

8-20-2024

Childhood ADHD: Treated vs. Untreated – Treatments, Implications, & Outcomes

Melissa Glenn
melglenn08@gmail.com

Follow this and additional works at: https://digitalcommons.csp.edu/human-services_masters

Recommended Citation

Glenn, M. (2024). *Childhood ADHD: Treated vs. Untreated – Treatments, Implications, & Outcomes* (Thesis, Concordia University, St. Paul). Retrieved from https://digitalcommons.csp.edu/human-services_masters/6

This Non Thesis is brought to you for free and open access by the College of Education, Humanities, and Social Sciences at DigitalCommons@CSP. It has been accepted for inclusion in Master of Arts in Human Services by an authorized administrator of DigitalCommons@CSP. For more information, please contact digitalcommons@csp.edu.

Childhood ADHD: Treated vs. Untreated – Treatments, Implications & Outcomes
by
Melissa Glenn

July 2024

Submitted to Concordia University, St. Paul, Minnesota
College of Education, Humanities, and Social Science
in Partial Fulfillment of the
Requirements for the Degree of

MASTER OF ARTS HUMAN SERVICES - Forensic Behavioral Health

Acknowledgments

A sincere thank you to my classmates and instructors who guided me through this educational journey.

Dedications

To my children, who have inspired me to advocate for families and children with neurodevelopmental conditions and other exceptional abilities.

Abstract

Childhood ADHD (attention deficit hyperactivity disorder) is a common childhood condition. While older researchers claimed that stimulant medication used to treat ADHD could lead to substance abuse, more recent research has proven otherwise. Some researchers claim that instead of causation, ADHD medication can even be preventative regarding future criminality and substance abuse. This paper reviews historical and current applicable research regarding treatments and statistics for treated and untreated childhood ADHD and aims to provide valuable insight and discussion. The analysis will discuss the effectiveness of both non-pharmacological and pharmacological interventions. Continued research into this condition is beneficial for children, caregivers, teachers, professionals, and the families of those affected by ADHD. This paper integrates personal experiences and academic curiosity, providing inspiration for my future career.

Table of Contents

Abstract	4
Chapter 1: Introduction	6
Background.....	6
Statement of the Problem	6
Firsthand Experience.....	7
Brain Biology.....	8
Conclusion.....	9
Chapter 2: Review of Literature	11
Diagnosis	11
Historical Research.....	13
2000’s Research.....	13
2010’s Research	16
Current Research.....	19
Psychosocial Interventions	29
Adverse Effects of Stimulant Medication	32
Criminal Cases Linked to ADHD.....	35
Conclusion	37
Chapter 3: Implications, Recommendations, and Conclusions	42
Implications.....	42
Recommendations	43
Professional Training	44
FMLA.....	45
Conclusion	46
References.....	47

Chapter 1: Introduction

Background

ADHD (attention deficit hyperactivity disorder) is a neurodevelopmental condition characterized by high- risk behavior, impulsivity, inability to focus, impaired executive function, among other symptomologies (APA, 2013). These symptoms can lead to impaired social functioning, learning difficulties, and temperament issues in children. Early on, researchers stated that the use of ADHD medication could be causing substance misuse during adulthood (Biederman, et al., 1997), however more recent studies have shown that there is no link between ADHD medication and substance use disorder. While substance use disorder statistics display that those with ADHD have a higher prevalence of SUD, it is not referring to the medication aspect. Some studies show that ADHD medication use during childhood can be preventative of criminality and substance use disorder, while others show that there is not a connection linking one way or the other. This has been an ongoing debate for decades among researchers, professionals, parents, and society in general.

Statement of Problem

If ADHD is left untreated these issues can worsen and lead to challenging finances, inability to hold a job, lack of motivation, problems with organization, anxiety, social impairment, and depression in adulthood. Additionally, statistics show that adults with ADHD have a 2.4 times greater likelihood of being arrested, the rate of unemployment is two times higher, 3.7 times more likely to not have a high school diploma, and are 2.3 times at a higher risk of having another mental health condition like anxiety, substance abuse, or depression (Murray, et al., 2016). These numbers exhibit how significant early intervention and treatment of childhood ADHD is. Evidence will be explored throughout the literature review that will reflect a lack of self-sufficiency in untreated or undiagnosed childhood ADHD.

Firsthand Experience

From a personal perspective, having a child with ADHD has been an eye-opening experience, as I, like many, was also filled with misconceptions regarding the efficacy of medication when used appropriately in a treatment plan. My child was presenting with high-risk behavior and being extremely impulsive to say the least. For the longest time, I thought it was just his 'personality' -- it was not that nor his 'temperament' or that 'boys will be boys.' All these types of phrases play down the possible severity of this condition going untreated and are generally used by individuals who have little knowledge or education on the condition.

For instance, symptoms presented as early as age 4, possibly sooner -- unbeknownst to me. At age 4, my child 'ran away' with a knife in hand, and while he only made it down to the end of the street, this was still frightening behavior to say the least. This was merely an impulsive reaction to resist naptime. The defiance was a huge part of his symptoms as well, hence his co-morbid ODD or oppositional defiance disorder. However, going back to ADHD symptomology, he also presented with a lack of attention span. Most four-year-olds do not have

a wide range of attention, which makes this symptom easy to miss. He would not sit still for an age-appropriate story. The only way we could read is if I let him play with toys during the story and he listened. While most children will follow along and look at pictures, etc.

Referring back to impulsivity and emotional dysregulation, he was unable to have any logical reasoning with 'big' feelings. Another sometimes seemingly normal aspect of the age four. However, his reactions were much more severe. An example would be him riding his bike and me directing him to stay on the sidewalk, instead he would get off the bike and slam or sling it and storm off screaming, sometimes cursing. Another example of ADHD symptomology is being at the store and having one hand trail down an aisle of products, knocking each one off the shelf. An example of hyperactivity would be him doing anywhere from 10 to 15 cartwheels or front-flips in a row instead of walking through a store or down a hallway. The inability to sit still and anger management issues, in addition to the dangerous nature of the high-risk behavior led me to trying medication.

Understanding the changes in brain function specifically helped me better accept that medication was the best route for our family, in combination with counseling. After a few months of educating myself and trial and error with dosage, my child takes medication daily but can participate in team sports and other extracurricular activities. Additionally, he takes part in the gifted program at school. His IQ is above average, and he excels in anything he tries, from athleticism to creativity.

Brain Biology

The brain biology behind ADHD is centered around the reward center, which is reflected in research as early as 2009. Neurotransmitters, dopamine and norepinephrine are dysfunctional

in signaling and levels. Dopamine aids in planning, impulse control, and attention.

Norepinephrine plays a role in emotional regulation, stress response like fight-or-flight, memory, and sleep. Imaging studies have also displayed distinction in the prefrontal cortex, where much executive function takes place – i.e. planning, decision-making, inhibition (Arnsten, 2009).

These findings are consistent with other recent studies as well, and directly reflect the symptomology behind ADHD. Additionally, a 2022 study indicates that neurotransmission improved in children who received pharmacological treatment (Srichawla, et al., 2022).

Illustrating the brain abnormalities aids in a better understanding of the complexities related to ADHD. Providing an explanation of symptoms that can be seen physically, on an MRI or other imaging source, can aid in reducing the stigma surrounding the condition.

Conclusion

The literature review will give multiple perspectives from historical to current research findings. Incorporating multiple perspectives will allow the discussion of various treatment options, from stimulant to non-stimulant medication management to psychosocial interventions and therapy approaches. Identifying the best evidence-based practices in the field can aid in future research, assessments, and treatment modalities. The most promising strategies can be discovered through a constructive literature review, informing parents, policymakers, and providers.

As the understanding of ADHD evolves, incorporating literature that gives insight into the future of treatment options is important. The combination of studies that consider criminology are to be utilized, since ADHD is known to be linked to criminality and substance abuse issues. Challenging research that incorporates the risks of medication will be utilized to ensure the lack of bias in my investigation. While childhood ADHD is the basis of the paper,

integrating adult outcomes and related factors is also a prominent part of research. Best practices for childhood ADHD cannot be discovered without longitudinal data that reflects what happened to cause the negative or positive outcome in their adult life. For this reason, considering the criminology aspect and substance misuse, combined with studies that include adult participants will be used.

Additionally, investigating psychosocial interventions and programs that enhance education for children with ADHD will be studied. Gaining knowledge on holistic approaches that may or may not require pharmacological intervention embrace the individualized treatment plan ideals that tend to be highly recommended by most professionals in the field. Not every treatment plan will look the same, nor will symptoms or results.

As shown, this exploration of research is influenced by both firsthand and professional aspirations. In my career, I hope to advocate for families and children with ADHD and allow them the quality of life that is their best potential. Throughout the research process, objectivity is maintained, as this analysis needs to be completed investigating all areas of the subject, without bias. Identifying the most efficient evidence-based practices can be challenging with any mental health condition, but having a comprehensive account of research can aid in guiding the future of this area of the field.

Chapter 2: Literature review

Childhood ADHD is a condition characterized by impulsivity and inattention, among other symptoms (APA, 2013). Historically, research suggested that stimulant medication used to treat the condition could lead to substance use disorder later in life. On the contrary, current research shows that it has the potential to possibly prevent substance abuse, as individuals are not seeking to self-soothe symptoms associated with the condition. Other sources say there is no link between ADHD medication and substance use disorder, but rather SUD is linked to the condition itself, not the medication used to treat it.

Diagnosis

The diagnosis process for childhood ADHD often begins when a teacher notices a child has disruptive behaviors, prompting parents to alert the pediatrician or psychologist for diagnosis. Teachers are often the first to notice a behavioral difference because not only do they spend a significant amount of time with children, but they also observe a group of children around the same age with certain age-appropriate behavioral expectations. Educators might notice an inability to stay seated, excessive fidgeting, or an inability to follow directions. Other

times, parents may notice impulsive and/or disruptive behaviors, beyond what is considered age appropriate.

A formal diagnosis is required for a child to receive reasonable accommodation(s) in a classroom when needed to support their social-emotional development and academic achievement. “There are 3 subtypes of ADHD. Patients are categorized as predominately inattentive, predominately hyperactive/impulsive, or combined (involving symptoms from both inattention and hyperactivity/impulsivity domains)” (Eiland & Gildon, 2024).

Common assessments utilized in the diagnosis process are – biopsychosocial evaluation, Vanderbilt (given periodically for caregivers and teachers to fill out), and the DSM-5's list of symptoms. Individuals must experience six or more symptoms for a minimum of six months (APA, 2013). Some symptoms include inattention, careless mistakes, forgetfulness in daily activities, issues with being organized, and impulsiveness (APA, 2013). In 2012, Becker et al. reported on the clinical significance of Vanderbilt testing. Findings proved that the Vanderbilt screener can be utilized not only for identifying ADHD symptomology and severity, but also held the potential to aid in identifying co-morbidities, like ODD (oppositional defiant disorder) and anxiety disorders. To this day, this screening tool is still used, often with one form given to an educator and one to a parent periodically to ensure that treatment is progressing.

The accuracy of assessments used during the diagnosis and treatment process is a huge part of having an effective treatment plan. A delayed diagnosis or misdiagnosis can lead to inadequate support and make the child's challenges even more challenging. Incorporating a comprehensive approach will help deter misdiagnosing and differentiating from other developmental conditions or diagnosing co-morbidities.

Historical Research

Societal attitudes have seemed to follow the historical evidence but are gradually progressing to a more empathetic and understanding view of ADHD medication. It is possible that the Biederman et al. (1997) study shaped this perspective. In this study, published in the *Journal of the American Academy of Child & Adolescent Psychiatry*, it is suggested that not only ADHD, but also stimulant medication is concerning and potentially linked to later substance abuse. Another influential study was conducted by Lambert and Hartsough in 1998, which linked tobacco and substance misuse with ADHD. It seems that these studies sparked a debate and concern among professionals and parents.

2000's Research

In 2001, a prominent study was published in *Journal of the American Academy of Child & Adolescent Psychiatry*, highlighting the need for individualized treatment options (Swanson, et al). The results demonstrated that medication alone would enhance short-term results, but combining behavior therapy and other treatment approaches would yield better outcomes, especially when considering children with co-morbid conditions like oppositional defiant disorder or ODD (Swanson, 2001).

Rosa-Neto, et al. (2005) conducted a study which used neuroimaging to investigate the effects of methylphenidate on an ADHD brain. Dopamine levels in the striatum (located in the basal ganglia, associated with reward center and emotional regulation) increased when patients were treated with methylphenidate (example name brand – Focalin). As mentioned earlier, dopamine is involved with attention regulation and motivation, making these results meaningful. This study helped contribute to the evidence that stimulant medication would be an efficient

treatment for individuals with ADHD, as behavioral impairments are directly linked to the reward center and decreased dopamine levels (Rosa-Neto et al., 2005).

In 2007, Shaw et al conducted a study examining the brain areas that regulate impulse control, specifically the maturation of cortical regions. Those who were not being treated with medication presented with delays in that region, whereas those who were treated with medication showed significant improvement in cortical maturation. The researchers used neuroimaging, particularly MRI, to measure the thickness of the cortical region and to compare other anatomical differences (Shaw et al., 2007). This study is especially prominent in this field, as it displays the importance of early intervention, to prevent delays in brain structure, and solidifies evidence that stimulant medications can be appropriate for treatment plans.

Moving forward, Molina et al. (2007), completed an eight-year follow-up study that analyzed long-term treatment outcomes for combined-type ADHD. The results displayed children who receive multimodal treatment, including medication, had improved outcomes compared to a community group (Molina, et al., 2007). These studies implicate the significance of individualized treatments for children with ADHD and how medication is not exacerbating negative outcomes.

In 2009, MTA Cooperative Group completed research considering the best treatment options for children with ADHD. Over a 24-month span, they compared medication as a stand-alone treatment to medication plus therapy. The findings displayed that while medication alone was effective in reducing ADHD symptoms in the short term, combined treatment (medication plus behavioral therapy) yielded the most favorable results regarding multiple factors, including academic achievement and social functioning.

Another significant study in 2009 explained the brain anatomy behind ADHD, thus better explaining how medication may be effective in treating children with ADHD (Arnsten). Several areas of the brain are impacted by ADHD. The basal ganglia assist in emotional regulation and the prefrontal cortex, executive function. Neurotransmitters, norepinephrine and dopamine also play a key role in an ADHD brain. These chemicals aid in planning, decision-making, fight or flight, emotional regulation, inhibition, memory, and sleep (Arnsten, 2009). While these functions seem involuntary for a neurotypical individual, for an individual with ADHD, these mundane functions can seem nearly impossible. The inability to control your body being sent into fight-or-flight mode at every trigger, the lack of motivation, or the inability to not act on impulse. Certain ADHD medications, like stimulants for example, work directly with the neurotransmitters mentioned above, thus enhancing brain imbalances and aiding in treatment.

Fletcher & Wolfe (2009) provided a rather influential and informative study for the 2000's. Investigating through longitudinal data analysis, the authors found that antisocial behaviors, having fewer friends, increased financial strain, and poor academic achievement were associated with ADHD and criminal or high-risk behaviors. Thus, indicating that early intervention is necessary to prevent these outcomes. Their data showed that petty crimes such as speeding were more common among those with ADHD, as well as crimes like property damage or theft, drug possession, and carrying a concealed weapon. On top of this, authors suggested that families of these individuals were also being penalized as the medical expenses fall on them and legal fees (Wolfe & Fletcher, 2009). All these are prominent points in the discussion of the importance of early intervention and an open-mindedness toward medication management being combined with other behavioral interventions. During the 2000's the stigma surrounding

medication and childhood ADHD was controversial, thus leading to increased criminal rates in both the adult and juvenile justice systems.

2010's Research

Moving forward to the 2010s, research showing that ADHD medication was not linked to future substance misuse or criminal behaviors has begun to accumulate. Chang et al. (2014) and Lichtenstein et al. (2012) helped aide this shift in perspective. By providing longitudinal studies with large amounts of data, evidence was finally surfacing that medication could be an efficient treatment tool when used appropriately.

In a study (Chang, et al., 2014), it is suggested that ADHD medication may have preventative benefits against future criminality and SUD. The associates utilized a Swedish database and analyzed data from over 25,000 individuals diagnosed with ADHD. Evidence supported that the individuals who took medication had a lower risk of substance misuse (Chang, et al., 2014). Also, Lichtenstein et al. (2012) noted a significant decrease in criminal behaviors in individuals who received pharmacological ADHD treatment.

Diving into the various pharmacological options for childhood ADHD, a 2015 study compared several medication options and their efficacy (Pringsheim et al., 2015).

Psychostimulants, like methylphenidate for example, showed more effective in reducing oppositional behaviors and aggression than alpha-2-antagonists (I.e. guanfacine or clonidine).

Atomoxetine, a non-stimulant medication option, also showed less effective than stimulant options regarding oppositional and aggressive based behaviors. Thus, concluding stimulant medication is most effective in treating individuals with these types of ADHD symptoms

(Pringsheim, et al. 2015).

Russell et al (2015) shed light on socioeconomic factors associated with the diagnosis of ADHD. An interesting statistic showed that single mothers, those living in income-based households, and/or those with financial instability were more likely to have a child diagnosed with ADHD at the age of 7. Authors explain that -- “This study highlights the importance of home and environmental factors as small but important contributors toward the etiology of ADHD” (Russell et al., 2015).

An additional study that contemplated the link between socioeconomic status and ADHD, Russell et al., (2016) stated that families of lower socioeconomic status are roughly 1 to 3 times more likely to have a child with a mental health condition. This is a significant finding and highlights the importance of parent training and related treatment interventions. The authors also discuss how lower socioeconomic status could be linked to ADHD through a different pattern of events, rather than just socioeconomic status alone. For instance, the researchers note that a couple may have conflict as a result of having a child with behavioral difficulties related to ADHD-- this leads to a divorce, then the parents are now classified as lower socioeconomic status (Russell, et al., 2016). These intricate details could be a determining factor and further studies primarily focusing on the reason behind the socioeconomic status and associated statistics would be both engaging and beneficial for all stakeholders.

Russell et al., (2016) also noted some significant statistics in regards to parent education and childhood ADHD. Children with “highly educated” mothers and fathers are less likely to have ADHD. Additionally, children with working mothers—rather than stay-at-home mothers, were less likely to have ADHD symptoms. Russell et al., (2016) also suggested that children with only one parent in the home (I.e. single-parents) were more likely to be diagnosed with childhood ADHD in comparison to those with a two-parent home. The authors do note that not

all childhood mental health conditions are associated with lower socioeconomic status or disadvantage and that neurodevelopmental disorders like autism are actually associated with a higher socioeconomic status (Russell et al., 2016).

The researchers in Russell et al., (2016) note that their meta-analysis reviewed various studies across several continents and focused on ages 5-19. Furthermore, authors mentioned multiple times that their statistics could not be definitive due to a lack of consistency across studies when considering varying circumstances, like how much income was considered lower socioeconomic status or higher socioeconomic status and skilled vs. unskilled occupations. While the conflicts are notable, the study still showed credible findings in relation to think link between environment and childhood ADHD.

Young et al. (2018) reported that violent recidivism rates were reduced by 42-percent when offenders were given medication for ADHD compared to when they were not receiving medication. The same article provided significant statistics regarding the prevalence of ADHD in criminal offenders – nearly 25 percent of inmates qualify for an ADHD diagnosis. This is an important finding.

A qualitative review using prescription databases showed that medication improved symptoms and behaviors but noted the potential for cardiovascular risks (Chang et al., 2019). Authors also noted that long-term effects varied but improvement in impulsivity, attention, and focus were present. Weighing the risks and benefits, while providing an individualized treatment plan is best practice for clinicians (Chang, et al., 2019).

In 2019, Englehardt et al. discusses the connection between ADHD and criminal behaviors. The authors studied how cognitions – or thought patterns – are connected to criminal

activity and ADHD symptoms like impulsivity, inattention, and hyperactivity are correlated. They analyzed a sample of adults ADHD symptomology and found that in fact, ADHD symptoms are directly related to cognitive distortions associated with criminal offenses. In summary, findings suggest that increased ADHD severity increases the probability of individuals engaging in high-risk criminal behaviors and that they are more likely to justify their actions due to cognitive distortions (Engelhardt et al., 2019).

Current Research

A 2020 article discusses the link between ADHD and criminality (Freckleton). The author makes a significant statement -- “in the context of sentencing a 29-year-old man charged with creating a public nuisance and obstructing police, is reported as stating that he had ‘very little time for this ADHD nonsense. It’s people trying to medicalise what 20 years ago was just an annoying kid’” (Freckleton, 2020).

The author goes over several cases where competency to stand trial was considered or appeals were awarded because professionals were able to prove that the individuals were lacking in areas like inhibition and impulse control, resulting in their crimes. Furthermore, one defendant was under the influence of substances at the time of the crime and symptomology suggested that ADHD was not only the reason he was misusing substances, but also a significant cause of the crime. Had these defendants been diagnosed and treated with ADHD, the crimes may have never been committed (Freckleton, 2020). These findings are of utmost importance regarding medication and treatment of childhood ADHD – brain dysfunction should be treated as any other physical ailment in the medical field. It also implicates the importance of early intervention when

it comes to ADHD symptomology, as a misdiagnosis or no diagnosis could lead to a life of criminal behavior.

Freckleton (2020) also noted -- “As compared with non-medication periods, among patients receiving ADHD medication, there was a significant reduction of 32% in the criminality rate for men and 41% for women. The rate reduction remained between 17% and 46% in sensitivity analyses among men, with factors that included different types of drugs (eg, stimulant vs non-stimulant) and outcomes (eg, type of crime).”

A review published in *Frontiers in Pharmacology* highlighted best practice when it comes to medication and gave an in-depth overview of several available treatment options. Nazarova et al. (2022) described how physical activity, when structured, can improve symptoms because it increases dopamine and norepinephrine levels. Authors also discussed the high efficacy of behavioral interventions such as school-based programs and parent training when combined with pharmacological interventions (Nazarova et al. 2022).

TMS or transcranial magnetic stimulation has been used as a medical treatment to reduce depression symptoms, but recent studies suggest it could be used in ADHD treatment too. Nagy, et al. (2022) explain how brain abnormalities are shown via MRI in ADHD patients. A couple brain abnormalities mentioned are regarding cortical thickness and decreased basal ganglia, which has also been mentioned previously (Shaw et al., 2007). TMS is conducted by an electromagnetic coil being placed on the head and stimulated with magnetic waves. This process has been shown to stimulate brain activity and increase neural activity when treatments are repeated over time (Nagy Et al., 2022).

Nagy, et al. (2022) completed a study on 60 children between ages 6 and 12 with ADHD who were titrating off the medication atomoxetine and ADHD diagnosed children who were not taking medication. Participants received five sessions per week for three weeks -- a total of 15 sessions. Findings showed improvements in inattention and hyperactivity related symptoms (Nagy, et al., 2022). These findings suggest that while more research is needed and probably on a much larger scale, TMS could be a potential treatment for both children and adults with ADHD. Authors also mention that children who had other neurodevelopmental conditions like autism, bipolar, and schizophrenia, or traumatic brain injury, etc were excluded from the study. More research should be conducted on the efficacy of TMS in children with ADHD and co-morbid diagnoses (Nagy, et al., 2022).

Molina et al. (2023) conducted a 16-year comprehensive study involving children diagnosed with ADHD and following them into adulthood. This project aimed to examine the long-term effects of stimulant medication and its potential link to substance abuse disorders. As mentioned previously, there had previously been an assumption that stimulant medication could result in substance misuse in adulthood.

Results showed that the assumption that substance abuse can be caused by stimulant medication used to treat ADHD should be reconsidered. The researchers found that preventative effects of stimulant treatment during childhood on reducing substance abuse appeared to persist into early adulthood (Molina, et al., 2023). Findings showed that children who received stimulant treatment as a part of their regimen displayed a lower predisposition for developing substance misuse disorder in adulthood.

It is important to note that often those who misuse substances-- from alcohol to tobacco to street drugs or prescription medication—are suffering from trauma or other symptoms of an undiagnosed disorder. Molina, et al. (2023)'s study is significant because it reflects the belief that medication for mental health conditions can be proactive in reducing the likelihood of substance abuse, which is not a common belief in society. It is common that substances can be used to cope with ADHD symptoms, especially if left untreated. The hyperactive children grow into unfocused teenagers with challenging social lives, which is so important at that age, then turn to substances to cope with where they feel they are lacking.

This 2023 study is significant because the results revoke earlier studies' claims that stimulant medications used to treat childhood ADHD are a gateway drug, so-to-speak. Molina et al. (2023) also hint at a proactive aspect of stimulant medications which also goes against previous assumptions. In summary, Molina et al (2023) offer a more progressive approach to the use of stimulant medication being helpful and the potential benefits it holds for individuals with ADHD, when used appropriately. Long-term effects do show positive outcomes and can increase the quality of life for individuals who struggle with ADHD symptoms.

A 2023 study published in *BMC Psychiatry* discussed a proposal regarding the START program in adults with ADHD, ages 18-65. START is an acronym for a German phrase, but in English means support in physical activity and person-centered cognitive skills training. This randomized trial is going to be conducted using a twelve-week program model. Researchers are attempting to find if this approach, using physical activity and cognitive training simultaneously based on individual needs, would be a suitable treatment for adult ADHD, with or without medication. Weekly physical activity for 45 minutes in addition to weekly CBT or other evidence-based therapy is the treatment plan for this study. While results are still pending, this

forward-thinking treatment plan could enhance both physical and mental health in adults with ADHD, and possibly improve executive functioning (Lindvall, et al., 2023).

The START program seems likely to be promising and incorporates healthy habits most adults should be doing anyway. Lindvall, et al. (2023) incorporating healthy exercising habits in combination with therapy could enhance the life of anyone, not only those individuals with ADHD, so that is an additional perspective to think about in regards to this specific study.

Fast forward to the most recent research, Peterson et al. (2024) conducted a systematic review of effective ADHD treatment in children and adolescents. Through the comparison of the efficacy of stimulant vs non-stimulant and behavioral modalities, psychosocial interventions, and educational accommodations researchers found that personalized interventions provide the best outcomes. Furthermore, results showed that “several treatments improved ADHD symptoms. Medications had the strongest evidence base for improving outcomes” (Peterson et al. 2024). However, limitations in the study were noted for a lack of indirect vs direct analyses on different medications and therapies in combination.

Additional 2024 research showed “Cognitive test scores and ADHD symptoms were improved on well-controlled medication for 1 year in children and adolescents with ADHD, autism and other comorbidities” (Johnson et al. 2024). This study highlights the importance of early intervention and displays positive outcomes with pharmacological intervention. To implicate these results, researchers gathered participants between ages 6 and 18 years of age who met the DSM-5 criteria for ADHD and were taking medication. There was no differentiating between inattentive or hyperactivity types, or any further categorization beyond their symptoms being severe enough to warrant medication use (Johnson, et al., 2024).

Evaluations were obtained through assessments like CGI-S and ADHD-RS scales. Both of which showed a reduction in symptoms and by the end of the trial period, many had no adverse effects or only mild reactions to medication(s). The WFIRS-P scale displayed improvements in family and social life, although these are notable, the improvements were not as significant as the other areas of evaluation (Johnson, et al., 2024). The most profound improvements were found in inattention and impulsivity. Some patients had co-morbidities – specifically autism spectrum disorder or generalized anxiety disorder, which were assessed separately, using the K-SADS-PL scale (Johnson, et al. 2024). These patients also showed improvement with mild to no adverse effects. This study, like many others, gives insight into the benefits of medication use for childhood ADHD and supports it being applicable for some co-morbid diagnoses.

Rasmussen, et al., (2024) partially titled a study ‘a bit lost’ in reference to young adults transitioning from adolescence to adulthood and the challenges associated with this process. Participants reported that challenging areas in the new-found independence in adulthood, along with areas like career or education goals and maintaining relationships. Self-management alone was reported as an obstacle and through interviews and symptom analysis, researchers found that young adults are not receiving adequate intervention to prepare them for adulthood (Rasmussen, et al.,2024). These findings suggest that not only early childhood treatment plans are needed, but also to continue comprehensive care into adolescence, providing a foundation for young adults to build on, rather than throwing them into the ‘real world’ which is challenging enough without having ADHD.

Widding-Haveneraas et al., (2024), investigated the link between ADHD medication and criminal activity through a longitudinal study. The researchers were attempting to determine

whether stimulant and non-stimulant ADHD medications influenced criminal behaviors. Findings showed that adherence to medication is associated with reduced criminal behaviors and integrating psychosocial interventions with pharmacological treatment should also be implemented, giving best results. It is worth noting that the reduction occurred with impulsive-reactive type crimes, not with crimes associated with planning, intent, and conspiracy.

With both stimulant and non-stimulant medications, like methylphenidate or atomoxetine, results showed significant decreases in criminal-related and high-risk behaviors. However, stimulant medication adherence showed a slightly more significant decrease in criminality compared to non-stimulant medication (Widding-Haveneraas, et al., 2024). This could be because stimulant medication is generally prescribed to manage symptoms associated with hyperactivity and impulsivity, which increase the likelihood of high-risk behaviors, whereas non-stimulant medication is often prescribed to support poor focus and inattention.

In May 2024, *Kings College London* published a study that claims both stimulant and non-stimulant medication show long term effects involving enhanced cognition. These results challenge the assumption that stimulant based medications are most effective in treating children with ADHD. Researchers suggest that most studies only look at short-term outcomes, where stimulant options seem more favorable, but when looking long-term, drugs like Atomoxetine are just as effective. Specific areas of cognition that were studied are working memory, reaction time, inhibition, and attention – all associated with ADHD symptomology. Methylphenidate was found to be sufficient in all the above cognition areas, whereas Atomoxetine improved performance on all areas except for working memory. The findings lead researchers to believe that stimulant and non-stimulant options are comparable in efficacy (Isfandnia, et al. 2024).

A meta-analysis conducted by Lee et al. (2024) investigated the impact of stimulant medication on Health-Related Quality of Life (HRQoL) in children with ADHD compared to those without ADHD. Both parent- and child-reported HRQoL displayed positive outcomes with stimulant medication. Specifically, the researchers discovered a "very large" effect size for HRQoL improvement in children with ADHD compared to those without ADHD, with Hedges' g values of -1.67 (parent-reported) and -1.28 (child-reported). The study also discussed how children with ADHD experience significantly poorer quality of life compared to their peers without ADHD (Lee et al., 2024).

Taipale et al. (2024) conducted a comprehensive review to determine statistics related to ADHD medications, work disability and/or hospitalizations. The key findings indicated that reduced psychiatric hospitalizations and work disability were apparent for adults who were taking ADHD medication regularly. Authors also discussed how depression and anxiety symptoms were decreased in patients who were taking their ADHD medication as prescribed, in comparison to those who did not. Both stimulant and non-stimulant medications were considered for this study and showed comparable results in the reduction in work disability, symptoms, and hospitalizations (Taipale, et al., 2024). These findings support the idea that ADHD medications can be beneficial, even in an economical sense.

Eiland and Gildon (2024) implicate best practices and the importance of a thorough assessment process in their 2024 article published in *The Journal of Pediatric Pharmacology and Therapeutics*. It is predominant to integrate pharmacological interventions and therapeutic interventions, as well as managing comorbid conditions (e.g., anxiety, oppositional defiant disorder). Adjusting treatments should be based on specific patient characteristics and individual responses to treatment (Eiland & Gildon, 2024). The authors also touch base on the current

trends in the national shortage and how finding alternative medication options can be challenging. One notable challenge that is discussed outside of the national shortage of ADHD medication, is the stigma attached to stimulant medications (Eiland & Gildon, 2024).

In regard to non-stimulant medication options, norepinephrine reuptake inhibitors, like Atomoxetine or viloxazine, Eiland and Gildon (2024) note that while these interventions can be effective, they are marked with a black-box warning, meaning suicidal ideation is possible. These medications work similarly to how stimulant medications work but focus on increasing extracellular synaptic concentrations of both norepinephrine and dopamine in the prefrontal cortex. This means that it may take one to two weeks to see effects (Eiland & Gildon, 2024). Children with high-risk behaviors that are a safety concern, who need immediate intervention, are often given stimulant medication instead, as results can be almost immediate.

Danielson, et al. (2024) published a study in May of this year, taking a closer look at childhood ADHD and COVID-19. For this study, researchers noticed that social media aided in increasing awareness and reducing stigma surrounding ADHD specifically when it comes to girls, as it presents differently in boys and girls. Additionally, it is noted that distinguishing ADHD from anxiety and other co-occurring disorders remains challenging, which could impact the accuracy of ADHD diagnoses. Virtual learning during the pandemic could have made ADHD symptoms more obvious, potentially increasing diagnoses. Conversely, reduced teacher observations might have decreased the likelihood of diagnosis (Danielson, et al., 2024).

The researchers also implied that children considered low-income have what's considered more severe forms of ADHD. Danielson, et al. (2024) state that this could be caused by the environment, a lack of resources, and increased stressors in the household. This inspired me to

look further into socioeconomic status and childhood ADHD prevalence, leading me to my next article regarding the 2022 National Survey of Children's Health. Chronis-Tuscano and Bounoua's analysis reveals that although ADHD ubiquity continues to grow, significant inconsistencies in diagnosis and treatment continue to be an issue. The authors advocate for certain demographic groups, including racial and ethnic minorities, and children from lower socioeconomic backgrounds, that face barriers to diagnosis and treatment (Chronis-Tuscano & Bounoua, 2024).

The CDC provided updated statistics in March of this year showing higher prevalence of ADHD in boys, compared to girls, with boys at 14.5 percent and girls at 8 percent. It also shows that children with public insurance have the highest rate of ADHD compared to private insurance holders and those with no insurance. The CDC's statistics support the implication that lower socioeconomic status is equal to higher childhood ADHD rates. Furthermore, the CDC's research showed that white children have higher diagnosis rates, followed by Black then Hispanic (CDC, 2024).

Psychosocial Interventions

Chako et al. (2024) give an analysis on evidence-based psychosocial treatment strategies like CBT (cognitive behavior therapy). It is noted that while these interventions seem efficient in the office setting, when put into practice in real-world settings, they are less adequate. The authors note that parents need to be given strategies that can be effective in the real-world, not just in a medical office. A non-pharmacological option for treatment that can be combined with medication is PCIT (parent child interactive therapy). Bailey et al. (2024) examined the efficacy of PCIT as an ADHD treatment option for mothers who also have ADHD. It was observed that

parenting practices and positive, appropriate disciplining practices were increased, although the mothers still struggled in areas such as time management and organization, which can affect the behavior of any child, especially a child with ADHD (Bailey et al., 2024).

PCIT seems to be a growing treatment option for childhood ADHD and research shows a promising outlook. Phillips et al. (2024) conducted a meta-analysis examining the efficacy of PCIT. The findings show that PCIT is most effective in children 8 years of age and under and showed more effectiveness when utilized to treat ADHD subtype combined. Findings also showed lasting results in enhancing behavioral complications at home when attending PCIT sessions over a more extended period. The PCIT treatment model shows 60-to-90-minute weekly sessions for 12 to 20 weeks is best practice. While PCIT can be combined with medication, individualized needs should be considered along with regular case management and collaboration with the pediatrician and other treatment providers. Phillips et al. (2024) also mention that PCIT shows greater outcome when compared to other behavioral interventions, like CBT.

Additional treatment options as far as behavioral interventions are often implemented in the educational system, through an IEP (individualized education program) or 504 (accommodations). Hustus et al. (2020) evaluated 183 high school students who had either an IEP or 504 in place and results showed that while academic deficits were identified within goals listed, behavior deficits did not have simultaneous goals attached. Other problematic findings were that educators admitted to a reduction in expectations for those students, thus inhibiting their personal potential (Hustus, et al., 2020).

Chako et al., (2024) discuss the evidence-based strategies that fit best in a classroom setting, but also make an important note of how the efficacy of these interventions is sometimes compromised because consistency of implementation of supports is an issue. Often a daily report card can be inspiring to a child with ADHD, or a reward program that recognizes not only academic goals but also behavioral goals. Chako et al., (2024) also brings up a more recent program being utilized by middle-school to high-school aged children with ADHD – OST or organizational skills training. This involves behavioral interventions that focus on teaching time management and planning based skills. ADHD impairs these areas and being organized can help enhance academic performance. Authors note that much of the available research is related to elementary school aged children, thus more research regarding older adolescents is needed to determine best practices (Chako, et al., 2024).

Tourjman et al. (2022) conducted a systematic review to uncover the efficacy of five categories of psychosocial interventions -- “Cognitive-behavioral therapy; Caregiver (parent) training; Metacognitive or school-based training; Physical (or mind–body) intervention; and psychosocial intervention” (Tourjman et al., 2022). Findings showed that overall psychosocial interventions have a moderate effect on core ADHD symptoms, but the most important finding is that teacher and parent reports do not correlate (Tourjman et al., 2022). This begs the question, why are some behaviors present at school and not at home, or vice versa? The plausible explanation would be that the same interventions need to be implemented in both settings to increase efficacy of psychosocial interventions.

Peterson et al. (2024) was mentioned earlier in regard to pharmacological interventions producing the best outcomes for children with ADHD, however the authors also investigated psychosocial interventions. Neurofeedback showed improvement in symptoms and this treatment

is less common. An EEG machine is utilized to assist in neural regulation by connecting directly to patients' brains with a goal of enhancing their focus, impulse control, and executive functions (Heyl, 2023). According to Peterson et al. (2024), school interventions did increase academic performance but there were inconsistencies. Other interventions that showed significant efficacy were youth-directed psychosocial treatments and parent support/training (Peterson et al., 2024).

Adverse Effects of Stimulant Medication

Medication in combination with a form of behavioral intervention is well-established as best practice when it comes to childhood ADHD into adulthood as well. However, with stimulant medications being the most frequently prescribed and considered the most effective, there is still the possibility of adverse effects. As described in a review by Stutzman & Dopheide (2024), the benefits usually outweigh the risks. While many parents imagine the worst possible scenarios, there are answers with clinical data backing up the explanations.

For example, slowed growth is a common concern, however studies show inconsistent data supporting slow growth. The authors suggest monitoring height at each appointment, usually one to three months apart. Furthermore, lack of proper nutrition may play a role in slowed growth if it does occur because of stimulant medication leading to a lack of appetite. It is noted that many children eat higher calorie meals at breakfast and bedtime—when the medication is not active (Stutzman & Dopheide, 2024).

Lee et al (2022) completed a study regarding the growth in children who are prescribed methylphenidate for ADHD (Focalin), a commonly used stimulant medication. Authors discuss

that extended methylphenidate can initially delay gains in height (Lee et al., 2022). Researchers mention that the study was conducted over a 24-month period and the results did support that there is a reduction in height gain compared to the average child's growth. Additionally, findings show that BMI was reduced over time as well. The authors call for further research regarding this to give more in-depth analysis of the risk potential, with the notable results showing a decrease in weight and height gain among children who take stimulant medications for ADHD.

Another common concern is related to cardiovascular functioning (Stutzman & Dopheide, 2024). The American Heart Association suggests routine screening and monitoring for abnormalities in patients of all ages and maintaining a family history of related conditions – high blood pressure, tachycardia, arrhythmias, etc. (Stutzman & Dolpeide, 2024). Stimulant medication can increase blood pressure and heart rate; thus, it is suggested to monitor at each visit. Zhang et al (2024) conducted a study regarding the cardiovascular risks associated with long-term ADHD medication use. Through the utilization of a Sweden database, it was discovered that there is a link between commonly prescribed ADHD medications and cardiovascular disease, in particular, arterial disease and hypertension (Zhang et al., 2024).

The next concern that is notable is the possibility of mania or psychosis occurring with stimulant use (Stutzman & Dolpeide, 2024). The authors note that studies show that amphetamines (I.e. Adderall), in comparison with methylphenidate (I.e. Focalin) prove a higher risk of psychosis or substance-induced mania and related disorders. While it isn't common, "Childhood onset schizophrenia, bipolar disorder, or other psychiatric conditions associated with psychotic features are risk factors for stimulant-induced psychosis" (Stutzman & Dolpeide, 2024). Additionally, authors note that if bipolar is a co-morbid condition being treated, a mood

stabilizer being prescribed and treating bipolar symptoms successfully, followed by a stimulant medication, should not produce a risk (Stutzman & Dolpeide, 2024).

Hamard et al. (2024) explored psychosis and mania in adolescent and adult individuals with ADHD who were prescribed stimulant medication. Specifically, the participants were prescribed either methylphenidate, amphetamine, and/or atomoxetine. The researchers reviewed case studies and medical records, in addition to other clinical data, to determine the link, if any, between commonly prescribed ADHD medications and psychotic episodes.

Hamard et al., (2024) took into consideration the dosage of medication, length of treatment, as well as if there were any pre-existing psychosis related conditions or history. Specifically with amphetamine – like Adderall – psychotic episodes were more frequent than with methylphenidate or atomoxetine. Furthermore, researchers found that if individuals had a history of a psychiatric condition, their risk was increased. Risks were also increased for those who took higher doses of amphetamine-based medications. Unfortunately, these medications are often prescribed based on what the child's health insurance will cover the cost of or pre-authorized as suitable. Additionally, when prescribing medications to children with ADHD, it is a trial-and-error process—if one medication proves ineffective, the physician will either increase the dosage or move on to the next medication covered by the child's insurance.

The information between Hamard et al (2024) and Stutzman & Dolpeide (2024) makes it clear that physicians should be vigilant in monitoring patients who are prescribed ADHD medications, especially when considering patient and family history, as well as co-morbid conditions. While research suggests that adverse reactions associated with manic episodes or psychosis are rare, it is possible (Hamard, et al 2024, Stutzman & Dolpeide, 2024).

Criminal Cases Linked to ADHD

After researching numerous types of scholarly articles, it is time to find the link between criminality and ADHD. While Freckleton (2020) made implications regarding ADHD and competency to stand trial and included the blunt notion of how some people who may be on the street involved in petty crimes are possibly the child that couldn't sit still in elementary school and were labeled the 'problem child' -- the urge to find cases that stood out and reflect the significance of ADHD was apparent.

In *R v Osborne* (2010) an appeal was filed stating that the defendant had undiagnosed/untreated ADHD. The crime was committed at the age of 14, which is a challenging age as it is with puberty and social development, but that doesn't excuse murder. However, the defendant explained in the appeal that the crime occurred because of impulsivity, a symptom of ADHD. There was no intent, as there was an altercation between the defendant and the victim. The defendant was fearfully armed with a piece of wood and accidentally fractured the victim's skull leading to his death. This action was the outcome of impulse – not thinking of consequences, only acting on fear and first thought. While the defendant was not granted a new trial and remained convicted – the appeal brought awareness of the severity of ADHD, if left untreated.

Another case involving a diagnosis of ADHD is *Davis vs. Norris* (1991) in which the charges were homicide. Davis claimed incompetency to stand trial, which was denied after the state's evaluations. However, the defense called a physician to testify that Davis did have a diagnosis of ADHD. The state's assessments showed otherwise, but did show diagnoses of antisocial personality disorder, psychoactive substance abuse, and alcohol abuse. The most

significant testimony was when the expert witness explained that one in five individuals who have ADHD will experience substance abuse and legal difficulties. Furthermore, it was explained that an individual with ADHD is eleven times more likely to be arrested prior to the age of 17. This case occurred in the 90's, which makes the statistics even more alarming, as those numbers are growing. The physician also stated that if Davis had received treatment earlier in his life, it is unlikely that Davis would have had any substance abuse problems or being charged with murder.

It is imperative that while ADHD may not be an applicable insanity defense, it should be taken under consideration by the criminal justice system. As discussed before, executive functioning, working memory, judgement, decision-making, emotional regulation – and the list goes on-- are affected by this condition. Impulsivity leads to many poor decisions and a lack of emotional regulation can also contribute to that and be exacerbated when under stress, or when combined with other psychiatric conditions or substance abuse.

Courts are beginning to look at ADHD as a mitigating factor in proceedings, which is a step in the right direction. For example, in *State v. Wiggins* (2005), while ADHD wasn't considered a defense, it was considered during sentencing as it was believed to have contributed to the impulsivity behind the crime. The criminal justice system finally considering ADHD in any part of the court process enhances the justice system and will play a role in other mental health conditions being recognized as special circumstances.

Conclusion

Before closing, it is important to touch base on the shortage of ADHD medications in the United States. This national shortage is unfortunately still a reality, even over the past two years,

no policies have been changed to increase the ability to manufacture the medication to at least meet the needs of patients. Is it increased diagnosis' causing the shortage or a lack of the FDA's consideration – probably a combination of both. Either way, ADHD symptoms being treated adequately requires consistent medication, so having to change medications based on what's available in a pharmacy that could be potentially 20 miles from your local pharmacy, is not helping anyone who struggles with ADHD symptoms and diminishing the quality of life for these individuals and their families or caregivers. Exacerbating symptoms and limiting resources isn't going to decrease the criminal justice offending rates, that's for sure.

Faraone et al. (2021) provides a conclusive study of the best care practices regarding childhood ADHD. As many of the other articles have stated, multimodal treatment plans are essential for positive educational growth and behavioral conflicts. researchers have made it clear that treatment processes should be individualized and specific to each child's needs (Wolraich et al., 2019). Educational strategies that promote positive reinforcement and collaborating closely with parents can set a child with ADHD up for academic achievement. Other educational interventions can include visual schedules and breaks, in addition to a consistent reward system, as mentioned earlier.

Through this literature review, which integrated studies ranging over the past few decades with a specific emphasis on more recent studies and interventions, it has been maintained that ADHD going undiagnosed can lead to adverse outcomes and reduced quality of life in several areas. As mentioned in Taipale et al (2024) adults who do take ADHD medication have reduced work disability and less hospitalizations, compared to those who do not adhere to pharmacological interventions. Whether it be the motivation to get up and go to work or even ambition to obtain a college degree, or conflicts in maintaining relationships, or a lack of time

management and procrastination issues, and other areas of daily life functioning – childhood ADHD is not something you ‘just grow out of.’

The more recent findings implicate a need for ongoing research and exploration into adults with ADHD, in addition to further research considering adolescents and ADHD. Through the use of the *American Psychiatric Association’s Diagnostic and Statistical Manual of Mental Disorders (5th ed.)*, the analysis gave a foundational layer of information regarding the symptomology and diagnosis of ADHD.

Incorporating various articles, like Arnsten (2009) that explain the brain anatomy associated with ADHD implies that medication is a viable option, that can be beneficial. If an individual had a medical condition that could be fixed with medication, it wouldn’t be given second thought. Mental health is just as important as physical health, as has been discussed in-depth throughout this review. The stigma surrounding ADHD only inhibits the future research and creates a lack of support for those with the condition. Society would not shun a diabetic for taking their insulin, why would a mental health disorder shine any different?

This review highlighted several best practice options when it comes to psychosocial interventions. Chako et al (2024) discussed the importance of evidence-based behavioral therapies and Bailey, et al (2024) described the more recent up-and-coming treatment efficacy of PCIT or parent child interactive therapy. Non-pharmacological interventions were considered in this review as well like TMS or trans magnetic stimulation (Nagy et al., 2022). While these innovative treatments are at the beginning stages of investigation, they are showing promise for the future of treatment options for ADHD, and other mental health conditions.

Briefly in this review the discussion of educational interventions, like 504 Accommodation Plans and the use of Individualized Education Program or IEP were identified as useful in reaching the academic potential for a child or adolescent with ADHD (Hustus et al., 2020). These programs can not only help individuals reach their best academic potential but also enhance their social life by inhibiting specific behaviors that may be contributing to challenges in social-emotional development.

Additionally, it was important to include adverse effects and recent literature regarding this. While most studies promote the use of stimulant or non-stimulant medications in treating ADHD, there are risks associated with these treatment options. As discussed in Hamard et al (2024) and Stutzman & Dolpeide (2024) psychosis and/or manic episodes are possible but rare adverse effects that require monitoring. Chang et al (2019) additionally touched base on related risks or adverse effects of ADHD medication. Other adverse effects were reviewed using Stutzman & Dolpeide (2024) and Zhang et al. (2024) considering the cardiovascular risks stimulant medication can indicate.

This review included insight from Widding-Havneraas, et al. (2024) regarding criminality statistics and demographic statistics from the CDC (2024). Every study included in this literature review only promotes the benefits of individualized treatment plans from childhood to adolescence, through adulthood. All the studies showed that while risks are apparent, ADHD medication can be beneficial when careful consideration is given. Furthermore, the combination of pharmacological interventions and non-pharmacological interventions being included in patient-centered treatment plans will lead to the most favorable results.

The literature has displayed how untreated ADHD can lead to substance abuse issues and criminal behaviors. Weighing the costs and benefits of medication should be assessed on an individual basis, as all treatment needs should be patient centered. However, the most recent research reflects that medication can be preventative in negating future substance abuse and that a lack of medication and treatment is more likely the cause when it comes to individuals with ADHD.

In closing, it is conclusive that contrary to dated studies, current evidence does not support the idea that ADHD medication contributes to increased likelihood of substance abuse. Instead, adequate management of ADHD symptoms, including medication, when necessary, appears to be beneficial in reducing the risk of adverse consequences associated with untreated ADHD. In conclusion, this literature review gives a logical synopsis of the historical perspectives through current understandings and findings of ADHD research. Examining outcomes of various treatment modalities has consistently shown that early intervention yields the best results. This includes the appropriate use of pharmacological treatments, as it can reduce adverse outcomes such as substance abuse and criminal behavior. Overall, the research exhibits the importance of evidence-based ADHD treatment approaches, including both pharmacological and non-pharmacological interventions. Balancing the risks and benefits on an individual basis and advocating for comprehensive treatment regimens are the bottom line.

Chapter 3: Implications, Recommendations, and Conclusions

Implications

According to an article titled *ADHD Grows Up*, while most ADHD cases are present during childhood, other categories are submerging. More recent research suggests that there are three categories – ADHD presenting during childhood, ADHD presenting in childhood and persisting to adulthood, and ADHD in adulthood with no childhood history (2024). While it's still under investigation, these categories do suggest that ADHD is still being researched and new research is being presented.

Notable implications from the literature review are regarding the best evidence-based practices for ADHD treatment. While all interventions should be individualized and fit the patient's needs based on their specific symptoms and circumstances, research seems to support that stimulant medication in combination with a form of behavioral therapy will produce the most favorable outcome.

Additionally, educational support will allow the individual to learn to their best potential, like implementing accommodations through a 504 or an IEP. Parent training is one of the biggest keys to successfully combatting unwanted behaviors and is most effective when this form of

therapy occurs at an early age. Research supports a mode of parent training referred to as PCIT and the statistics are promising.

It seems that much of the mitigating of symptoms begins at home, in a stable and consistent environment. Hence, the statistics show that individuals that are lower on the socioeconomic totem pole end up with a higher ADHD prevalence. This begs the question, is it genetics or environment? Well, it is both. The environmental aspect discussed in Russell et al., (2016) where it was stated that children of lower socioeconomic status are 1 to 3 times more likely to have a mental health condition. This leads me to think that this is why psychosocial and parent training interventions are so effective—environmental link.

However, like the proper treatment being individualized and multimodal, the cause is also multifactorial. While circumstances vary, the best treatment processes do not. All articles pointed at the most favorable treatment being a mix of what's needed, based on symptoms. While one child may need a stimulant with PCIT, another may need a non-stimulant and CBT. Both options are equally efficient, assuming the symptoms match the need.

Clinicians should be heavily educated in childhood ADHD and pediatricians especially. While child psychologists and related fields are trained to assess and diagnose appropriately – pediatricians often pull up a single questionnaire on their laptop, then prescribe the most convenient medication, and refer patients out for therapy options. Pediatricians should take a more personalized approach. This does not refer to all pediatric doctors, only the few that make getting diagnosed with a mental health condition seem simple. Mental health conditions, like ADHD, are not simple, thus the process should be intricate.

As stated earlier, Rasmussen, et al., (2024) discussed the unfortunate facts that young adults with ADHD are genuinely struggling with self-independence. To re-cap, the study showed a lack of motivation in work and career and an inability to maintain relationships and even highlighted obstacles in everyday life like organization. This is a call for early intervention, folks.

Recommendations

French et al (2024) conducted an umbrella review in consideration of ADHD impacts just a couple of months ago. The analysis noted several intriguing points, one of which was surprising – ADHD is still considered underdiagnosed, even though the prevalence is steadily increasing. The authors also note that primary care physicians are commonly managing ADHD medications and therapies, which can create a challenge for them, so collaborative efforts among all providers would improve the treatment process for everyone.

A suggestion may be to have insurance companies, including the federal government insurances (I.e. Medicaid) -- since the lower economic level individuals are more likely to have a severe symptomology—have a special program with case managers for these individuals. There are programs like this for individuals of all ages with other neurodevelopmental conditions, like autism for example. The implementation of this could solve many logistical issues and make it easier for the insurance companies as well, as far as what is approved and what isn't -- everyone would already know if there was a case manager in charge of referrals, authorizations, claims, prescriptions, etc.

Professional Training

Training should be available for a range of professional fields. Many teachers do not receive specialized education in special needs if they are not planning on being a special education educator. However, all-inclusive classrooms are the expectation and training in these areas should be required for all school staff. Looking back to my autistic child's traumatic kindergarten school year, I remember that his teacher mentioned at an IEP meeting that she was not trained to 'deal with these students' and that the school had a lack of resources to educate him or effectively deal with his conflicting behaviors. All students in the public school system are entitled to FAPE or a Free Appropriate Public Education (*US Department of Education*). This FAPE law requires schools in the student's district to adhere to giving them an appropriate education. However, we decided that continuing his education at another elementary school was for the best because they had a specialized autism program that would gradually integrate him into the general education setting. However, all schools should have these programs, as federal law mandates (*US Department of Education*).

Police officers should be trained in a manner that allows them to identify those with neurodevelopmental conditions, like ADHD. If emergency personnel know the signs and symptoms, then they can handle these individuals in a more appropriate technique, without using force and exacerbating an already stressful situation. With judgement inhibited and a lack of impulse-control, combined with emotional dysregulation – even just a routine traffic stop can trigger anger or aggressive responses, which could trigger the police officer to react. Officers could also view ADHD symptoms as suspicious behaviors as well, prompting unnecessary searches, sobriety tests, and arrests.

FMLA

Another recommendation concerns the needs of caregivers and/or families of those with ADHD. The FMLA or Family Medical Leave Act gives employees the right to have time away from work when they have a loved one with serious illness, childbirth, among other circumstances. FMLA protects these employees from being disciplined or terminated when they must leave work unscheduled (*United States Department of Labor*). However, employers should be required to pay at least 80 percent of the usual hourly rate. While their job is protected, their paycheck is not.

Imagine getting a call from the elementary school that your child with ADHD has had a severe meltdown and injured himself, you are headed to the hospital for stitches and wait hours to be seen and must pay a hefty medical bill as well. FMLA will protect your position, but it does not provide any form of provisional pay while you have left. The DOL does state that employees can use accrued PTO or sick leave/vacation days, but that does not seem fair. There should be laws in place for certain provisions that allow a certain amount of paid leave with the FMLA that does not take away from personal accrual or vacation/sick days.

Conclusion

There are significant differences between individuals who have been treated for ADHD compared to those who have not received treatment and/or diagnosis. These distinctions imply that well-managed ADHD is achievable and is the primary function of best potential quality of life for those with the condition. As discussed, medication management combined with psychosocial interventions and therapies like PCIT, especially at a young age, have illustrated the best results.

Medication management stands out as the most important treatment, as it proves most efficacy in not only symptom reduction, but overall functioning. With medication improving attention and reducing impulsivity, social-development and academic performance can be significantly improved. PCIT has been shown to improve family dynamics in general, through parent-child interaction, and can significantly reduce a stressful home environment for all members of the family.

Statistics show that substance abuse disorder is highly prevalent in the ADHD community, more so in the undiagnosed ADHD community. As mentioned before, studies show that substance abuse often begins as a coping mechanism for ADHD symptoms. A lack of emotional regulation and inhibited judgement often leads those individuals with ADHD that are not receiving the appropriate treatment, to a path of destruction that starts with experimentation. Once a chemical dependency has developed, the individual will turn to petty crimes or even dangerous and violent criminal behaviors to support their habit. The cure is prevention – early intervention.

By integrating medication and behavior therapy, in addition to educational interventions, the quality of life for individuals with ADHD, along with their families/caregivers, can be enhanced immensely. Without proper treatment plans and collaboration among all providers, best case scenarios cannot be achieved. While each individual's needs and symptoms may vary, the influence of compassionate care should not. Children to adults, ADHD should be taken seriously and destigmatized by society. With the research discussed throughout this paper, it proves that no matter the medication, the results show that pharmacological interventions are considered the most effective treatment strategies since brain abnormalities have been proven to be linked to symptoms behind the condition.

References

ADHD grows up. *Nat. Mental Health* 2, 461–462 (2024). <https://doi.org/10.1038/s44220-024-00262-w>

American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders* (5th ed.)

Arnsten AF. The Emerging Neurobiology of Attention Deficit Hyperactivity Disorder: The Key Role of the Prefrontal Association Cortex. *J Pediatr*. 2009 May 1;154(5):I-S43. doi: 10.1016/j.jpeds.2009.01.018. PMID: 20596295; PMCID: PMC2894421.

Bailey BA, Heaton SC, McNeil CB, Nelson MM. Treatment Engagement and Outcomes in Parent–Child Interaction Therapy with Mothers with a History of ADHD: A Case Series. *Journal of Indian Association for Child and Adolescent Mental Health*. 2024;20(2):171-176. doi:10.1177/09731342241240656

Becker SP, Langberg JM, Vaughn AJ, Epstein JN. Clinical utility of the Vanderbilt ADHD diagnostic parent rating scale comorbidity screening scales. *J Dev Behav Pediatr*. 2012 Apr;33(3):221-8. doi: 10.1097/DBP.0b013e318245615b. PMID: 22343479; PMCID: PMC3319856.

Biederman, J., Wilens, T., Mick, E., Faraone, S. V., Weber, W., Curtis, S., ... & Lelon, E. (1997).

Is ADHD a risk factor for psychoactive substance use disorder? Findings from a four-year prospective follow-up study. *Journal of the American Academy of Child & Adolescent Psychiatry*.

CDC. (2024). *Prevalence of Diagnosed Attention-Deficit/Hyperactivity Disorder Among*

Children Ages 5–17 Years: United States, 2020–2022. Retrieved from

<https://www.cdc.gov/ncbddd/adhd/data.html>.

Chacko, A., Merrill, B.M., Kofler, M.J. et al. Improving the efficacy and effectiveness of evidence-based psychosocial interventions for attention-deficit/hyperactivity disorder (ADHD) in children and adolescents. *Transl Psychiatry* 14, 244 (2024).

<https://doi.org/10.1038/s41398-024-02890-3>

Chang Z, Ghirardi L, Quinn PD, Asherson P, D'Onofrio BM, Larsson H. Risks and Benefits of Attention-Deficit/Hyperactivity Disorder Medication on Behavioral and Neuropsychiatric Outcomes: A Qualitative Review of Pharmacoepidemiology Studies Using Linked Prescription Databases. *Biol Psychiatry*. 2019 Sep 1;86(5):335-343. doi:

10.1016/j.biopsych.2019.04.009. Epub 2019 Apr 17. PMID: 31155139; PMCID: PMC6697582.

Chang, Z., Lichtenstein, P., Halldner, L., D'Onofrio, B., Serlachius, E., Fazel, S., ... & Larsson, H. (2014). Stimulant ADHD medication and risk for substance abuse. *Journal of Child Psychology and Psychiatry*, 55(8), 878-885.

Chronis-Tuscano, A., & Bounoua, N. (2024). ADHD Prevalence Rose, Yet Disparities Remain: Commentary on the 2022 National Survey of Children's Health. *Journal of Clinical*

Child & Adolescent Psychology, 53(3), 361–372.

<https://doi.org/10.1080/15374416.2024.2359075>

DAVIS v. NORRIS (1991). *CaseMine*. Retrieved from -

<https://www.casemine.com/judgement/us/5914b5fcadd7b04934776293>

Danielson, M. L., Claussen, A. H., Bitsko, R. H., Katz, S. M., Newsome, K., Blumberg, S. J., ...

Ghandour, R. (2024). ADHD Prevalence Among U.S. Children and Adolescents in 2022: Diagnosis, Severity, Co-Occurring Disorders, and Treatment. *Journal of Clinical Child &*

Adolescent Psychology, 53(3), 343–360. <https://doi.org/10.1080/15374416.2024.2335625>

Eiland, L. S., & Gildon, B. L. (2024). Diagnosis and treatment of ADHD in the pediatric population. *Journal of Pediatric Pharmacology and Therapeutics*, 29(2), 107-118.

<https://doi.org/10.5863/1551-6776-29.2.107>

Engelhardt PE, Nobes G, Pischedda S. The Relationship between Adult Symptoms of Attention-Deficit/Hyperactivity Disorder and Criminogenic Cognitions. *Brain Sci.* 2019 Jun

2;9(6):128. doi: 10.3390/brainsci9060128. PMID: 31159467; PMCID: PMC6627881.

Faraone et al. (2021). The World Federation of ADHD International Consensus Statement: 208 Evidence-based conclusions about the disorder. *Neurosci Biobehav Rev.* 2021

Sep;128:789-818. doi: 10.1016/j.neubiorev.2021.01.022. Epub 2021 Feb 4. PMID:

33549739; PMCID: PMC8328933.

Fletcher J, Wolfe B. Long-term consequences of childhood ADHD on criminal activities. *J Ment Health Policy Econ*. 2009 Sep;12(3):119-38. PMID: 19996475; PMCID: PMC3398051.

French B, Nalbant G, Wright H, Sayal K, Daley D, Groom MJ, Cassidy S, Hall CL. The impacts associated with having ADHD: an umbrella review. *Front Psychiatry*. 2024 May 21;15:1343314. doi: 10.3389/fpsy.2024.1343314. PMID: 38840946; PMCID: PMC11151783.

Freckelton I. Attention Deficit Hyperactivity Disorder (ADHD) and the Criminal Law. *Psychiatr Psychol Law*. 2020 Jan 6;26(6):817-840. doi: 10.1080/13218719.2019.1695266. PMID: 32128011; PMCID: PMC7033699.

Hamard J, Rousseau V, Durrieu G, et al Psychosis with use of amphetamine drugs, methylphenidate and atomoxetine in adolescent and adults. *BMJ Ment Health* 2024;27:e300876.

Heyl, J.M. (2023, December 18). Neurofeedback treatment for ADHD: How it works. *Verywell Mind*. <https://www.verywellmind.com/neurofeedback-treatment-for-adhd-5271502>

Hustus, C. L., Evans, S. W., Owens, J. S., Benson, K., Hetrick, A. A., Kipperman, K., & DuPaul, G. J. (2020). An Evaluation of 504 and Individualized Education Programs for High School Students With Attention Deficit Hyperactivity Disorder. *School Psychology Review*, 49(3), 333–345. <https://doi.org/10.1080/2372966X.2020.1777830>

- Isfandnia, F., El Masri, S., Radua, J., & Rubia, K. (2024). The effects of chronic administration of stimulant and non-stimulant medications on executive functions in ADHD: A systematic review and meta-analysis. *Neuroscience & Biobehavioral Reviews*. Advance online publication. <https://doi.org/10.1016/j.neubiorev.2024.105703>
- Johnson, M., Johnels, J.Å., Östlund, S. et al. Long-term medication for ADHD (LMA) trial: 2-year prospective observational study in children and adolescents. Core symptoms, daily functioning, and comorbidity outcomes. *Eur Arch Psychiatry Clin Neurosci* 274, 879–890 (2024). <https://doi.org/10.1007/s00406-023-01744-1>
- Lambert, N. M., & Hartsough, C. S. (1998). Prospective study of tobacco smoking and substance dependencies among samples of ADHD and non-ADHD participants. *Journal of Learning Disabilities*, 31(6), 533–544. <https://doi.org/10.1177/002221949803100603>
- Lee, S., Choi, B., & Kim, S. (2024). Treatment of childhood ADHD with stimulant medication: a meta-analysis. *Journal of Pediatric Psychology*, 46(3), 245-260. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC10068409/>
- Lee Y, Kong N, Koo S, Bai DS, Kim HJ, Jeong H, Seo WS. A 24-Month Effects of Methylphenidate Use on Growth in Children and Adolescents With Attention Deficit Hyperactivity Disorder. *Psychiatry Investig*. 2022 Mar;19(3):213-219. doi: 10.30773/pi.2021.0309. Epub 2022 Feb 25. PMID: 35196830; PMCID: PMC8958206.
- Lichtenstein, P., Halldner, L., Zetterqvist, J., Sjolander, A., Serlachius, E., Fazel, S., ... & Larsson, H. (2012). Medication for attention deficit–hyperactivity disorder and criminality. *New England Journal of Medicine*, 367(21), 2006-2014.

Lindvall, M.A., Holmqvist, K.L., Svedell, L.A. et al. START – physical exercise and person-centred cognitive skills training as treatment for adult ADHD: protocol for a randomized controlled trial. *BMC Psychiatry* 23, 697 (2023). <https://doi.org/10.1186/s12888-023-05181-1>

Molina, B. S. G., Kennedy, T. M., Howard, A. L., et al. (2023). Association between stimulant treatment and substance use through adolescence into early adulthood. *JAMA Psychiatry*, 80(9), 933–941. <https://doi.org/10.1001/jamapsychiatry.2023.2157>

MTA Cooperative Group. (2009). National Institute of Mental Health multimodal treatment study of ADHD follow-up: 24-month outcomes of treatment strategies for attention-deficit/hyperactivity disorder. *Pediatrics*, 113(4), 754-761.

Molina, B. S., Hinshaw, S. P., Eugene, A., Swanson, J. M., Pelham, W. E., Hechtman, L., ... & Vitiello, B. (2007). The MTA at 8 years: Prospective follow-up of children treated for combined-type ADHD in a multisite study. *Journal of the American Academy of Child & Adolescent Psychiatry*, 46(8), 989-1002

Murray CJL, et al. (2016). Long-term outcomes of attention-deficit/hyperactivity disorder and conduct disorder: A systematic review and meta-analysis. *Journal of the American Academy of Child & Adolescent Psychiatry*.
<https://www.sciencedirect.com/science/article/abs/pii/S0890856716311571>

Nagy, N.A.S., Amin, G.R., Khalil, S.A. et al. The therapeutic role of repetitive transcranial magnetic stimulation in children with attention deficit/hyperactivity disorder in Egypt a

randomized sham controlled clinical trial. *Middle East Curr Psychiatry* 29, 55 (2022).
<https://doi.org/10.1186/s43045-022-00210-3>

Nazarova VA, Sokolov AV, Chubarev VN, Tarasov VV, Schiöth HB. Treatment of ADHD: Drugs, psychological therapies, devices, complementary and alternative methods as well as the trends in clinical trials. *Front Pharmacol.* 2022 Nov 17;13:1066988. doi: 10.3389/fphar.2022.1066988. PMID: 36467081; PMCID: PMC9713849.

Peterson BS, Trampush J, Maglione M, Bolshakova M, Rozelle M, Miles J, Pakdaman S, Brown M, Yagyu S, Motala A, Hempel S. Treatments for ADHD in Children and Adolescents: A Systematic Review. *Pediatrics.* 2024 Apr 1;153(4):e2024065787. doi: 10.1542/peds.2024-065787. PMID: 38523592..

Phillips, Sharon & Druskin, Lindsay & Mychailyszyn, Matthew & Victory, Erinn & Aman, Emily & Mcneil, Cheryl. (2024). The Efficacy of Parent–Child Interaction Therapy (PCIT) for Youth with Attention-Deficit/Hyperactivity Disorder (ADHD): A Meta-Analysis. *Child Psychiatry & Human Development.* 1-10. 10.1007/s10578-024-01678-2.

Pringsheim T, Hirsch L, Gardner D, Gorman DA. The pharmacological management of oppositional behaviour, conduct problems, and aggression in children and adolescents with attention-deficit hyperactivity disorder, oppositional defiant disorder, and conduct disorder: a systematic review and meta-analysis. Part 1: psychostimulants, alpha-2 agonists, and atomoxetine. *Can J Psychiatry.* 2015 Feb;60(2):42-51. doi: 10.1177/070674371506000202. PMID: 25886655; PMCID: PMC4344946.

R v Osborne (2010) EWCA Crim 547. *CaseMine.*

- Rasmussen, I.L., Schei, J. & Ørjasæter, K.B. “A bit lost”—Living with attention deficit hyperactivity disorder in the transition between adolescence and adulthood: an exploratory qualitative study. *BMC Psychol* 12, 20 (2024).
<https://doi.org/10.1186/s40359-024-01522-1>
- Rosa-Neto, P., Lou, H. C., Cumming, P., Pryds, O., Karrebaek, H., Lunding, J., ... & Gjedde, A. (2005). Methylphenidate-evoked changes in striatal dopamine correlate with inattention and impulsivity in adolescents with attention deficit hyperactivity disorder. *NeuroImage*, 25(3), 868-876.
- Russell AE, Ford T, Russell G. Socioeconomic Associations with ADHD: Findings from a Mediation Analysis. *PLoS One*. 2015 Jun 1;10(6):e0128248. doi: 10.1371/journal.pone.0128248. PMID: 26030626; PMCID: PMC4451079.
- Russell, A. E., Ford, T., Williams, R., & Russell, G. (2016). The Association Between Socioeconomic Disadvantage and Attention Deficit/Hyperactivity Disorder (ADHD): A Systematic Review. *Child Psychiatry and Human Development*, 47(3), 440-58.
<https://doi.org/10.1007/s10578-015-0578-3>
- Shaw, P., Eckstrand, K., Sharp, W., Blumenthal, J., Lerch, J. P., Greenstein, D., ... & Rapoport, J. L. (2007). Attention-deficit/hyperactivity disorder is characterized by a delay in cortical maturation. *Proceedings of the National Academy of Sciences*, 104(49), 19649-19654.
- Stutzman DL, Dopheide JA. Practice Pearls for Stimulant Treatment of Attention-Deficit/Hyperactivity Disorder in Youth. *J Pediatr Pharmacol Ther*. 2024 Jun;29(3):215-

231. doi: 10.5863/1551-6776-29.3.215. Epub 2024 Jun 10. PMID: 38863854; PMCID: PMC11163912.

Swanson, J. M., Kraemer, H. C., Hinshaw, S. P., Arnold, L. E., Conners, C. K., Abikoff, H. B., ... & Wu, M. (2001). Clinical relevance of the primary findings of the MTA: Success rates based on severity of ADHD and ODD symptoms at the end of treatment. *Journal of the American Academy of Child & Adolescent Psychiatry*, 40(2), 168-179.

Taipale H, Bergström J, Gèmes K, Tanskanen A, Ekselius L, Mittendorfer-Rutz E, Helgesson M. Attention-Deficit/Hyperactivity Disorder Medications and Work Disability and Mental Health Outcomes. *JAMA Netw Open*. 2024 Mar 4;7(3):e242859. doi: 10.1001/jamanetworkopen.2024.2859. PMID: 38506810; PMCID: PMC10955386.

Tourjman V, Louis-Nascan G, Ahmed G, DuBow A, Côté H, Daly N, Daoud G, Espinet S, Flood J, Gagnier-Marandola E, Gignac M, Graziosi G, Mansuri Z, Sadek J. Psychosocial Interventions for Attention Deficit/Hyperactivity Disorder: A Systematic Review and Meta-Analysis by the CADDRA Guidelines Work GROUP. *Brain Sci*. 2022 Aug 1;12(8):1023. doi: 10.3390/brainsci12081023. PMID: 36009086; PMCID: PMC9406006.

United States Department of Labor. (n.d.). *FMLA frequently asked questions*.

<https://www.dol.gov/agencies/whd/fmla/faq#:~:text=The%20FMLA%20only%20require%20unpaid%20leave.%20However%2C%20the,leave%20rules%20in%20order%20to%20substitute%20paid%20leave.>

US Department of Education (ED). (n.d.). Free appropriate public education under Section 504.

Home. <https://www2.ed.gov/about/offices/list/ocr/docs/edlite->

FAPE504.html#:~:text=The%20Section%20504%20regulation%20requires%20a%20sch
ool%20district,the%20nature%20or%20severity%20of%20the%20person%E2%80%99s
%20disability.

Widding-Havneraas T, Zachrisson HD, Markussen S, Elwert F, Lyhmann I, Chaulagain A, Bjelland I, Halmøy A, Rypdal K, Mykletun A. Effect of Pharmacological Treatment of Attention-Deficit/Hyperactivity Disorder on Criminality. *J Am Acad Child Adolesc Psychiatry*. 2024 Apr;63(4):433-442. doi: 10.1016/j.jaac.2023.05.025. Epub 2023 Jun 27. PMID: 37385582.

Wolraich ML, Hagan JF Jr, Allan C, Chan E, Davison D, Earls M, Evans SW, Flinn SK, Froehlich T, Frost J, Holbrook JR, Lehmann CU, Lessin HR, Okechukwu K, Pierce KL, Winner JD, Zurhellen W; SUBCOMMITTEE ON CHILDREN AND ADOLESCENTS WITH ATTENTION-DEFICIT/HYPERACTIVE DISORDER. Clinical Practice Guideline for the Diagnosis, Evaluation, and Treatment of Attention-Deficit/Hyperactivity Disorder in Children and Adolescents. *Pediatrics*. 2019 Oct;144(4):e20192528. doi: 10.1542/peds.2019-2528. Erratum in: *Pediatrics*. 2020 Mar;145(3):e20193997. doi: 10.1542/peds.2019-3997. PMID: 31570648; PMCID: PMC7067282.

Young, S., Gudjonsson, G., Chitsabesan, P. et al. Identification and treatment of offenders with attention-deficit/hyperactivity disorder in the prison population: a practical approach based upon expert consensus. *BMC Psychiatry* 18, 281 (2018).
<https://doi.org/10.1186/s12888-018-1858-9>

Zhang L, Li L, Andell P, Garcia-Argibay M, Quinn PD, D'Onofrio BM, Brikell I, Kuja-Halkola R, Lichtenstein P, Johnell K, Larsson H, Chang Z. Attention-Deficit/Hyperactivity Disorder Medications and Long-Term Risk of Cardiovascular Diseases. *JAMA Psychiatry*. 2024 Feb 1;81(2):178-187. doi: 10.1001/jamapsychiatry.2023.4294. PMID: 37991787; PMCID: PMC10851097.