and socioeconomic backgrounds, will also provide valuable insights into making AI-driven solutions more inclusive and effective.

This case study contributes to the growing body of evidence that digital tools and AI-driven interventions hold great promise for ADHD management, potentially transforming approaches to cognitive and behavioral support for those with ADHD. As technology continues to advance, integrating AI tools like ChatGPT into therapeutic practices could represent a significant step forward in enhancing the quality of life for individuals with ADHD.

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. Rohner H, Gaspar N, Philipsen A, Schulze M. Prevalence of Attention Deficit Hyperactivity Disorder (ADHD) among Substance Use Disorder (SUD) Populations: Meta-Analysis. *Int J Environ Res Public*

Health. 2023;**20**(2). [PubMed ID: 36674031]. [PubMed Central ID: PMC9859173]. https://doi.org/10.3390/ijerph20021275.

3. 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.

4. Antshel KM, Faraone SV, Maglione K, Doyle AE, Fried R, Seidman LJ, et al. Executive functioning in high-IQ adults with ADHD. *Psychol Med*. 2010;**40**(11):1909-18. [PubMed ID: 20085666]. https://doi.org/10.1017/S0033291709992273.

5. Hoben J, Hesson J. Invisible Lives: Using Autoethnography to Explore the Experiences of Academics Living with Attention Deficit Hyperactivity Disorder (ADHD). *New Horizons in Adult Education and Human Resource Development*. 2021;**33**(1):37-50. https://doi.org/10.1002/nha3.20304.

6. Anicoche GAE. *Augmented Reality Based Inhibition/Impulse Control Assessment Tool for Attention Deficiency Hyperactivity Disorder (ADHD) Children*. 2023.

7. Washington L, Neylon K. Resources to Help Select Behavioral Health and Wellness Mobile Applications. *NASMHPD Res Institute*. 2022.

8. Oh S, Choi J, Han DH, Kim E. Effects of game-based digital therapeutics on attention deficit hyperactivity disorder in children and adolescents as assessed by parents or teachers: a systematic review and meta-analysis. *Eur Child Adolesc Psychiatry*. 2024;**33**(2):481-93. [PubMed ID: 36862162]. https://doi.org/10.1007/s00787-023-02174-z.

9. Berrezueta-Guzman S, Kandil M, Martin-Ruiz ML, Pau de la Cruz I, Krusche S. Future of ADHD Care: Evaluating the Efficacy of ChatGPT in Therapy Enhancement. *Healthcare (Basel)*. 2024;**12**(6). [PubMed ID: 38540647]. [PubMed Central ID: PMC10970191]. https://doi.org/10.3390/healthcare12060683.

10. Ayala S. ChatGPT as a Universal Design for Learning Tool Supporting College Students with Disabilities. *Educational Renaissance*. 2023;**12**:22-41.

11. Roshannia S, Maleki-Karamolah S, Akhlaghi Z, Kordestani-Moghadam P. A Review of Cognitive Disorders in Attention Deficit Hyperactivity Disorder with Emphasis on Executive Functions and Brain Structures. *International Clinical Neuroscience Journal*. 2021;**8**(2):60-6. https://doi.org/10.34172/icnj.2021.14.

12. Nejati V, Peyvandi A, Nazari N, Dehghan M. Cognitive Correlates of Risky Decision-Making in Individuals with and without ADHD: A Meta-analysis. *Neuropsychol Rev*. 2024. [PubMed ID: 38902592]. https://doi.org/10.1007/s11065-024-09646-2.

13. Salmi J, Metwaly M, Tohka J, Alho K, Leppamaki S, Tani P, et al. ADHD desynchronizes brain activity during watching a distracted multi-talker conversation. *Neuroimage*. 2020;**216**:116352. [PubMed ID: 31730921]. https://doi.org/10.1016/j.neuroimage.2019.116352.

14. Hartung CM, Canu WH, Serrano JW, Vasko JM, Stevens AE, Abu-Ramadan TM, et al. A new organizational and study skills intervention for college students with ADHD. *Cognitive and Behavioral Practice*. 2022;**29**(2):411-24.

15. Balogh L, Pulay AJ, Rethelyi JM. Genetics in the ADHD Clinic: How Can Genetic Testing Support the Current Clinical Practice? *Front Psychol*. 2022;**13**:751041. [PubMed ID: 35350735]. [PubMed Central ID: PMC8957927]. https://doi.org/10.3389/fpsyg.2022.751041.

16. Vahedifard F, Haghighi AS, Dave T, Tolouei M, Zare FH. Practical Use of ChatGPT in Psychiatry for Treatment Plan and Psychoeducation. *arXiv preprint arXiv:2311.09131*. 2023.

17. Moraiti I, Drigas A. AI Tools Like ChatGPT for People with Neurodevelopmental Disorders. *International Journal of Online and Biomedical Engineering (iJOE)*. 2023;**19**(16):145-55. https://doi.org/10.3991/ijoe.v19i16.43399.

18. Benallie KJ, McClain MB, Bakner KE, Roanhorse T, Ha J. Executive functioning in children with ASD+ADHD and ASD+ID: A systematic review. *Research in Autism Spectrum Disorders*. 2021;**86**. https://doi.org/10.1016/j.rasd.2021.101807.

19. Champ RE, Adamou M, Tolchard B. The impact of psychological theory on the treatment of Attention Deficit Hyperactivity Disorder (ADHD) in adults: A scoping review. *PLoS One*. 2021;**16**(12). e0261247. [PubMed ID: 34932573]. [PubMed Central ID: PMC8691636]. https://doi.org/10.1371/journal.pone.0261247.

20. Gill SS, Kaur R. ChatGPT: Vision and challenges. *Internet of Things and Cyber-Physical Systems*. 2023;**3**:262-71. https://doi.org/10.1016/j.iotcps.2023.05.004.

21. Kofler MJ, Singh LJ, Soto EF, Chan ESM, Miller CE, Harmon SL, et al. Working memory and short-term memory deficits in ADHD: A bifactor modeling approach. *Neuropsychology*. 2020;**34**(6):686-98. [PubMed ID: 32437194]. [PubMed Central ID: PMC7483636]. https://doi.org/10.1037/neu0000641.

22. 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. [PubMed ID: 34091591]. [PubMed Central ID: PMC8179928]. https://doi.org/10.1038/s41398-021-01473-w.

23. Tamdjidi R. *ChatGPT as an assistive technology to enhance reading comprehension for individuals with ADHD*. 2023. Available from: https://www.diva-portal.org/smash/record.jsf?pid=diva2:1778288.

24. Kalla D, Smith N, Samaah F, Kuraku S. Study and analysis of chat GPT and its impact on different fields of study. *International journal of innovative science and research technology*. 2023;**8**(3).

25. Nazir A, Wang Z. A Comprehensive Survey of ChatGPT: Advancements, Applications, Prospects, and Challenges. *Meta Radiol*. 2023;**1**(2). [PubMed ID: 37901715]. [PubMed Central ID: PMC10611551]. https://doi.org/10.1016/j.metrad.2023.100022.