Examining Cognitive Behavioral Therapy as a treatment for Attention-Deficit/Hyperactivity Disorder in Adolescents: A Secondary Analysis

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Abstract

This study examines Cognitive Behavioral Therapy (CBT) in the treatment of adolescent girls with ADHD, a population often underdiagnosed and undertreated. Girls are more likely to exhibit inattentive symptoms, rather than hyperactive symptoms, leading to delayed diagnoses and treatment. Untreated ADHD in girls can lead to serious adverse outcomes, including increased risk for comorbid psychopathology, substance abuse, self-harm, and unplanned pregnancy. Mediating factors include maltreatment, academic failure, peer victimization, and emotional dysregulation. The purpose of this study is to contribute to the gap in research surrounding the sex differences of using CBT as a treatment method for ADHD. Results found that CBT as a treatment method for ADHD produced a significant reduction of ADHD symptoms posttest ($p < .001$). Girls and boys both benefited from CBT and environment (group or individual) was not found to have a significant impact on posttest outcomes. Several sex-differences in treatment outcomes were identified. Girls with anxiety showed a greater amount of reduction in ADHD symptoms at posttest compared to girls without anxiety, with medium effect sizes in the subthreshold (effect size = -0.42) and inattentive (effect size = -0.46) profiles. Boys with depression demonstrated a greater amount of reduction in ADHD symptoms at posttest compared to boys without depression, with medium to large effect sizes in the inattentive (effect size = -0.46) and hyperactive (effect size = -0.84) profiles. These results highlight the importance that individual characteristics may have on treatment outcome. The adolescent profiles identified point toward potential areas for future research.

Dedication

For Mom and Dad

and misunderstood adolescents

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Table of Contents

List of Tables

Table of Figures

Chapter I. Introduction

Background of the Problem

Millions of U.S. children and adolescents have been diagnosed with Attention-Deficit/Hyperactivity Disorder ADHD; (Centers for Disease Control and Prevention, 2023). The estimated number of children aged 3-17 with a diagnosis of ADHD in the United States is 6 million using data from 2016-2019. Boys outnumber girls with diagnoses, almost 2:1, with boys having a diagnostic rate of 13% compared to 6% of girls. Research suggests that girls are not less likely to have ADHD, but rather, less likely to receive a diagnosis for the disorder because of the way their symptoms manifest (Hinshaw et al., 2020; Young et al., 2020). ADHD has [1]sex differences, meaning that the symptoms of the disorder typically differ between girls and boys. Girls tend to display covert symptoms, in the form of inattention (Chronis-Tuscano, 2022). Children and adolescents with inattentive type may have difficulty staying focused or remembering important tasks. Boys are more likely to display hyperactive symptoms, which may be more visible to parents and teachers.

Untreated ADHD can lead to challenges and adverse life outcomes, and the effects may be intensified for girls. Although girls and boys with ADHD often struggle with the organizational demands of school, girls tend to have lower self-esteem about their ADHD (Quinn & Madhoo, 2014). The consequences of not fitting in socially may be more upsetting for girls because of the significance social relationships have on their well-being (Kok et al., 2020). Adolescents that struggle with their close relationships may develop additional internalizing

[1] Sex differences in this study refers to the differences that exist between ADHD symptoms and how they manifest in cis-gendered girls and boys. Gender exists on a spectrum and is socially, culturally, and individually experienced.

problems, which can evolve into other serious issues. Internalizing problems are inward directed problems that affect thoughts, feelings, and mood which are often difficult to observe.

The types of symptoms a girl is predisposed to, as well as her environmental circumstances, play an influential role in the dysfunction she will develop (Quinn & Madhoo, 2014). Examples of mediation pathways are present throughout the literature surrounding untreated girls with ADHD (Owens & Hinshaw, 2020). A mediation pathway is a model that shows how a third variable affects the relationship between two other variables. Girls with ADHD are at risk for the developmental progressions of comorbid psychopathology (Hinshaw et al., 2022; Young et al., 2020), substance abuse (Castellano-García et al., 2022), self-harm (Beauchanie et al., 2019), and unplanned pregnancy (Owens & Hinshaw, 2020). More information about these mediation pathways can be found in Chapter II.

The most empirically supported treatments for adolescents with ADHD are medication, psychosocial intervention, or the combination of both treatments (Evans et al., 2018). Behavioral interventions are also frequent practice towards treating ADHD in the school setting (Evans et al., 2016). Some adolescents prefer not to use medication as treatment due to the possible negative side effects of medication (Wolraich et al., 2019). There is little information about the long-term consequences of treating children with ADHD medication (Dalsgaard et al., 2014). Further complications exist when medicating girls with ADHD. Girls are less likely to receive prescriptions for ADHD medication compared to boys and more likely to receive antidepressants before ADHD medication (Kok et al., 2020; Quinn & Madhoo, 2014). There is evidence that girls may benefit from medication that is optimized to their hormonal cycle, although literature is limited surrounding this topic (Roberts et al., 2018).

Cognitive Behavioral Therapy (CBT) is the most empirically supported psychosocial intervention (Antshel et al., 2014; Evans et al., 2018; David et al., 2021; Sibley et al., 2014; Young et al., 2020; Young & Smith 2017). CBT works by intervening unhelpful cognitions and increasing positive behaviors. Using CBT as a treatment for ADHD is an emerging body of research. Wolraich and colleagues updated the clinical practice guidelines for the diagnosis, evaluation, and treatment of ADHD in children and adolescents (2019). This update highlights the importance for future research in CBT as a treatment method for ADHD. CBT may allow adolescents to take part in their treatment plan. Adolescence may be a particularly difficult developmental time for children with ADHD because of the increased academic demands, challenging social context, exposure to risky behaviors, and expectations for independence (Evans et al., 2016). This makes CBT for use with adolescents a compelling area of research. The use of Medication and CBT as treatment methods are discussed in Chapter II, as well as their strengths, weaknesses, and hormonal considerations.

This study is informed using feminist theory, which falls under the umbrella of critical theory (Arinder, 2020). The purpose of using a feminist theory lens is to examine how women have been historically oppressed throughout research and science. Feminist theory begins with the belief that systems exist that oppress and work against individuals. Feminist theory does not believe in the exclusion of men for women's causes. Instead, feminist theory believes that understanding, advocacy, and change can occur when power and oppression are acknowledged. It is important to understand the difference between gender equality and gender equity in the context of this study. Gender equality states that all individuals, regardless of gender, should have equal rights, opportunities, and treatment in society, while gender equity acknowledges people as individuals and advocates for tailored assessment and treatment (Minow, 2021).

Feminist theory states that societal structures must be identified to determine where discrimination and exclusion are created (Arinder, 2020). This study considers gender equity by addressing the female manifestations of ADHD symptoms and potential hormonal differences. The structures relevant to this study are the classroom, psychological identification and treatment, medication drug trials, and academic research. Feminist research aims to disrupt systems of oppressions created by societal structures.

The two main psychologists referenced to inform this paper's use of feminist theory are Dr. Stephen Hinshaw and Dr. Susan Young. Dr. Hinshaw and colleagues authored the most recent Annual Research Review regarding ADHD in Girls and Women (2022), while Dr. Young and colleagues authored an Expert Consensus Statement regarding Females with ADHD (2020). Table 1 provides the key points of both articles.

Table 1

Risk Factors and Mediators for Girls with ADHD

Mediator	Dysfunction	Characteristic	Article
Maltreatment	= Suicidal Behaviors	Girl + ADHD +	**Beauchanie et al., 2019**
Academic Failure	= Substance Abuse	Girl + ADHD +	**Castellano-García et al., 2022**
Peer Victimization, Rejection	= Depression	Girl + ADHD +	**Kok et al., 2016**
Family Maltreatment + Peer Victimization, Rejection	= Self-Harm	Girl + ADHD +	**O'Grady & Hinshaw 2021**
Low Academic Performance	= Unplanned Pregnancy	Girl + ADHD +	**O'Grady & Hinshaw 2021**
Late Diagnoses + Late Treatment	= Substance Abuse	Girl + ADHD +	**Ottoman et al., 2016**
Early Externalizing Symptoms + Executive Functioning Deficit + Negative Father Parenting	= NSSI	Girl + ADHD +	**Meza et al., 2021**
Adverse Childhood Experiences + Low Self-Esteem	= Suicidal Ideation	Girl + ADHD +	**Meza et al., 2021**
Early Externalizing Symptoms + Adverse Childhood Experiences + Low Self-Esteem	= Suicide Attempt	Girl + ADHD +	**Meza et al., 2021**

Table 2

Female Specific Manifestations of ADHD

Detection of ADHD in girls

- Girls present inattentive and hyperactive/impulsive symptoms.
- Symptom severity may be lower in girls than in boys, particularly in hyperactive/impulsive symptoms.
- Inattention in girls may look like destruction, disorganization, overwhelm, and a lack of effort.
- Symptoms are pervasive and impairing (not transient or fluctuating)
- Symptoms may intensify during periods of social or educational transition.
- Adult women may develop self-awareness and seek help.
- Symptoms may be exacerbated by hormonal changes.
- Gender biases in teachers and parents affect referrals.
- Inattentive girls are more often missed because their symptoms are less overt.

Comorbidity

- In girls and women, comorbidities are often more internalized in nature.
- Low mood, emotional lability, and anxiety are especially common in girls with ADHD.
- Externalizing behaviors are less common in girls but may exist.
- Girls may suffer more general impairments in intellectual functioning.
- Risk of substance abuse is elevated for boys and girls with ADHD.
- Internalizing problems secondary to, or comorbid with ADHD, may be misinterpreted as primary conditions.
- Do not discount ADHD in girls because of a lack in behavioral problems.

Associated features and vulnerabilities

- Emotional dysregulation may be more severe in girls with ADHD.
- Social problems may be particularly impairing.
- Girls with ADHD are vulnerable to bullying.
- Girls with ADHD tend to become sexually active earlier than their peers, early and unplanned pregnancies are elevated.
- The rate of ADHD among inmates is similar for boy and girl offenders.
- Increased dropout and academic underachievement
- Decreased self-esteem and self-concept.
- Increased rate of accidents

Compensatory and Coping Behaviors

- Compensatory behaviors, such as masking, may delay referral.
- Dysfunctional strategies, such as binge drinking or smoking weed, may be used to cope with emotional turmoil, social isolation, and rejection.
- Some girls may seek to build social support through high-risk activities (e.g., gangs, sexual activity, criminal activities)

Rationale & Significance of the Study

It is possible that sex may influence the effectiveness of CBT as a treatment for ADHD. CBT as treatment for ADHD is an emerging body of research that demonstrates promising results (Antshel et al., 2014; Boyer et al., 2016; Coelho et al., 2017; Sprich et al., 2016; Vidal et al., 2015). A secondary analysis of sex differences in a sample of adolescents who completed CBT as treatment for ADHD symptoms, offers new perspective toward treating adolescents with ADHD using CBT.

Purpose of Study

The purpose of this study is to examine CBT as treatment method, while considering the ways in which girls manifest ADHD symptoms.

Research Questions

Recommendations for serving adolescent girls with ADHD include tailoring interventions to the female presentation of symptoms (Wolraich et al., 2019). Although there is little to no research describing the process for tailoring an ADHD intervention for adolescent girls. An emerging body of research suggests that CBT might be an effective treatment method for serving adolescents with the disorder, given the need for psychosocial interventions for ADHD (Sprich et al., 2016). CBT is the most empirically supported psychosocial intervention (Antshel et al., 2014; Evans et al., 2018; David et al., 2021; Sibley et al., 2014; Young et al., 2020; Young & Smith 2017). CBT is highly adaptable, which may allow practitioners to adapt the intervention for use with adolescent girls. CBT is most used to treat internalizing problems, which is a frequent comorbidity in girls with ADHD. There is limited research regarding the effectiveness of CBT specifically for adolescent girls with ADHD. Which leads to the following research questions:

1. Is CBT an effective treatment for adolescent girls with ADHD?
    a. Is there a differential outcome for girls and boys when CBT is used to treat ADHD?
2. Does CBT environment (e.g., individual or group) impact treatment effectiveness for adolescent girls with ADHD?

Definition of Terms

Term 1. Attention Deficit Hyperactivity Disorder (ADHD) is a neurodevelopmental disorder that is marked by an ongoing pattern of inattention and/or hyperactivity-impulsivity that interferes with the functions of daily living (American Psychiatric Association, 2013).

Term 2. Behavioral intervention involves changing the behavior contingencies in the target setting, so that the children are more likely to increase desired behavior and decrease undesired behavior (Evans et al., 2016).

Term 3. Cognitive Behavioral Therapy (CBT) accomplishes change through cognitive restructuring, thought stopping, behavioral activation, and exposure techniques. It involved intervening cognitions (what we think), affect (what we feel), physiological response (how our body responds), and behavior (what we do; Young & Smith 2017).

Term 4. Emotional dysregulation is the inability to control negative emotions (e.g., anger, fear, sadness) during goal-directed behavior (O'Grady & Hinshaw, 2021).

Term 5. Nonsuicidal Self-Injury (NSSI) is deliberate self-harm without the intent to die (Beauchanie et al., 2019).

Term 6. Psychosocial Interventions are used to train new or replacement behaviors until the behaviors become automatic, the environment is not changed, and contingences are not used (Evans et al., 2018).

Limitations

The current study is a secondary analysis of previous studies that used CBT to treat adolescents with ADHD. A benefit of using previously conducted studies is the access to a much higher sample of adolescents. Although secondary analysis was the ideal structure for this study, there are limitations to its scope and generalizability. The studies used took place outside of the United States, the study conducted by Haugan and colleagues (2022) took place in Norway, while the study conducted by Boyer and colleagues (2016) took place in the Netherlands. Norway and the Netherlands are culturally alike in tolerance and use of democracy. A major limitation was the lack of racial diversity in both studies. There is a major difference in the racial make-up of Norway and the Netherlands compared to the United States. A collection of studies that use CBT to treat adolescent ADHD was identified, although these studies did not meet inclusion criteria to be included in the secondary analysis, they hold valuable information. Countries represented are the United States, Brazil, and Spain, in addition to Norway and the Netherlands.

Chapter II. Literature Review

Girls may be underdiagnosed and undertreated for ADHD because of referral bias (Hinshaw et al., 2022; Young et al., 2020). ADHD is prevalent in girls and boys; however, their symptoms often manifest differently. Girls are more likely to display inattentive symptoms with internalizing symptoms, which can be difficult to observe. Boys are more likely to display hyperactive symptoms with externalizing behaviors. The stereotype of ADHD is often referred to as the "disruptive boy." This stereotype is dangerous because if adults are only considering the ways boys display ADHD, then girls will continue to be underserved (Young et al., 2020). It also creates a situation where girls must demonstrate serious impairments before a referral occurs. This phenomenon is referred to as "the Gender Paradox," and it occurs in disorders that have a sex-related prevalence (Hinshaw et al., 2022). The sex with the lower prevalence (e.g., girls with ADHD) must display severe symptoms to be identified. In a study conducted by Mowlem and colleagues, parents tended to underrate the hyperactive symptoms in girls (2019). Parent ratings of impairments did not distinguish between girls with ADHD and girls with high symptoms, yet they did with samples of boys. This means that parents seem less able to identify impairing symptoms among girls, which may lead to fewer referrals for assessment in girls with ADHD.

Girls with ADHD are often perceived as less impaired compared to their male peers (Ottosen et al., 2016). However, girls tend to have fewer DSM-IV symptoms, but are just as impaired as boys by their symptoms (Quinn & Madhoo, 2014). Still, practitioners may consider inattention as "subthreshold" for an ADHD diagnosis (Ottosen et al., 2016). The concept that inattention is less problematic than hyperactivity is dangerous for girls with ADHD. Girls may be at a higher risk for adverse outcomes if ADHD is left untreated. Hyperactive symptoms tend to decrease naturally into adulthood due to socialization, but issues with inattention tend to

persist throughout life (Vildalen et al., 2019). ADHD in girls can be examined from the perspective of the disorder's primary or secondary conditions. Girls with ADHD are particularly vulnerable to mediation pathways, where symptoms may evolve into serious dysfunction or lead to risky behavior, which may lead to irreversible life outcomes.

ADHD is typically diagnosed in childhood, but the ratio between girls and boys with ADHD becomes much closer to equal in adulthood (Millenet et al., 2018). It is possible that more women are identified with ADHD in adulthood because of their heighted ability to advocate for themselves. When girls become women they may seek help for their symptoms, unaware that they are experiencing the effects of untreated ADHD. Vildalen and colleagues investigated the gender difference in self-reported ADHD symptoms in a group of adults with ADHD (2019). The results found that men reported receiving a diagnosis in childhood more frequently compared to women, while women reported significantly higher total symptom scores compared to men. Meaning, women with ADHD report higher levels of impairment compared to men with ADHD. Parents and teachers may see girls with ADHD as less impaired than boys with the same disorder, but evidence suggests the opposite may be true. Girls are more likely to use compensatory strategies to hide their ADHD symptoms (Hinshaw et al., 2022; Young et al., 2020). Mirroring the behaviors of others, masking, hiding impairments, and using prosocial behavior are all examples of compensatory strategies, which can make identifying ADHD in girls difficult.

The History of ADHD in the DSM

ADHD is a neurodevelopmental disorder that is defined in the Diagnostic and Statistical Manual of Mental Disorders (DSM; American Psychological Association, 2013). The DSM is a handbook used by mental health professionals to assist in the diagnosing of mental disorders; the

DSM contains descriptions and the symptoms needed to meet criteria for specific disorders, such as ADHD. The first edition of the DSM was issued by the American Psychological Association (APA) in 1952 and did not include ADHD or an equivalent disorder. The second edition, which was released in 1968, included a previous version of ADHD, referred to as "Hyperkinetic Reaction of Childhood". In 1980, the third edition of the DSM was released, which changed Hyperkinetic Reaction to Childhood to Attention Deficit Disorder (ADD). This distinction created ADD and the subcategories with hyperactivity or without hyperactivity. A revision to the DSM-III changed ADD to the modern name of Attention-Deficit/Hyperactivity Disorder, which is the current ADHD. The fourth edition of the DSM was released in 2000; this version included ADHD and established the two major domains of ADHD as predominantly inattentive type or hyperactive-impulsive type, with combined presentation as an additional type. The most current version is the DSM-V, which was released in 2013. The DSM-V included lifespan criteria to the definition of ADHD and relocated the disorder to the neurodevelopmental chapter of disorders; ADHD previously belonged to Disorders Diagnosed in Infancy, Childhood, and Adolescence.

The Berkeley Girls with ADHD Longitudinal Study

The Berkeley Girls with ADHD Longitudinal Study (BGALS) is the largest followed sample of girls with ADHD (Owen et al., 2017). The study originally observed the girls in research-based summer camps in 1997, 1998, and 1999. The group began with 140 girls aged 6-12 years old. Throughout the years the study has been able to maintain 92-95% retention in participants. Since then, four follow-ups of the summer camp participants have been completed. The fifth follow-up assessment is currently being conducted. BGALS is conducted through Hinshaw Labs at the University of California, Berkeley.

Cultural Differences in ADHD

According to a systematic review and meta-analysis conducted by Salari and colleagues, the global rate of ADHD in adolescents aged 12 to 18 is 5.6% (2023). This rate is slightly different across countries. The current study uses participants from Norway (Haugan et al., 2022) and the Netherlands (Boyer et al., 2016). The United States, Norway, and the Netherlands are similar in their status as industrialized countries that use capitalism and democracy (Central Intelligence Agency, 2024).

Norway has a population of 5.5 million and is ethnically 81.5% Norwegian, 8.9% European, and 9.6% other ethnic groups (Central Intelligence Agency, 2024). The diagnostic rate for ADHD in children and adolescents in Norway is estimated to be 5% (Duric & Elgen, 2011). In Norway, ADHD tends to be treated more often in boys compared to girls with a 3:1 ratio, and girls are more likely to show internalizing symptoms and less disruptive behaviors (Skogli et al., 2013). This highlights the similarities in sex differences of ADHD in Norway and the United States.

The Netherlands has a population of 17 million and is ethnically 75.4% Dutch, 6.4% European (excluding Dutch), 2.4% Turkish, 2.4% Moroccan, 2.1% Surinamese, 2% Indonesian, and 9.3% other ethnic groups (Central Intelligence Agency, 2024). The diagnostic rate for ADHD in children and adolescents in the Netherlands is estimated to be 4.8% (Le et al., 2014). In the Netherlands, more boys have ADHD compared to girls with a 3:1 ratio, and girls are reported to have less severe inattention, hyperactivity/impulsivity, but greater intellectual impairments than boys with ADHD (Boyer et al., 2016). Additionally, girls tend to have more internalizing disorders compared to boys, who are more likely to externalize. This highlights the similarities in sex differences of ADHD in the Netherlands and the United States.

The United States has a population of 339 million and is ethnically 61.6% White, 12.4% Black, 6% Asian, 1.1% Indigenous and Alaska native, 0.2% Native Hawaiian and Other Pacific Islander, 10.2% two or more races, and 8.4% other ethnic groups (Central Intelligence Agency, 2024). An estimated 18.7% of the total U.S. population is Hispanic. The diagnostic rate for ADHD in children and adolescents aged 5 to 17 is 11.3% in the United States (CDC, 2023).

Norway and the Netherlands are not representative of the United States ethnically, most evident in a lack of diversity surrounding people who are black or Hispanic. A discussion of this is included in limitations. Both Norway and the Netherlands have a lower prevalence of ADHD (Duric & Elgen, 2011; Le et al., 2014); however, similar sex differences are noted (Boyer et al., 2016; Skogli et al., 2013). The participants of both studies were primarily adolescents with inattentive type (n = 128) or combined type (n = 52) ADHD. Hyperactivity (n = 8) was not frequent in either sample. This is representative of the worldwide prevalence of subtypes, where inattentive subtype is the most common, followed by combined type, and then hyperactive type (Ayano et al., 2020). Although subtype prevalence may shift across, sex, age, culture, and lifespan.

Academic Functioning

Children and adolescents with ADHD receive lower grades on school reports and standardized tests, and experience higher rates of retention and dropout compared to their same aged peers (DuPaul & Langberg, 2015). In a study conducted by Langberg and colleagues, adolescents turned in on average 10%-15% fewer homework assignments compared to the class average (2016). Homework completion was found to impact GPA the most, even more than baseline GPA, intelligence, achievement, race, or family income.

Smith and colleagues examined the self-reported intrinsic and extrinsic academic motivation in adolescents with ADHD (n = 162) and without ADHD (n = 140; 2020). Adolescents with ADHD reported lower levels of academic extrinsic and intrinsic motivation and higher levels of amotivation compared to their peers without ADHD. Sex was not a significant predictor of motivation. Higher intrinsic motivation for knowledge was associated with higher reading accuracy. Extrinsic motivation was the only area associated with grades, and amotivation was negatively associated with multiple areas of academic impairment. These findings suggest that adolescents with ADHD struggle the goal directed behaviors associated with academics.

The most common services provided to students with ADHD in middle school is extended time, or other services that reduce expectations for these students (Evans et al., 2016). There is no evidence that by providing these services students will improve their ability to meet age-appropriate expectations. Academic interventions are aimed at improving skills, while accommodations help students accomplish work (Wolraich et al., 2019). Long term accommodations without interventions may lead to reduced expectations for students with ADHD.

Inattention is less likely to be observed by teachers or parents because it is less disruptive (Quinn & Madhoo, 2014). Girls with ADHD may develop better coping strategies compared to boys with the disorder, and satisfactory academic achievement should not rule out ADHD in girls. Castellano-García and colleagues did not find any gender differences regarding academic functioning in adolescents with ADHD (2022). ADHD was frequently associated with poorer performance and grade repetition. Academic failure is associated with an increased risk of substance abuse and unplanned pregnancy.

Peer Functioning

Many studies that investigated problematic peer functioning in children with ADHD have focused on boys. As a result, Kok and colleagues completed a systematic literature review to examine the peer functioning of girls with ADHD in friendship, peer status, social skills, and peer victimization (2016). Girls with ADHD are more likely to have no friends compared to their neurotypical peers. Girls with combined type demonstrate difficulty maintaining stable friendships, while girls with inattentive type show more difficulty maintaining multiple friendships over time. Friendship was found to moderate the relationship between behavioral risk and peer victimization, and the presence of at least one friend reduced the risk of victimization. Girls with ADHD are more likely to be rejected by their peers and less popular compared to their neurotypical peers. Increased social impairment, lower levels of social competence, and lower levels of general social functioning are demonstrated in girls with ADHD.

Littman and Wagenberg found that girls experience greater emotional dysregulation and rejection sensitivity compared to boys (2023). Inattentive girls are more likely to be ignored or victimized by their peers; while girls with externalizing symptoms tend to bully, exclude, and torment peers, leading to peer rejection. Girls with ADHD have fewer and less satisfying friendships. Girls may attempt to bond with others through sexual exploitation or substance use.

The findings of Kok and colleagues (2016) and Littman and Wagenberg (2023) were consistent with previous findings. Quinn and Madhoo (2014) examined the self-esteem and peer relationships in women and girls with ADHD based on population studies. Girls scored themselves lower than boys on mental well-being, relationship to parents, and relationships to others. Teachers reported believing that girls are more embarrassed compared to boys about their ADHD diagnosis. Issues with peer relationships and self-esteem may persist past childhood;

women with ADHD were found to struggle more with negative self-image compared to men with ADHD.

Comorbid Psychopathology

ADHD demonstrates extraordinarily elevated levels of comorbidity, and Girls with ADHD may be difficult to identify because of their tendency to display anxiety or depression (Hinshaw et al., 2022). Frequent comorbidities for girls with ADHD include anxiety disorders, depressive disorders, and oppositional defiant disorders; boys with ADHD tend to show comorbidity in the form of depressive disorders, conduct disorders, and substance abuse disorders (Quinn & Madhoo, 2014). Comorbidity independent of ADHD, or developed because of untreated ADHD, can decrease the likelihood that ADHD will be diagnosed. Comorbidities often persist into adulthood, and women with ADHD who received a late diagnosis are more likely to have a history of anxiety and depression compared to women without ADHD. Internalizing symptoms secondary to ADHD may be misinterpreted as primary conditions (Young et al., 2020). Low mood, emotional lability, and anxiety are especially common in girls with ADHD. ADHD in girls should not be ruled-out because of the presence of internalization or a lack of behavioral problems.

Ottosen and colleagues conducted a population-based study to examine sex differences in comorbidity patterns in children and adolescents with ADHD (2019). Girls and boys with ADHD showed significant increased risks of all 12 of the comorbid disorders examined, compared to those without ADHD. Anxiety, bipolar disorder, depression, and eating disorders, were more common in girls, while tic disorder was more common in boys; however, for these disorders, ADHD increased the risk equally for girls and boys. Autism, and ODD/CD were more common in boys; however, the association with ADHD was significantly stronger for girls. This means

that although boys are more likely to be diagnosed with Autism or ODD/CD, girls with ADHD are significantly associated with the development of these disorders, compared to girls without ADHD. Intellectual disability, personality disorder, schizophrenia, substance abuse, and suicidal behavior were more common for girls, and the association with ADHD was significantly stronger for girls.

Bennett and colleagues examined the characteristics of adolescents with depression to determine gender differences (2005). Their sample consisted of 416 adolescents, and results found that although the experience of depression is similar across girls and boys, there were notable differences. Girls tend to display depression though guilt, poor body image, and fatigue. Boys tend to display loss of pleasure, changes in sleep, or extreme anhedonia.

Powell and colleagues conducted a decade long population study to investigate the link between childhood ADHD and adolescent depression (2020). Results suggest that academic and peer functioning mediate the development of adolescent depression. Children and adolescents with ADHD have a significantly increased rate of developing depressive symptoms. This highlights the importance of monitoring the development of depression in adolescents with ADHD.

Substance Abuse

Castellano-García and colleagues conducted a narrative review to examine the sex differences in substance use, prevenance, and pharmacological treatment in adolescents with ADHD (2022). These results are consistent with those from previous studies. ADHD is associated with increased risk towards substance abuse, and girls with ADHD are at an increased risk for some types of substance abuse. Boys tend to display more accentuated ADHD

symptoms, which may lead to earlier diagnosis and a higher likelihood of receiving pharmacological treatment.

Ottosen and colleagues conducted a nationwide population-based study to examine the gender differences in children and adolescents and ADHD and substance abuse (2015). The presence of ADHD increases the risk of all substance abuse outcomes, and there were no differences in overall estimates. However, in participants with ADHD and without comorbidities, as well as with ADHD and comorbid ODD/CD, girls had higher risk for developing substance abuse. Girls with ADHD tend to be perceived as less impaired than boys with the disorder; however, there is evidence that girls are at a higher risk for adverse life outcomes compared to boys. A protective factor toward reducing the risk of substance abuse in adolescents with ADHD is prompt treatment and access to stimulation medication, both of which girls have less access compared to boys. Depression, ADHD, anxiety, and other disruptive conduct disorders in late adolescence increase the risk for substance abuse (Yildiz et al., 2020).

Self-Harm

Beauchaine and colleagues conducted a methodological review examining Nonsuicidal Self-injury (NSSI) and suicidal behaviors in girls (2019). Results found that 50% of impulsive preadolescent girls, who also experience maltreatment are likely to develop NSSI, and 33% are likely to attempt suicide by late adolescence. Maltreatment includes physical abuse, sexual abuse, and neglect. NSSI is a strong predictor of future suicide attempts and completion and although NSSI is resistant to treatment, interventions are typically given to adolescents who have already begun self-harming. Adolescent girls with ADHD who have also been maltreated present a need for targeted prevention, rather than waiting for NSSI and suicide attempts to emerge.

Castellano-García and colleagues found that inattentive ADHD might be linked to an increased risk of suicidal behavior because inattention is a particularly deteriorating factor (2022). Girls are usually diagnosed later, have inattentive ADHD, and are less likely to receive any type of treatment. As a result, girls present greater deterioration because of the difficulties and problems suffered. Girls with ADHD may present more suicidal ideation because of increased substance abuse, which increases the risk for suicidal ideation and attempt.

Meza and colleagues compared girls with ADHD (n = 140) to girls without ADHD (n = 88) to compare lifetime risk of self-harm (2021). Results found that most girls with positive histories of lifetime self-harm engaged in such behaviors in adolescence. Self-harm was associated with ADHD combined type. Predictors of NSSI were externalizing symptoms, overall executive functioning, and father's negative parenting; predictors of suicidal ideation were adverse childhood experiences and low self-esteem; and predictors of suicide attempt were early externalizing symptoms, adverse childhood experiences, and low self-esteem. Suicide rates are currently increasing across the US in all age-groups, with the greatest increase in girls aged 10 to 14, which makes understanding early childhood predictors of self-harm a priority.

O'Grady & Hinshaw suggest that targeting emotional dysregulation might be the solution towards lowering self-harm in girls with ADHD (2021). Emotional dysregulation is the inability to control negative emotions such as anger, fear, or sadness, even during goal-directed behavior. Prevention should target preadolescents who demonstrate the risk factors for developing NSSI. Areas of emphasis include, increasing emotion-related skills, parent-child relationship dynamics, and enhancing peer relationships.

Unplanned Pregnancy

Data from a longitudinal study that followed 140 grade school-aged girls with ADHD for 16 years, found a 42.6% rate of experiencing unplanned pregnancy compared to 10.6% of girls without childhood ADHD (Owens & Hinshaw, 2020). ADHD is marked by issues with self-regulation (e.g., impulsiveness), which may explain the difference in unplanned pregnancy between girls with and without ADHD. Low academic achievement and substance abuse frequency may predict unplanned pregnancy in late adolescent girls (Owens & Hinshaw, 2020). Low academic achievement and substance abuse may contribute to late adolescent risky sexual behavior, which was associated with an increase in likelihood of unplanned pregnancy. This finding highlights the need to intervene in academic engagement and substance use in girls with ADHD.

Although the presence of ADHD is linked to unplanned pregnancy, outcomes in the offspring of women with ADHD is an identified area of future research (O'Grady & Hinshaw, 2021). Mothers with ADHD may engage in risky behaviors during pregnancy, such as poor compliance with prenatal care or substance use during pregnancy (Chronis-Tuscano, 2022). These behaviors may lead to pre-term birth complications or future behavioral problems. Additionally, young mothers with ADHD may have difficulties with child discipline, behavioral management, and the organizational demands of parenting (e.g., cleaning clothes, keeping medical appointments; Young et al., 2020). These difficulties are exacerbated when mothers with ADHD have children with ADHD, which is often the case as ADHD has a heritability rate of 70-80% within parent-child relationships (Young et al., 2020).

Treatment Methods

Seeking ADHD treatment may prove challenging for families. Clinic treatment tends to rely heavily on parent involvement, while treatment in the schools poses significant challenges with time, funding, and access to trained professionals (Evans et al., 2016). Pharmacological treatments, psychosocial treatments, and the combination of both are well-established interventions for children and adolescents with ADHD. David and colleagues investigated the efficacy of treating ADHD using the combination of medication and psychotherapy (2021). Results found that combined treatment was superior to medication alone based on parent ratings of ADHD symptoms. Medication tends to have a stronger effect on ADHD symptoms, but the positive effects cease when the medication stops, while psychosocial interventions may produce a symptom reduction that persists (Woraich et al., 2019). Although ADHD is the most common childhood neurobehavioral disorder, there is an overall lack of training programs for clinicians surrounding the treatment of ADHD. Treatment methods for ADHD vary; however, proper treatment for girls with ADHD entails a full understanding of female presentation and consideration of how individual symptoms have presented historically (Quinn & Madhoo 2014). ADHD is a chronic condition that requires consideration and communication across multiple environments.

Medication

Medication is the most evidence-based treatment for ADHD; however, most studies have short follow-up periods (e.g., 1 to 3 years) and there is little information about the long-term consequences of treating children with ADHD medication (Dalsgaard et al., 2014). Some families choose not to use medication as treatment due to the negative side effects. The short-term side-effects of stimulant medication are loss of appetite, abdominal pain, headaches, and

sleep disturbance (Wolraich et al., 2019). Quinn and colleagues found that medication for ADHD was associated with a lower risk for substance related problems (2017). Whether a child might benefit from medication as a treatment method depends on the culture to which the child belongs. Medication may not be the most appropriate option if psychosocial interventions are available, and the child's symptoms are not severe. Medication may be an appropriate option for a child with severe symptoms who belongs to an environment without psychosocial interventions. Factors such as cost, short-term, and long-term side effects should all be considered when deciding whether to medicate a child with ADHD.

Girls tend to receive significantly fewer prescriptions for ADHD compared to boys and girls are more likely to be treated with antidepressants before receiving treatment for ADHD (Kok et al., 2020; Quinn & Madhoo, 2014). This may be the result of identifying a secondary condition before identifying ADHD. This occurs when a girl is diagnosed with depression or anxiety before she is diagnosed with ADHD, even though her internalizing symptoms are the result of untreated ADHD. In this case, treating the primary case of ADHD is the most ideal treatment, but the identification of the secondary treatment often delays the identification of ADHD (Young et al., 2020).

Women have historically been underrepresented in drug trials, which means girls who are medicated for their ADHD risk overmedication (Zucker & Predergast, 2020). For many years women were excluded from drug trials for the belief that their hormonal cycle would impact the results. The National Institute of Health mandated that all clinical trials be performed on males and females in 1993; however, thousands of drugs remain on the market that were studied before 1993. A considerable proportion of drug trials still underrepresent women in the trials or fail to analyze the data for sex differences.

ADHD symptoms change throughout the menstrual cycle, and it is possible that women may benefit from a medication dosage that adjusts in conjunction with this cycle (Roberts et al., 2018). Inattention in women may increase after the ovulation phase of the menstrual cycle, which is marked by decreased levels of estradiol and increased levels of progesterone and testosterone, while other women report a premenstrual magnification of ADHD symptoms (Camara et al., 2022). Future research surrounding the optimization of ADHD medication to the menstrual cycle is needed.

Cognitive Behavioral Therapy (CBT)

There is a clear distinction between psychosocial interventions and behavioral interventions. Behavioral interventions rely on changing behavioral contingencies in a target setting, so that children are likely to increase desired behaviors and decrease undesired behaviors (Evens et al., 2018). Psychosocial interventions do not manipulate contingencies; instead, new or replacement behaviors are trained until they become routine. Cognitive Behavioral Therapy (CBT) is an example of a psychosocial intervention that focuses on changing automatic thoughts that may lead to maladaptive behaviors. Psychosocial treatment methods are gaining popularity because adolescents and parents may be reluctant to take medication as a treatment option.

CBT is a psychosocial intervention that focuses on the relationship between cognitions (what we think), affect (what we feel), physiological response (how our body responds), and behavior (what we do; Young & Smith, 2017). According to Antshel and colleagues, CBT is the most common psychosocial intervention (2014). CBT is frequently used to treat internalizing problems; however, CBT is an extremely modifiable intervention and can be adapted to treat a variety of childhood problems. The foundation of CBT is that feelings and behaviors are a product of a person's cognitions, and that negative cognitions can be restructured (Young &

Smith, 2017). CBT aims to reduce psychological distress and maladaptive behavior, both of which are frequent occurrences in adolescents with ADHD. CBT refers to thoughts that are distorted, biased, negative, overly general, or restrictive towards themselves or others as "thinking errors." CBT techniques help people develop positive coping techniques that help them identify their thinking errors and reevaluate their thoughts. This leads to coping in a new way and managing demanding situations more successfully. The goal is to increase positive feelings and improve self-efficacy and self-confidence. Adolescence is a period when the desire for independence increases. CBT may be an opportunity to include the adolescent in their treatment, rather than the practitioner working primarily with the parents to create a plan. CBT can provide adolescents inclusion in their own treatment, which is not always a priority in ADHD treatment.

Antshel and colleagues were one of the first groups to treat adolescents with ADHD using CBT (2014). Their study used an adult CBT manual that was modified for use with adolescents. Results found that adolescents with comorbid ODD benefited less from treatment, while adolescents with comorbid anxiety or depression benefited more from treatment. Antshel and colleagues recommended more research involving CBT as a treatment method for adolescent ADHD.

Additional Studies with CBT as Treatment for ADHD

Coelho and Colleagues (2017)

Coelho and colleagues conducted a study that analyzed group CBT used to treat ADHD by comparing medication to medication combined with CBT (2017). Participants (n = 60) were children aged 7-14 with ADHD; 48 of the children were boys. Children were placed into one of two treatment methods: medication (Unimodal; n = 30) or medication combined with CBT (Multimodal; n = 30). Children were placed into groups pseudo-randomly. Family member availability and school schedules were considered when organizing groups; however, no group differences in age, gender, IQ, or socioeconomic status were found. Assessments were collected pre- and post- treatment. CBT sessions lasted 2 hours and were given in a group setting over 20 sessions. CBT was administered by specialized psychological professionals and each session had a therapist and a co-therapist. Results found no difference between the treatment methods, except in the social skills of the medication combined with CBT group. Overall, the type of treatment did have an effect of the indicator of difficulty of the assertiveness/coping (p = .001), self-control (p = .05), and self-report (p = .001) subscales. The combined treatment group used lower levels of medication and displayed higher levels of treatment adherence. Only one child dropped out of the combined treatment, while six dropped out of the medication only group. This may indicate that combined treatment offers social benefit. Results from this study suggest that group CBT for ADHD may provide social benefit and therefore increase participant treatment adherence.

Sprich and Colleagues (2016)

Sprich and colleagues randomly assigned a sample of adolescents with ADHD to CBT treatment or wait list control (2016). Participants (n = 46) were adolescents aged 14-18 with clinically significant ADHD symptoms despite treatment with medication. Adolescents were

randomized for CBT treatment (n = 24) or waitlist control (n = 22). Assessments were collected at baseline, 4 months post-treatment, and 8 months post-treatment. A blind independent evaluator rated symptom severity, and parent and self-reports were completed. CBT was administered to adolescents individually over 12 sessions. Participants could reschedule appointments as needed, and treatment took about 17 weeks (about 4 months). The treatment was delivered by licensed psychologists and post-doctoral trainees. Sessions were held individually; however, parents were included in the final 10 minutes of the sessions to discuss progress, course content, and take-home practice. An independent evaluator (IE) rated symptom severity on the ADHD Current Symptom Scale using parent and adolescent report. The IE also rated each participant using the Clinical Global Impression Severity Scale (CGI), which is a global measure of distress and impairment. Results found that participants who received CBT resulted in 10.93 lower points on the IE rated parent score ($p < .0001$), 5.24 lower points on the IE rated adolescent score ($p < .0001$), and 1.17 lower on the IE rated CGI score ($p < .0001$). The results from this study suggest that adding CBT and medication is superior to treating adolescents with ADHD using medication alone.

Vidal and Colleagues (2015)

Vidal and colleagues conducted a randomized control trial to examine the efficacy of group CBT on adolescents with ADHD (2015). Participants (n = 119) were adolescents aged 15-21 with ADHD and persistent symptoms despite medication. Adolescents were randomized into a CBT treatment group (n = 59) or a waitlist control (n = 60). No statistically significant differences between groups were detected regarding demographic characteristics or baseline measurement of symptoms. Assessments were collected pre- and post- treatment. A blind independent evaluator rated symptom severity, and parent and self-reports were completed.

Adolescents were required to stabilize their medication dosage two months prior to the study. CBT was administered to adolescents over 12 sessions. CBT was administered by two clinical psychologists in groups of 6-8 adolescents. Results found that participants assigned to the CBT treatment had reduced ADHD symptoms compared to the control group. Outcomes were assessed by a blinded evaluator using the ADHD Rating Scale (ADHD-RS; adolescent and parent report), Clinical Global Impression Scale for Severity (CGI-S; adolescent and clinician report), and the Global Assessment of Functioning (GAF). Results found ADHD-RS adolescent report ($p < .001$), ADHD-RS parent report ($p < .001$), CGI-S self-report ($p < .001$), CGI-S clinician report ($p < .001$), and GAF evaluator report ($p < .001$). Findings support CBT group therapy as a treatment method for reducing ADHD symptoms in adolescents.

Summary

Coelho and colleagues examined the differences between medication alone or CBT in combination with medication (2017). The study found that both treatment methods were effective, but social benefits were present in the group that used medication in combination with CBT. Combination treatment allowed for a lower dosage of medication to be utilized. This finding may be important for adolescent girls, who may be overmedicated in dosage because of predominately male drug trials (Zucker & Predergast, 2020). Participants benefited from the social aspect of group CBT, which may also pertain to adolescent girls, whose social relationships are particularly influential toward their well-being. In contrast, Sprich and colleagues found that adding CBT to treatment was far superior to medication alone (2016). A major difference between the studies was that Sprich and colleagues (2016) administered CBT individually to participants. However, Vidal and colleagues also found that CBT in addition to treatment was superior to medication alone (2015); CBT was administered in the group setting,

like Coelho and colleagues (2017). Vidal and colleagues predicted that CBT in addition to medication would result in decreased ADHD symptoms, which was supported (2015). Their secondary hypothesis was that CBT group therapy and treatment would also reduce internalizing symptoms. This was not supported, but an explanation is that the sample used in the study had a low baseline for anxiety and depressive symptoms prior to the treatment. It is possible that a larger amount of internalizing symptom reduction would have occurred had the sample been predisposed to those symptoms, such as with girls with ADHD and internalizing disorders. These studies demonstrate that CBT as a treatment method for ADHD show promising results, although their results and methods for implementing treatment differed slightly.

Table 3

Articles that use CBT as a Treatment for Adolescent ADHD

Article	Country	CBT Type	Participants	Age	Outcomes
Boyer et al., 2016	Netherlands	Individual	156	12-17	PML and SFT CBT methods were comparable; Overall, no major differences were found between using PML or SFT CBT methods for adolescents with ADHD (p = .177). Adolescents with less depressive symptoms and more anxiety symptoms benefited more from PML (p = .017)
Coelho et al., 2017	Brazil	Group	60	7-14	Results of CBT with medication indicated social benefit, there were no differences between cognitive and behavioral outcomes. Increased frequency of empathy (p = 0.001), assertiveness/coping (p = 0.05), and self-control (p = 0.001); less difficulty on assertiveness/coping (p = 0.001) and self-control (p = 0.020)
Haugan et al., 2022	Norway	Group	100	14-18	No difference between treatment group and control group in symptom impairments on parent rated (p = 0.95), adolescent rated (p = 0.36), or teacher rated (p = 0.40) ADHD symptoms. All 3 informants reported reduced ADHD symptoms from pretest to posttest; however, to be considered clinically meaningful, authors required a 30% reduction in symptoms, which was not observed.
Sprich et al., 2016	United States	Individual	46	14-18	CBT with medication is superior to medication alone. Reduced parent assessment of symptom severity (p < 0.0001), adolescent assessment of symptom severity (p < 0.0001), and CGI mean (p < 0.0001)
Vidal et al., 2015	Spain	Group	119	15-21	CBT treatment significantly reduced ADHD symptoms Reduced parent rating scale (p < 0.001), adolescent rating scale (p < 0.001), CGI self-report (p < 0.001), and CGI clinician (p < 0.001)

Articles Excluded from Secondary Analysis

Coelho and colleagues did not conduct a randomized control trial and were excluded from secondary analysis (2017). The cut-off date to be included in this study is 2016; therefore, Vidal and colleagues were also excluded (2015). Sprich and colleagues were contacted, but no longer had access to their raw data, and therefore could not be included (2016).

Articles Included in Secondary Analysis

Treating adolescents with ADHD using CBT is an emerging body of research with promising results. To be included in this secondary analysis, studies must have used a randomized control trial with adolescents within the age range of 12-18. The study must have contained female participants. The study must have been written in English or translated. A CBT treatment must have been given by a qualified professional. The cut-off year to be included in this study was 2016, to adhere to IRB's rule of data deletion after seven years. Of the studies listed above, Haugan and colleagues (2022) and Boyer and colleagues (2016) met the criteria for inclusion in this study. The authors of the studies were contacted for access to their raw data and both studies agreed to share their raw data for secondary analysis.

Haugan and Colleagues (2022)

Haugan and colleagues conducted a two-arm parallel controlled trial that randomized adolescents to a group CBT or a non-CBT condition (2022). The study took place in Norway and participants were recruited from two outpatient child and psychiatry clinics. Participants (n = 100) were adolescents aged 14-18 years; the average age of participants was 15.3. Adolescents had received psychoeducational intervention and medication for their ADHD but still had impairing symptoms. To be included in this study, adolescents need a diagnosis of ADHD or clinically impairing symptoms of ADHD. Of the participants, 91% were on pharmacological

treatment for ADHD and 53% had at least one comorbid psychological condition according to the DSM-V. Comorbidity of the following disorders were permitted: mild to moderate depression, anxiety disorders, bipolar disorders, tic disorders, oppositional defiant disorder, and mild autism spectrum disorders. The following comorbid disorders were excluded: severe depression, suicidality, conduct disorder, psychoses, intellectual disability, and current substance abuse. The authors hypothesized that the group of adolescents who received CBT as additional treatment for ADHD would demonstrate an improvement of ADHD symptoms compared to the control group. CBT treatment consisted of 90-minute sessions that took place over 12 weeks. Treatment was administered to groups of 4-6 adolescents by group leaders. Group leaders were given a copy of the Young-Bramham textbook describing treatment strategies in CBT for ADHD. They also participated in a full-day course on CBT and the delivery of the research treatment manual. Supervision was given regularly to all group leaders by an experienced CBT supervisor, who attended some sessions as an observer. Assessments were collected at clinic admission, two-weeks before treatment, and two-weeks after treatment. The study considered treatment successful if symptoms were reduced by 30% from pretest to posttest. This was not achieved within this sample of adolescents. CBT directed solely at adolescents with no parent involvement did not show support for treating ADHD. Although participants recorded that they were very satisfied with the group CBT treatment.

Haugan and colleagues conducted a post-hoc subgroup analyses that explored any potential moderating effects of age, IQ, SES, severity of anxiety symptoms and ADHD symptoms (2022). The post-hoc evaluation found no significant effect of the treatment outcome based on these variables; however, sex was not assessed as a moderator for treatment results.

This study contains valuable variables for a female secondary analysis. Individuals were included in this study if their ADHD symptoms were subthreshold for a diagnosis, but still impairing. This fact might contribute to the considerable number of girls that participated in this study because girls often fail to meet the criteria for an ADHD diagnosis, even with impairing symptoms (Quinn & Madhoo, 2014). Individuals were included in this study with internalizing disorders, specifically mild to moderate depression and anxiety disorders, which are prevalent in girls with ADHD (Ottosen et al., 2019). There were 100 participants in this study, 57 of which were girls. Of that, 29 girls were randomized to the treatment group, while 28 were randomized to the control group.

Boyer and Colleagues (2016)

Boyer and colleagues examined two different CBT methods for treating adolescents with ADHD (2016). This study took place in the Netherlands and participants were recruited from 16 mental health care centers. Participants (n = 159) were adolescents aged 12-17 years; the average age was 14.4. To be included in this study, adolescents needed a diagnosis of ADHD from the DSM-V. Of the participants, 124 used medications during the treatments. Participants were requested to keep their dosage the same during the study. Comorbid conditions were included, except for the following conditions: comorbid autism spectrum disorder, depression with suicidal ideations, acute familial crisis, conduct disorder, or predominant addiction. The CBT treatments consisted of 45 to 60-minute sessions that took place over 9 weeks (about 2 months). Both treatment methods included two additional sessions administered to the parents of adolescents. One of the CBT treatments was focused on planning (Plan My Life; PML) and every session was a fixed lesson that focused on a specific planning skill and strategy. The other CBT treatment used Solution Focused Therapy (SFT). In SFT, the topic of the session was chosen by the

participant, and solutions were discussed using questions designed to lead the participant to an appropriate solution. CBT was administered to the adolescents individually by therapists. The therapists had at least a master's degree in psychology. Results found marginally significant treatment differences, in favor of PML. There does not appear to be a need for personalized CBT treatment for adolescents with ADHD.

Boyer and colleagues measured a broad range of pretreatment patient characteristics as potential moderators for treatment preference (2016). The variables considered include age, gender, full-scale IQ, medication use, parental education, ADHD subtype, ADHD severity, comorbid ODD/CD, depressive and anxiety symptoms, overall impairment, and planning problems. Planning problems were included because PML specifically addressed adolescent planning problems, while the SFT did not. Results showed no group differences on all patient characteristics between both treatment methods; however, there were significant improvements in ADHD symptoms for both types of CBT as treatment for adolescents with ADHD.

Boyer and colleagues examined group differences between the PML and SFT methods (2016). There were only 42 female participants of the 159 recruited for the study. It is possible that the number of female participants made it difficult to demonstrate as significant group difference based on gender. Further analysis of sex as a treatment factor may provide valuable information towards CBT as a treatment for adolescent girls with ADHD. In contrast to Haugan and colleagues (2022), CBT was found beneficial as treatment for ADHD symptoms which makes further analysis compelling. It is possible that the results of the studies were impacted by the treatment environment. Haugan and colleagues (2022) used a group delivery method, while Boyer and colleagues (2016) used an individual delivery.

Table 4

Articles Included in the Secondary Analysis

Article	**Haugen et al., 2022**	**Boyer et al., 2016**
Location	Norway	The Netherlands
Participants	100 (56 girls)	159 (42 girls)
Age Range	14-18	12-17
Medication	91 participants	124 participants
Treatment	CBT in addition to medication	PML-CBT or SF-CBT
Treatment	Group setting (4-6 students)	Individually administered
Duration	90-minutes, 12 weeks	45 to 60-minutes, 9 weeks

Summary

Girls have been historically underdiagnosed and undertreated for ADHD because of referral bias and the covert presentation of symptoms (Mowlem et al., 2019). Parents and teachers are the target audience for this study because they are often the adults who refer children and adolescents with potential ADHD. Mental health professionals, psychologists, and women with ADHD are other populations that may benefit from this study.

Short-term effects of untreated ADHD include school related and social problems (Wolraich et al., 2019). These difficulties may become exacerbated when treatment is postponed, which is often the case for girls. Untreated ADHD in girls as several mediation pathways of dysfunction, such as developing risky behaviors that may lead to substance abuse (Wolraich et al., 2014; Owens & Hinshaw, 2020), self-harm (Beauchanie et al., 2019; Castellano-García et al., 2022; Meza et al., 2021) or unplanned pregnancy (O'Grady & Hinshaw, 2021). Proper

identification and treatment of ADHD in girls is necessary to prevent additional dysfunctions from forming (Young et al., 2020; Hinshaw et al., 2022).

Pharmacological treatments, psychosocial treatments, and the combination of both are well-established interventions for children and adolescents with ADHD (Evans et al., 2018). Behavioral interventions rely on environmental contingencies and are frequently used in the school setting. Although behavioral interventions may be beneficial with certain behaviors and organization associated with school, a limitation of behavioral interventions is that they do not generalize across environments. Psychosocial interventions do generalize across environments and CBT is the most empirically supported type of psychosocial intervention (Antshel et al., 2014; Evans et al., 2018; David et al., 2021; Sibley et al., 2014; Young et al., 2020; Young & Smith 2017). Although CBT is commonly used to treat internalizing disorders, there is an emerging body of research using CBT in treatment for ADHD in adolescents (Boyer et al., 2016; Coelho et al., 2017; Haugan et al., 2022; Sprich et al., 2016; Vidal et al., 2015). Medication may have stronger effects toward reducing inattentive or hyperactive symptoms in students with ADHD; however, side effects are a risk of this treatment (Wolraich et al., 2019). Some adolescents and parents prefer not to use medication as treatment and opt for behavioral and psychosocial interventions. Girls are under prescribed ADHD medication and are more likely to be given antidepressants as a pharmacological response to their symptoms (Kok et al., 2020). When girls are accurately diagnosed with ADHD and offered medication as a treatment method, they run the risk of being overmedicated in dosage because drug trials are predominately conducted on male subjects (Zucker & Predergast, 2020). There is evidence that girls may benefit from medication that is optimized to their hormonal cycle, although this is not yet frequent practice (Roberts et al., 2018).

There are a limited number of studies that examine CBT as a treatment method for adolescents with ADHD. This study aims to contribute to the literature surrounding CBT as a treatment method for adolescent girls with ADHD. After data was cleaned, 199 adolescents remained for secondary analysis (68 girls; 131 boys).

Chapter III. Methodology

There is a need to contribute to the knowledge base surrounding the treatment of adolescent girls with ADHD using CBT. This study uses a linear regression model to analyze data obtained from two studies. The studies were conducted in Norway (Haugan et al., 2022) and the Netherlands (Boyer et al., 2016). The rest of Chapter III provides a detailed description of the research design of this study and the research designs studies used in the secondary analysis. The instruments used in both studies are discussed and the overlap of assessments is presented. A description of the process that was used to locate both studies is described, as well as the inclusion and exclusion criteria for secondary analysis. The method for analyzing data is introduced in addition to the set of factors used in the linear regression model. Chapter III concludes with assumptions that are present in the current study.

Research Questions

1. Is CBT an effective treatment for adolescent girls with ADHD?
    a. Is there a differential outcome for girls and boys when CBT is used to treat ADHD?
2. Does CBT environment (e.g., individual or group) impact treatment effectiveness for adolescent girls with ADHD?

Data Collection Procedures

The studies were located using the OhioLINK Library Catalog. Only peer reviewed journals were included in this search. The search terms included "randomized controlled trials" OR "RCT" OR "random assignment" AND "CBT" OR "cognitive behavioral therapy" OR "cognitive behavior therapy" AND "ADHD" OR "attention deficit hyperactivity disorder" AND

"Adolescent" NOT "Anxiety." The search resulted in 137 initial results, which were then coded for relevance for use in this study.

Studies were included if CBT was administered as a treatment for ADHD in adolescents aged 12-18. Studies were excluded if the authors no longer had access to the raw data. CBT must be used to treat ADHD. Studies that used CBT to treat any other primary condition, including anxiety, depression, or Autism were excluded; however, participants with comorbid conditions were allowed. The authors of the eligible studies were contacted and asked for access to their raw data.

Research Design

The current study is a quantitative design that examines the impact of multiple female ADHD characteristics on CBT treatment effectiveness. It is conducted using a secondary analysis approach that utilizes data from two previously conducted randomized control trials. The use of a secondary analysis allows for the assessment of a large population of adolescent girls that underwent CBT as a treatment method for their ADHD, which pertains to the first research question. It also allows for multiple environments to be examined, which pertains to the second research question about CBT environment effectiveness. This study uses a feminist theory theoretical framework to explain the historical inadequacy of female consideration in ADHD identification and treatment (Arinder, 2020). Historically, women have been excluded from ADHD research (Camara et al., 2022; Hinshaw et al., 2022; Kok et al., 2020; Roberts et al., 2018; Young et al., 2020; Zucker & Predergast, 2020). Understanding the systematic exclusion of women from research pertaining to certain topics is the first step towards deconstructing this form of oppression. The present study aims to contribute to the literature surrounding CBT as a treatment for adolescent girls with ADHD.

This study aims to find out if ADHD subtype, comorbid internalization, and treatment type (individual or group) influence the success of CBT as treatment for ADHD. This is accomplished using a multiple linear regression model. In this equation, Y represents the dependent variable or treatment outcome, and X represents the independent variables, or participant characteristics. Mediation occurs when a third variable, the mediator, influences the dependent variable (Y). Multiple linear regression uses X to predict Y using mediators.

Using multiple characteristics allows for comparison among the independent variables. The independent variables were used to predict the success of CBT as a treatment method in adolescents. The independent variables were examined further to determine which variable provided the strongest or weakest prediction for treatment success. Linear regression is used to predict the way two or more variables are related to one another. First, this study will examine how participant characteristics predict treatment outcome. This relationship is reciprocal, meaning that outcome can then be used to predict participant characteristics. To accomplish this, an equation must be developed to represent the Y-intercept. The following equation was created: $Y = \beta_0 + \beta_1(\text{ADHD-subtype}) + \beta_2(\text{anxiety}) + \beta_3(\text{depression}) + \beta_4(\text{treatment type})$.

The Research Design of Haugan and Colleagues (2022)

Haugan and colleagues conducted a two-arm parallel randomized controlled trial (2022). Participants were randomized to a 12-week CBT program ($n = 50$) or a control condition ($n = 50$). Participants were assessed at admission to the study, two-weeks before treatment, and two-weeks after treatment. The primary outcomes were assessed using parent, teacher, and self-ratings of ADHD symptoms, using the ADHD Rating Scale IV. Secondary outcomes included symptom severity, executive function, functional impairment, and emotional problems. ADHD

symptom severity was assessed by evaluators blinded to group allocation at baseline and post-treatment.

The Research Design of Boyer and Colleagues (2016)

Boyer and colleagues conducted a two-arm parallel-group randomized controlled trial. Participants were randomized to a 9-week Planning-Focused CBT (*n* = 83) or Solution-Focused CBT (*n* = 76; 2016). Participants were assessed at admission to the study, after study completion, and 3-month post-test. Pretreatment characteristics were exported as potential moderators to treatment effects. This study utilized Qualitative Interaction Trees (QUINT) as a statistical technique to explore qualitative interactions. Additionally, qualitative treatment subgroup interactions for treatment effects from pretest to post-test and from post-test to follow-up were investigated.

Participants

Haugan and colleagues recruited participants from two out-patient child and adolescent psychiatry (CAP) university clinics in Norway (2022). Assessment took place two weeks before treatment and two weeks after treatment. Adolescents were between the ages of 14-18 and had a previous clinical diagnosis of ADHD. Adolescents who reported symptoms below the threshold for ADHD were included if their ADHD symptoms were impaired even while on medication, as determined by the CGI-S. Therefore, adolescents were included with a diagnosis of ADHD, or subthreshold ADHD with impairing symptoms. To be included, participants must have taken medication consistently for two months prior to the study; however, adolescents who had previously been on medication, but terminated medication due to minimal effect or intolerable side effects after two medication trials, were included. Participants with the following comorbid disorders were included: mild to moderate depressive disorders, anxiety disorders, bipolar

disorders, tic disorders, oppositional defiant disorders, and mild symptoms of autism. Adolescents were unable to seek other parallel psychological interventions while enrolled in the study. The following comorbidities were excluded: severe depression, suicidal behavior, conduct disorder, psychoses, intellectual disability (IQ < 70), autism spectrum disorder, and current substance abuse. Thirty adolescents were excluded because they were receiving on-going psychotherapy or had previously received CBT treatment for ADHD.

Boyer and colleagues recruited participants from one of sixteen participating mental health care centers in the Netherlands (2016). Assessments took place a week before treatment, a week after treatment, and three months after treatment. Adolescents were between the ages of 12-17 and had received previous DSM-IV diagnoses of ADHD by a child psychiatrist or psychologist. During the treatment, 124 participants were on medication. Participants were requested to keep their dosage stable throughout the treatment. Participants with the following comorbidities were excluded: intellectual disability (IQ < 80), autism spectrum disorder, depression with suicidal ideations, acute familial crisis, conduct disorder, or predominant addiction. Comorbid anxiety and depression symptoms were included. No adolescents were reported to be excluded because of on-going psychotherapy or previous CBT treatment.

After controlling for missing data and removing the control, 199 participants were available for secondary analysis. Of that, 68 were girls and 131 were boys.

Instrumentation

Data was collected using psychological assessments prior to implementing treatment to gain baseline functioning, and again after CBT to determine treatment outcome. Boyer and colleagues collected assessment pre-treatment, post-treatment, and three-month follow-up (2016); while Haugen and colleagues collected assessment at admission to the clinic, two weeks

before treatment, and two weeks after treatment (2022). There were similarities in the instruments used between the studies.

ADHD Symptoms

Haugan and colleagues assessed ADHD symptoms using the ADHD Rating Scale-IV (ADHD RS-IV; 2022). The ADHD RS-IV uses 18-items that correspond to the diagnostic criteria for ADHD. Raters report the frequency of each item from 0 = not at all, to 3 = very often, with higher scores indicating more symptoms. The scale consists of nine symptoms of inattentiveness and nine symptoms of hyperactivity, which represent the two predominate subtypes of ADHD. The scale has been validated for children and adolescents aged 5-18, and results from an evaluation of the ADHD-RS found adequate levels of internal consistency, test-retest reliability, and cross-informant agreement for both parent and teacher ratings (DuPaul et al., 1998). Haugan and colleagues found Cronbach alpha coefficients of 0.78 to 0.81 on the ADHD-RS IV parent report, 0.80 to 0.82 on the teacher report, and 0.80 to 0.84 for self-ratings (2022).

Boyer and colleagues assessed ADHD symptoms using the Disruptive Behavior Disorder (DBD) rating scales (2016). Parent rating scales were completed. The DBD contains four subscales composed of the DSM-IV criteria for inattention, hyperactivity/impulsivity, Oppositional Defiant Disorder, and Conduct Disorder (Pelham et al., 1992). The inattention and hyperactivity/impulsivity scales contain 18-items and scores range from 0 to 54, with higher scores indicating more symptoms of ADHD. In children with ADHD, parent ADHD ratings were found to have high internal consistency and adequate test-retest reliability (DuPaul et al., 1991).

Both assessments used a score range of 0 to 54, with higher scores indicating higher levels of ADHD severity. Therefore, treatment outcome was able to be assessed using the same

scale. Scores 0-18 are interpreted as ADHD unlikely, scores 19-26 may require a full assessment, and scores above 37 are considered very likely for ADHD (Coghill & Seth, 2015).

Anxiety Symptoms

Both studies assessed anxiety symptoms using the Screen for Child Anxiety Related Emotional Disorders (SCARED). SCARED is a 41-item rating scale that is completed by adolescents. The scales range from 0 = not true, to 2 = very true. Items are added up to create a total anxiety score, ranging from 0 to 138. Higher scores indicate more anxiety symptoms. The SCARED demonstrates good internal consistency (α = .74 to .93), test-retest reliability (correlation coefficients = .70 to .90), discriminative validity between anxiety and other disorders, and within anxiety disorders, and moderate parent-child agreement (r = 0.20 to 0.47, p < .001; Birmaher et al., 1997). Participants were coded for the presence of anxiety if their SCARED score was 25 or higher.

Depression Symptoms

Haugan and colleagues assessed depression symptoms using the Mood and Feelings Questionnaire-short version (SMFQ; 2022). The SMFQ is a 13-item questionnaire that assesses depression symptoms in children and adolescents. Children and adolescents report if a sentence is true or not true regarding their feelings or behaviors from the past two-weeks. Scores range from 0 to 26, with a cut-off score of 12. A Norwegian study found the measure to be a fast, practical, and feasible measure to detect depression to adolescents (Jarbin et al., 2020). The Cronbach's alpha was 0.93 in the study performed by Haugan and colleagues (2022).

Boyer and colleagues assessed depression symptoms using the Child Depression Inventory (CDI; 2016). The CDI uses raw scores to assess adolescent depressive symptoms. Scores range from 0 to 54, with higher scores indicating more symptoms. The CDI has

demonstrated high internal consistency of 0.94 for normal subjects and 0.80 for psychiatric populations (Saylor et al., 1984) A cut-off score of 16 is found to have the most optimal balance between sensitivity and specificity for depression in children and adolescents (Roelofs et al., 2010). Participants with a score of 16 or higher were coded for depression.

Table 5

Assessments Used in the Secondary Analysis

Article	Assessments
Haugan	ADHD Rating Scale-IV (ADHD RS-IV)
	Screen for Child Anxiety Related Emotional Disorders (SCARED)
	Mood and Feelings Questionnaire-short version (SMFQ)
Boyer	Disruptive Behavior Disorder rating scale (DBD)
	Screen for Child Anxiety Related Emotional Disorders (SCARED)
	Child Depression Inventory (CDI)

Data Analysis

The acquired raw data underwent a secondary analysis using a linear regression model. The linear regression model used the following female mediators for ADHD symptoms: ADHD subtype, presence of an internalizing disorder, and treatment type (individual or group). Treatment was slightly different between both studies. Haugen and colleagues administered group treatment in 90-minute sessions over 12 weeks, for 1080 minutes or 18 hours of treatment (2022). Boyer and colleagues gave individual treatment in 45-minute sessions over 8 weeks for 360 minutes or 6 hours of treatment (2016). The Boyer study included two parent sessions,

which adds an additional parental educational component of 90 minutes or 1.5 hours to the treatment plan (2016).

Boyer and colleagues determined ADHD subtype using the Diagnostic Interview Schedule for Children version IV (DISC-IV), which is a structured diagnostic interview (2016). Adolescents were classified into inattentive, hyperactive, or combined type (2022). Haugan and colleagues determined ADHD subtype using the Schedule for Affective Disorders and Schizophrenia for school age children-Present and Lifetime version (Kiddie-SADS-PL), and identified adolescents as having subthreshold ADHD, inattentive, hyperactive, or combined type (2022). Participants were included in this study with subthreshold ADHD, if ADHD symptoms were still found to be impairing. Treatment outcome will be determined using ADHD posttest results. Participants were coded for anxiety and depression and whether they received group or individual treatment.

This study uses two models to conduct multiple comparisons; therefore, the Bonferroni correction is used to account for multiple comparisons. The error rate is the probability of making a Type 1 error, or incorrectly rejecting the true null hypothesis (the chance of finding a false positive result). For a single model, an alpha level is typically set at .05 or 5%. To perform multiple comparisons, the alpha level must be adjusted to keep the error rate around .05. The Bonferroni correction accomplishes this by taking the original alpha level (.05) and dividing it by the number of tests, in this case 2 = .025.

The first model uses a regression for the total sample and uses sex as a main effect. The second model splits the girls and the boys to compare their outcomes separately. This method will be utilized because sex is not a mediator, instead it is a fixed characteristic that can be acted

on by outside forces (mediation variables). Separating the participants by sex will provide a clear interpretation of the differences in participant outcome.

Table 6

Total Model Interaction Terms

Beta	**Variable**	**Definition**
	Sex	(0 = Girl, 1 = Boy)
β_0	Intercept	Girl, Inattentive, No Anxiety, No Depression
β_1	Subtype	Inattentive, Hyperactive, or Combined
β_2	Comorbid Anxiety	Presence of Anxiety
β_3	Comorbid Depression	Presence of Depression
β_4	Treatment	Treatment Type (individual or group)
β_5	Sex * Subtype	Interaction between Sex and Subtype
β_6	Sex * Anxiety	Interaction between Sex and Anxiety
β_7	Sex * Depression	Interaction between Sex and Depression
β_8	Sex * Treatment	Interaction between Sex and Treatment
β_9	Sex * Subtype * Treatment	Interaction between Sex, Subtype, and Treatment

Note. This equation uses the sex variable labels 0 = girl and 1 = boy to study the relationship between treatment outcome and sex.

Table 7

Split Model Interaction Terms

Beta	Variable	Definition
β_0	Intercept	Girl, Inattentive, No Anxiety, No Depression
β_1	Subtype	Inattentive, Hyperactive, or Combined
β_2	Comorbid Anxiety	Presence of Anxiety
β_3	Comorbid Depression	Presence of Depression
β_4	Treatment	Treatment Type (individual or group)
β_5	Subtype * Treatment	Interaction between Subtype and Treatment Type

Note. Equation: $Y = \beta_0 + \beta_1(\text{subtype}) + \beta_2(\text{anxiety}) + \beta_3(\text{depression}) + \beta_4(\text{dosage})$

Assumptions

The current study assumes that in both studies used in the secondary analysis, the CBT intervention was administered with fidelity by qualified individuals. In both studies, the responses obtained from the parent, teacher, and self-report accurately reflected their observations of ADHD symptom manifestation. Finally, it is assumed that the participants of both studies answered all the interview questions openly and honestly.

Chapter IV. Results

This study examined the effectiveness of CBT as a treatment method for adolescents with ADHD. The chapter is organized in terms of the research questions posed in Chapter I, as well as results obtained through exploratory data analysis. The models discussed in Chapter III were performed using JASP software, which is an open-source statistical analysis program. The results of those models are reported in Tables 8, 9, and 10.

Total Sample Model

The results obtained from the total sample multiple linear regression are presented in Table 8. The outcome variable is posttest symptoms, while the referent is girl, subthreshold ADHD, no comorbid anxiety, and no comorbid depression.

Table 8

Total Model Results

Parameter	Unstandardized	Standard Error	*t*	*p*
Intercept	17.47	5.01	3.48	< .001
Boy	3.23	7.84	0.41	.68
Inattentive	-0.96	5.25	-0.18	.85
Hyperactive	-7.84	7.91	-0.99	.32
Combined	3.33	4.47	0.74	.45
Comorbid Anxiety	-1.52	2.29	-0.66	.50
Comorbid Depression	2.78	2.56	1.08	.27
Group CBT	-2.00	3.75	-0.53	.59
Boy ∗ Inattentive	-2.35	8.02	-0.29	.76
Boy ∗ Hyperactive	12.64	10.49	1.20	.23
Boy ∗ Combined	5.39	7.26	0.74	.45
Boy ∗ Comorbid Anxiety	2.20	2.87	0.76	.44
Boy ∗ Comorbid Depression	-8.46	3.66	-2.30	.02
Boy ∗ Group CBT	-5.03	5.63	-0.89	.37
Inattentive ∗ Group CBT	8.22	4.86	1.69	.09
Hyperactive ∗ Group CBT	NaN	NaN	NaN	NaN
Combined ∗ Group CBT	NaN	NaN	NaN	NaN
Boy ∗ Inattentive ∗ Group CBT	1.42	7.50	0.19	.85
Boy ∗ Hyperactive ∗ Group CBT	NaN	NaN	NaN	NaN
Boy ∗ Combined ∗ Group CBT	NaN	NaN	NaN	NaN

$R^2 = 0.17$, F (15, 183) = 3.82, $p < .001$

Note. There were not enough participants with hyperactivity or combined type ADHD who received group CBT to generate values for Hyperactive ∗ Group CBT, Combined ∗ Group CBT, Male ∗ Hyperactive ∗ Group CBT, or Male ∗ Combined ∗ Group CBT.

Results of Total Sample Model

Treatment outcome was assessed using adolescent ADHD symptom posttest scores. Adolescents demonstrated a reduction in ADHD symptom posttest scores that was statistically significant ($p < .001$). The total sample model identified a significant value for the interaction between boys who receive treatment with comorbid depression ($p = .02$). Boys who received treatment with comorbid depression reduced -8.46 points on the posttest assessment compared to the referent group.

Split Model Interactions

After the total model was examined, participants were divided by sex to compare outcomes. The results of the split models are presented in Table 9.

Table 9

Split Model Results (Girls)

Parameter	Unstandardized	Standard Error	*t*	*p*
Intercept	17.47	4.52	3.86	< .001
Inattentive (1)	-0.96	4.74	-0.20	.83
Hyperactive (2)	-7.84	7.14	-1.09	.27
Combined (3)	3.33	4.03	0.82	.41
Anxiety (Yes)	-1.52	2.07	-0.73	.46
Depression (Yes)	2.78	2.31	1.20	.23
Treatment (Group)	-2.00	3.39	-0.59	.55
Inattention * Treatment (Group)	8.22	4.39	1.87	.06
Hyperactivity * Treatment (Group)	NaN	NaN	NaN	NaN
Combined * Treatment (Group)	NaN	NaN	NaN	NaN

$R^2 = 0.07$, F (7, 60) = 1.73, $p = .11$

Note. There were not enough girls with hyperactivity or combined type ADHD who received group CBT to generate values for hyperactivity * treatment or combined * treatment.

Results of Girl Split Model

The average ADHD symptoms pretest score prior to treatment is 25.02 across sexes, the average ADHD symptoms posttest score for girls after treatment is 17.47, which produced a significant *p* value of < .001. A significant *p* value of 0.06 was found in the interaction between the inattention subtype and treatment (group). Meaning, girls with inattentive ADHD, who attended the group treatment, resulted in 8.22 points higher on the ADHD symptoms posttest compared to the referent group. Girls with comorbid anxiety showed a reduction of -1.52 points on the ADHD symptoms posttest compared to the referent group, meaning girls with comorbid

anxiety fared better from CBT treatment. Girls with comorbid depression showed an elevation of 2.78 points on the ADHD symptoms posttest compared to average. Although girls with comorbid depression demonstrated a reduction in ADHD symptoms from pretest to posttest, it appears girls with comorbid depression did not benefit as well as girls with no comorbidity or girls with comorbid anxiety. There is a 4.3-point posttest difference between girls with comorbid anxiety and girls with comorbid depression. This results in a medium effect size of 0.46 between groups.

Table 10

Split Model Results (Boys)

Parameter	Unstandardized	Standard Error	t	p
Intercept	20.70	6.29	3.28	.001
Inattentive (1)	-3.32	6.33	-0.52	.60
Hyperactive (2)	4.79	7.18	0.66	.50
Combined (3)	8.72	5.98	1.46	.14
Anxiety (Yes)	0.68	1.80	0.37	.70
Depression (Yes)	-5.68	2.73	-2.07	.04
Treatment (Group)	-7.03	4.38	-1.60	.11
Inattention * Treatment (Group)	9.65	5.96	1.61	.10
Hyperactivity * Treatment (Group)	NaN	NaN	NaN	NaN
Combined * Treatment (Group)	NaN	NaN	NaN	NaN

$R^2 = 0.21$, F (7, 123) = 1.73, $p < .001$

Note. There were not enough boys with hyperactivity or combined type ADHD who received group CBT to generate values for hyperactivity * treatment or combined * treatment.

Results of Boy Split Model

The average ADHD symptoms pretest score prior to treatment is 25.02 across sexes, the average ADHD symptoms protest score for boys after treatment is 20.70, which produced a significant *p* value of .001. Although not significant, the presence of comorbid depression obtained a *p* value of .04. Boys with depression demonstrated a reduction of -5.68 points on the ADHD symptoms posttest compared to average. Boys with depression fared between from CBT

treatment. There is a 6.26-posttest difference between boys with comorbid depression and boys with comorbid anxiety. This results in a medium to large effect size of .68 between groups.

Research Question 1: Sex Outcomes

1. Is CBT an effective treatment for adolescent girls with ADHD?
    a. Is there a differential outcome for girls and boys when CBT is used to treat ADHD?

Regarding the first research question, results from the total sample model show that sex was not a significant factor of posttest symptom reduction. This sample demonstrated comparable results for girls and boys that underwent CBT as a treatment for ADHD (girls $p < .001$; boys $p = .001$). The posttest assessment of ADHD symptoms uses a score range of 0-54. On average, adolescents from this study showed a reduction of 5.77 points on the assessment of ADHD symptoms from pretest to posttest.

Research Question 2: CBT Environment

Does CBT environment (e.g., individual or group) impact treatment effectiveness for adolescent girls with ADHD?

Regarding the second research question, sex did not appear to impact CBT environment effectiveness. This means that girls and boys demonstrated similar posttest results, regardless of whether they attended individual or group CBT treatment. Although no value was statistically significant, the data trends imply that in this sample girls benefited more from individual CBT compared to group CBT. In this sample, boys demonstrated comparable results across individual or group CBT.

Table 11

Sex and Environment Symptom Reduction

Sex/Treatment	*n*	Average Symptom Reduction
Girl Group CBT	26	4.34
Girl Individual CBT	42	7.57
Boy Group CBT	14	5.92
Boy Individual CBT	117	5.42

Note. Although statistically no significance was assigned to CBT environment, data trends imply that for girls, individual CBT was slightly more beneficial with an average 3.23-point difference between groups.

Figure 1

Posttest Symptom Reduction by Sex and Environment

Note. The x-axis represents the reduction in ADHD symptoms from pretest to posttest, while the x-axis represents the group allocation by participant sex and CBT environment. On average, participants demonstrated a symptom reduction of 5.77 points from pretest to posttest.

Table 12

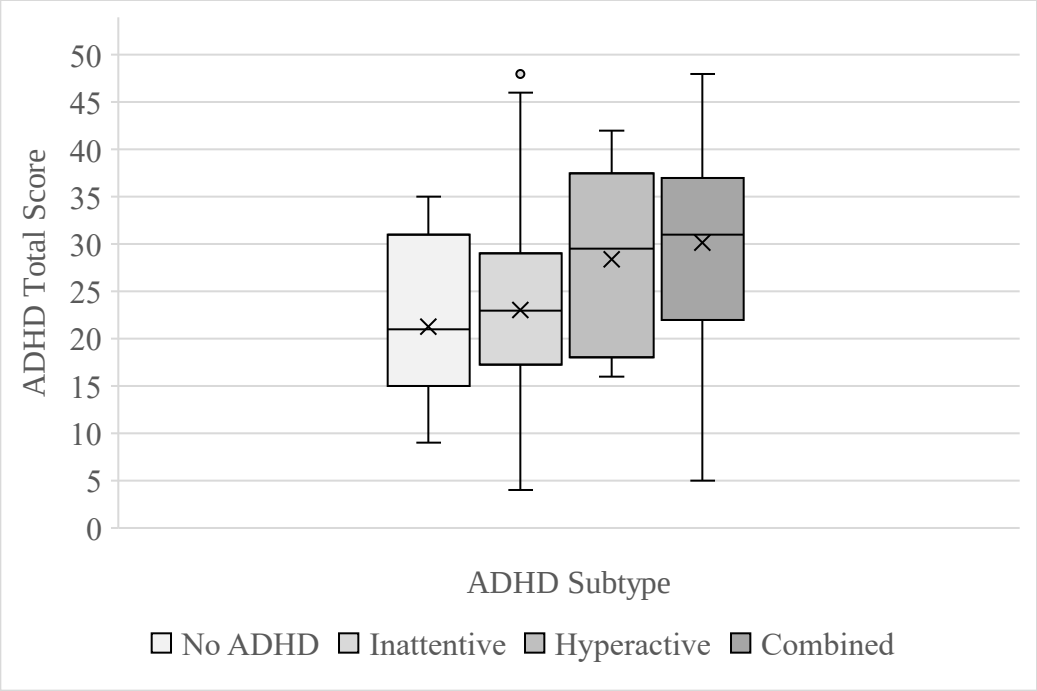
Pretest and Posttest Symptoms by Subtype

Subtype	***n***	**Pretest**	**Posttest**	**Reduction**
Subthreshold ADHD	11	21.27	14	7.27
Inattentive	128	23.05	17.52	5.53
Hyperactive	8	28.38	20.25	8.12
Combined	52	30.14	24.47	5.66

Note. According to this sample, there were no significant interactions between sex and subtype on posttest outcome.

Figure 2

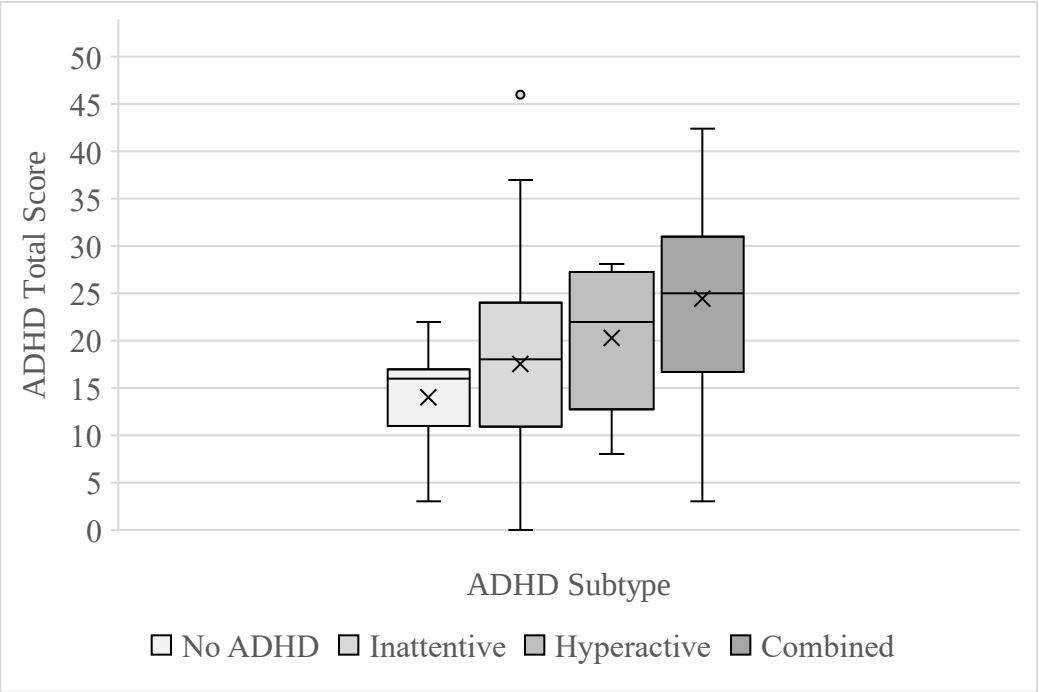
Total Pretest Symptom Average by Subtype



Note. The y-axis represents ADHD symptoms measured during the pretest assessment, while the x-axis represents the variability between ADHD subtypes. Scores range from 0-54, with high scores indicating more ADHD symptoms. Scores 0-18 are interpreted as ADHD unlikely, scores 19-26 may require a full assessment, and scores above 37 are considered very likely for ADHD (Coghill & Seth, 2015).

Figure 3

Total Posttest Symptom Average by Subtype



Note. The y-axis represents ADHD symptoms measured during the posttest assessment, while the x-axis represents the variability between ADHD subtypes. Scores range from 0-54, with high scores indicating more ADHD symptoms. Scores 0-18 are interpreted as ADHD unlikely, scores 19-26 may require a full assessment, and scores above 37 are considered very likely for ADHD (Coghill & Seth, 2015).

Exploratory Results

This secondary data analysis was exploratory in nature. As a result, additional models were created and preformed to gather more information about CBT as a treatment method for adolescents with ADHD. The participants were allocated into groups based on sex and subtype, which resulted in four groups per sex (no ADHD, primarily inattentive, primarily hyperactive, and combined type) for a total of 8 groups. An additional linear regression was not conducted for girls with hyperactive presentation because there were not enough adolescents with this profile to

produce enough degrees of freedom. The same was true for boys with subthreshold ADHD. Interestingly, girls with hyperactive presentation and boys with subthreshold ADHD are culturally representative of the way ADHD is identified across the sexes. It is possible that these profiles were lacking participants because these profile types are rare. The following additional models were performed: girls with subthreshold ADHD, girls with primarily inattentive type, girls with combined type, boys with primarily inattentive type, boys with primarily hyperactive type, and boys with combined type. Table 13 reports the effect sizes for adolescents based on sex, subtype, and the presence of anxiety or depression.

Table 13

Effect Sizes Using Sex and Subtype

Subtype	*n*	Anxiety Effect Size	Depression Effect Size
		Girls	
No ADHD	7	-0.42	0.49
Primarily Inattentive	36	-0.46	0.00
Combined Type	23	0.34	0.33
		Boys	
Primarily Inattentive	92	-0.04	-0.46
Primarily Hyperactive	6	0.19	-0.84
Combined Type	29	0.21	-0.25

Table 14

Effect Sizes Using Sex, Subtype, and Internalization

Subtype	Girls	Boys
	Effect Size between Anxiety and Depression	
Subthreshold ADHD	.91	N/A
Inattentive	0.46	0.45
Hyperactive	N/A	1.03
Combined	N/A	.47

Note. No meaningful effect was found for girls with combined ADHD. Exploratory analyses were not conducted for girls with hyperactivity or boys with subthreshold ADHD due to the limited number of participants with these characteristics.

Table 15

Girls with Subthreshold ADHD Profile Summary

Presentation	*n*	Symptom Reduction
None	3	4.66
Anxiety	3	9
Depression	0	N/A
Both	1	4
Overall	7	6.42

Table 16

Girls with Subthreshold ADHD Results

Parameter	Unstandardized	Standard Error	t	p
Intercept	18.84	2.91	6.47	0.007
Anxiety (1)	-3.95	3.88	-1.01	0.38
Depression (1)	4.62	5.49	0.84	0.46
Centered Pretest Score	0.62	0.24	2.58	0.08

$R^2 = 0.43$, F (3, 4) = 2.54, $p = 0.23$

Girls with Subthreshold ADHD

The referent for this group of girls is subthreshold ADHD and no anxiety or depression. The presence of anxiety produced a medium effect size of -0.42. Girls with subthreshold ADHD and anxiety fared better from CBT treatment compared to the baseline. The opposite was true for the presence of depression, which produced a medium effect size of 0.49. Girls with subthreshold ADHD and no anxiety or depression displayed an average symptom reduction of 4.66, compared to girls with subthreshold ADHD and anxiety (average reduction = 9). This supports previous literature of CBT as a treatment method for anxiety.

There is an 8.57-point difference between the girls with subthreshold ADHD and anxiety, compared to the girls with subthreshold ADHD and depression. This equates to a large effect size of 0.91 between groups.

Table 17

Girls with Inattentive ADHD Profile Summary

Presentation	***n***	**Symptom Reduction**
None	12	3.81
Anxiety	16	7.21
Depression	1	-1
Both	7	9.66
Overall	36	6.32

Table 18

Girls with Inattentive ADHD Results

Parameter	**Unstandardized**	**Standard Error**	***t***	***p***
Intercept	21.10	1.84	11.41	< .001
Anxiety (Yes)	-4.32	2.37	-1.81	0.07
Depression (Yes)	-0.02	2.76	-0.00	0.99
Centered Pretest Score	0.44	0.13	3.42	0.002

$R^2 = 0.25$, $F\ (3, 33) = 5.06$, $p = 0.006$

Girls with Inattentive ADHD

The referent for this group of girls is inattentive presentation and no anxiety or depression. The presence of anxiety produced a medium effect size of -0.46. Girls with inattentive presentation and anxiety fared better from CBT treatment compared to the baseline. The presence of depression produced a no meaningful effect size. This supports previous literature of CBT as a treatment method for anxiety.

There is a 4.29-point difference between the girls with inattentive ADHD and anxiety, compared to the girls with inattentive ADHD and depression. This equates to a medium effect size of -0.46 between groups.

Table 19

Girls with Combined ADHD Profile Summary

Presentation	***n***	**Symptom Reduction**
None	10	10.41
Anxiety	4	5.5
Depression	1	-6.9
Both	7	2.05
Overall	23	6.2

Table 20

Girls with Combined ADHD Results

Parameter	**Unstandardized**	**Standard Error**	***t***	***p***
Intercept	17.19	2.60	6.59	< .001
Anxiety (Yes)	3.22	4.14	0.77	0.44
Depression (Yes)	3.16	4.42	0.71	0.48
Centered Pretest Score	0.20	0.18	1.13	0.26

$R^2 = 0.01$, F (3, 20) = 1.10, $p = 0.37$

Girls with Combined ADHD

The referent for this group of girls is combined type and no anxiety or depression. The presence of anxiety produced a medium effect size of 0.34, which means that girls with combined type and anxiety were helped less by CBT treatment compared to the baseline. The same was true for girls with combined type and depression, which produced a medium effect size of 0.33. Girls with combined type and no anxiety or depression demonstrated an average symptom reduction of 10.41, while girls with both only reduced by 2.05 points on average.

These results are unique from the findings found in subthreshold ADHD and inattentive presentation profiles. The comorbid presence of anxiety or depression in girls with combined type harms the potential benefit from CBT treatment. The girls with combined type benefited the most if they did not have anxiety or depression. There is no meaningful difference between girls with combined type ADHD and anxiety and combined type ADHD and depression.

Table 21

Boys with Inattentive ADHD Profile Summary

Presentation	***n***	**Symptom Reduction**
None	62	4.72
Anxiety	23	5.49
Depression	1	12
Both	6	8.17
Overall	92	5.22

Table 22

Boys with Inattentive ADHD Results

Parameter	**Unstandardized**	**Standard Error**	***t***	***p***
Intercept	19.25	0.99	19.33	< .001
Anxiety (Yes)	-0.45	1.82	-0.25	0.80
Depression (Yes)	-4.31	3.21	-1.34	0.18
Centered Pretest Score	0.59	0.09	6.14	< .001

$R^2 = 0.29$, F (3, 89) = 13.80, p = < .001

Boys with Inattentive ADHD

The referent for this group of boys is inattentive presentation and no anxiety or depression. The presence of anxiety produced an effect size that was not meaningful, meaning that the presence of anxiety demonstrated a minimal impact on boys with inattentive presentation symptom reduction. The presence of depression produced a medium effect size of -0.46. Boys with inattentive presentation and depression fared better from CBT treatment compared to the baseline.

There is a 4.26-point difference between boys with inattentive ADHD and anxiety and boys with inattentive ADHD and depression. This equates to a medium effect size of -0.45 between groups.

Table 23

Boys with Hyperactive ADHD Profile Summary

Presentation	***n***	**Symptom Reduction**
None	3	12.76
Anxiety	1	0
Depression	1	0
Both	1	11.72
Overall	6	8.3

Table 24

Boys with Hyperactive ADHD Results

Parameter	**Unstandardized**	**Standard Error**	***t***	***p***
Intercept	25.65	1.93	13.28	0.00
Anxiety (Yes)	1.83	1.75	1.04	0.40
Depression (Yes)	-7.87	2.36	-3.33	0.08
Centered Pretest Score	0.02	0.14	0.20	0.85

$R^2 = 0.79$, F (3, 3) = 7.35, $p = 0.12$

Boys with Hyperactive ADHD

The referent for this group of boys is hyperactive presentation and no anxiety or depression. Anxiety produced an effect size that was not meaningful, meaning it showed minimal impact on boys with hyperactive AHDD symptom reduction. Depression produced a large effect size of -0.84. Boys with hyperactive presentation and depression fared better from CBT treatment compared to the referent.

There is a 9.70-point difference between boys with hyperactive ADHD and anxiety and boys with hyperactive ADHD and depression. This equates to a large effect size of 1.03 between groups.

Table 25

Boys with Combined ADHD Profile Summary

Presentation	***n***	**Symptom Reduction**
None	20	5.46
Anxiety	5	1.8
Depression	2	5.5
Both	1	10
Overall	29	5.21

Table 26

Boys with Combined ADHD Results

Parameter	**Unstandardized**	**Standard Error**	***t***	***p***
Intercept	21.41	2.09	10.20	< .001
Anxiety (1)	2.03	3.28	0.61	0.54
Depression (1)	-2.37	4.5	-0.52	0.60
Centered Pretest Score	0.76	0.18	4.15	< .001

$R^2 = 0.37$, F (3, 26) = 6.67, $p = 0.002$

Boys with Combined ADHD

The referent for this group of boys is combined type with no anxiety or depression. The presence of anxiety produced a small effect size of 0.21, which means that the boys with combined type and anxiety fared slightly worse from CBT treatment compared to the baseline. Depression produced a small effect size of -0.25, which means the boys with combined type and depression fared slightly better from CBT treatment than the referent.

There is a 4.40-point difference between boys with combined type ADHD and anxiety and boys with combined type ADHD and depression. This equates to a medium effect size of 0.47 between groups.

Summary

Although girls and boys appeared to benefit similarly from CBT treatment overall and by environment type, there were clear differences in the outcome trends between girls and boys. For girls, the results of subthreshold ADHD and inattentive presentation were consistent with previous findings of CBT as a treatment for anxiety. Girls from the subthreshold ADHD and inattentive presentation, with anxiety fared better from CBT than those without anxiety. This was not true for girls with combined type ADHD. Instead, girls with combined type benefited the most from CBT treatment if they did not have anxiety or depression. Boys with inattentive and hyperactive presentations, with depression fared better from CBT than those without depression. This was most notable in boys with hyperactive presentation. The presence of anxiety demonstrated minimal impact on symptom reduction for the boys with inattentive or hyperactive presentation. Boys with combined type fared slightly better with depression and slightly worse with anxiety. Potential explanations for these findings will be explored in the discussion section. Conclusions and recommendations based on the present findings are presented in Chapter V.

Chapter V. Conclusions and Recommendations

This chapter presents a summary of the study and important conclusions drawn from the data presented in Chapter IV. It discusses the implications of this study's results. The chapter concludes with recommendations for future research.

Review of the Study

This study examined Cognitive Behavioral Therapy (CBT) as treatment for adolescents with ADHD. Girls were selected as the focus of this study because girls are often unidentified and undertreated for ADHD (Hinshaw et al., 2022; Young et al., 2020). It is hypothesized that this historical lack of identification and treatment is the result of the covert nature of female ADHD, leading to referral bias (Mowlem et al., 2019). Girls are more likely to demonstrate inattentive presentation with internalizing symptoms, which may be hard for parents and teachers to identify.

CBT used to treat ADHD is a growing body of literature (Antshel et al., 2014; Boyer et al., 2016; Coelho et al., 2017; Haugan et al., 2022; Sprich et al., 2016; Vidal et al., 2015). CBT is most used to treat anxiety and it is recommended as a psychosocial treatment for ADHD with adolescents (Young et al., 2020). This study was designed with the theory that CBT might be more beneficial to girls with ADHD because of its emphasis on reducing psychological stress and maladaptive behavior (Young & Smith, 2017).

Two main research questions were developed to consider CBT as a treatment method for adolescent girls. The first examines the effectives of CBT as a treatment method and inquires if there are any potential outcome differences between girls and boys that receive CBT. The second inquires whether treatment environment in the form of individual or group CBT impacts treatment outcome for adolescent girls.

A secondary data analysis was conducted to gather a group of adolescents that had received CBT as a treatment for ADHD. Boyer (2016) and Haugan (2022) agreed to share data from their randomized controlled trials, which resulted in 199 participants. Several multiple linear regression models were designed and then conducted in JASP software to assess for any potential factors of significance. Factors of interest included: sex, ADHD subtype, the presence of anxiety, the presence of depression, group allocation (individual or group), as well as any interactions between these named factors.

This study was exploratory in nature and several additional models were conducted to further analysis treatment outcomes based on sex and subtype. This resulted in 6 additional profile types: girls with subthreshold ADHD, girls with primarily inattentive type, girls with combined type, boys with primarily inattentive type, boys with primarily hyperactive type, and boys with combined type.

The results from the total sample model found that CBT produced a significant reduction of ADHD symptoms posttest ($p < .001$). In this sample, sex was not a significant factor for posttest outcome. Girls and boys both benefited from CBT as a treatment method for ADHD symptom reduction. Sex did not appear to impact effectiveness based on CBT environment. Girls and boys demonstrated similar posttest results, regardless of whether they attended individual or group CBT. No combination of sex and ADHD subtype was found to have a significant impact on posttest outcomes; however, combined type demonstrated a significant number of reduced symptoms ($p = .014$). Adolescents with combined type demonstrated the most severe symptoms at pre- and post- test.

The results from the additional models identified several interactions with medium to large effect sizes. For girls, treatment was impacted by the presence of comorbid anxiety. Girls

with anxiety showed a greater amount of reduction in ADHD symptoms at posttest compared to girls without anxiety, with medium effect sizes in the subthreshold (effect size = -0.42) and inattentive (effect size = -0.46) profiles. Anxiety proved ineffective at impacting treatment outcome for boys. Instead, treatment was impacted by the presence of comorbid depression in boys. Boys with depression demonstrated a greater amount of reduction in ADHD symptoms at posttest compared to boys without depression, with medium to large effect sizes in the inattentive (effect size = -0.46) and hyperactive (effect size = -0.84) profiles. Combined type did not follow the established trends for girls or boys. Girls with combined type benefited the most if they did not have anxiety or depression. Anxiety and depression produced small effect sizes for boys with combined type. Boys with combined type and anxiety fared slightly worse, while boys with combined type and depression fared slightly better.

Discussion

Overall, CBT was found effective for reducing ADHD symptoms in adolescents with ADHD. A significant reduction of ADHD symptoms was found posttest ($p < 0.001$). There were no meaningful differences in the overall estimates between girls and boys; however, differences did emerge when data was characterized by sex, comorbidity, and ADHD subtype.

Sex did not appear to impact CBT environment effectiveness, meaning that boys and girls demonstrated similar posttest results, regardless of whether they attended individual or group therapy. Although differences were not statistically significant, trends showed individual treatment appeared to be slightly more beneficial for girls with ADHD. One hypothesis is that some of the themes associated with ADHD in girls are private in nature. Girls may be more likely to be open about issues of substance abuse, self-harm, maltreatment, or risky sexual behavior in an individual setting compared to a group setting.

Covert symptoms tend to present problems for identification and treatment. This is true for both girls with anxiety and boys with depression. Parents and teachers are often responsible for observing problematic behavior in children and adolescents. Girls with ADHD and anxiety may be well-behaved, demonstrate good grades, and display compensatory skills, which further mask their difficulties (Quinn & Madhoo, 2014). Boys with depression may demonstrate loss of pleasure, changes in sleep, or extreme anhedonia, which are also difficult for parents and teachers to identify (Bennett et al., 2005; Powell et al., 2020). It is possible that girls with anxiety and boys with depression benefited the most from CBT treatment because both groups of less likely to receive any treatment for their conditions.

The Gender Paradox happens in disorders that have a sex-related prevalence (Hinshaw et al., 2022). The sex with the lower prevalence must display more serious symptoms to be identified. Therefore, the sex with lower prevalence often experiences under identification and undertreatment. This is true for both girls with ADHD and boys with depression (Hinshaw et al., 2022; Shi et al., 2021; Young et al., 2020). The ratio for depression is 2:1, with more girls experiencing and reporting depression compared to boys (Shi et al., 2021). Girls with depression tend to express more symptoms as a way of help-seeking. Traditional masculinity is the social expectation for boys to be strong, independent, and exhibit self-control, which may cause the suppression of emotional response or help-seeking behaviors (Möller-Leimkühler, 2002).

In alignment with feminist theory, this study aims to identity the societal structures where discrimination is created (Arinder, 2020). This is done by acknowledging the historic under identification and treatment of girls with ADHD. This study also highlights the historic inadequacy of identification and treatment of depression in boys. ADHD in girls and depression in boys have a sex-related prevalence because of gendered social expectations (Hinshaw et al.,

2022; Shi et al., 2021). This inspires a discussion about diagnostic criteria for girls with ADHD and boys with depression.

Hinshaw and colleagues identify diagnostic criteria as an unresolved issue in considering ADHD in girls and depression in boys (2022). There is debate whether girls should be diagnosed in relation to overall norms (norms gathered from girls and boys) verses norms gathered specifically from girls. Using norms specifically from girls may cause girls to meet symptom thresholds more easily. Hinshaw and colleagues acknowledge the parallel argument for boys with depression (2022). If symptoms of depression in boys were compared to norms derived from other boys, it is possible that more would meet the criteria for depression. However, caution is urged so that rates of either disorder are not consequently overinflated. Although rating scales are a useful tool in assessment, findings should be interpreted cautiously (Young et al., 2020). In the absence of girl or boy specific norms, greater emphasis should be placed on additional information gathered from parents and school. Another consideration identified by Young and colleagues is alternative cut-off scores for girls with ADHD and boys with depression (2020). Rigid cut-off scores may lead to false positives and negatives in the identification of disorders with a sex-related prevalence.

Treatment for adolescents with ADHD should reflect equity, rather than equality. Meaning, tailored treatment, rather than identical treatment should be utilized. Treatment planning must consider the unique needs and situation of the adolescent at hand. Special caution must be used when considering diagnoses with a sex-related prevalence, so that the historic systematic exclusion is not continued. Unless girls with ADHD and boys with depression are accurately identified during diagnostic procedures, they may never receive evidence-based treatment.

Limitations

Participants were recruited from two different studies, from two different countries. As a result, some of the assessments used between studies were different. In this case, assessments were converted to the same scale so that results across studies could be compared. This study did not use a proper control group. A control was not used in the Boyer and colleagues' study, instead participants were allocated to two different CBT treatments (2016). The result was a limited number of control participants from the Haugen and colleagues' study (2022). This study aimed to understand the effects of CBT treatment on adolescents with ADHD, and the limited number of control participants from the Haugen study were rejected (2022). Another limitation is the discrepancy between adolescent profiles. Boys that were treated using individual CBT were overwhelmingly most of the participants in this study. The sample used lacks cultural diversity. Participants were recruited from the Netherlands and Norway, which are not representative of the diversity in the United States. There was a lack of participants who identified as black or Hispanic. Although this study provided valuable information about adolescent functioning, the results may not be generalizable to adolescents in the United States. CBT as treatment for ADHD is a growing field and several countries are exploring this method. The results from this study may help direct the participant focus for future studies. This study used data from 199 participants. The size of this sample makes it difficult to generalize the results to all adolescents. Instead, this study was exploratory and may be thought of as an exercise to direct future research.

Conclusion

Adolescents benefited from treatment, regardless of whether the CBT was administered individually or group setting. Although for girls, individual treatment was slightly more beneficial, due to the private nature of many of the factors associated with girls with ADHD.

Girls and boys both benefited from CBT as a treatment for ADHD in overall estimates. Additional differences were found after data had been categorized based on sex, comorbidity, and subtype. Results found that girls with ADHD and comorbid anxiety and boys with ADHD and comorbid depression benefited the most from CBT treatment with medium to large effect sizes. This study began as an examination of CBT as a treatment to ADHD for the unique needs and disparities of adolescent girls. However, the results of the study highlight the significance of the Gender Paradox and the importance for practitioners, teachers, and parents to be aware of covert symptom expression. Girls with ADHD and boys with depression are less likely to be identified and treated, and therefore more likely to develop serious dysfunction (Hinshaw et al., 2022). Timely and accurate identification and treatment is necessary to reduce the risk of a condition developing into adverse life outcomes, which is true for girls and boys. Adolescents with ADHD are more likely to develop issues with academic and peer functioning (Young et al., 2020), which can intensify and lead to additional issues of comorbidity (Ottosen et al., 2019), substance abuse (Castellano-García et al., 2022), and self-harm (Beauchanie et al., 2019).

Recommendations

Results from this study highlight the need for parents, teachers, and psychological practitioners to understand the ways in which covert symptoms manifest in children and adolescents. Children and adolescents rely on the adults around them to identify any dysfunction and make the appropriate referral that will lead to treatment (Millenet et al., 2018). Girls with ADHD and boys with depression will continue to be underserved until the adults surrounding them are knowledgeable of symptom presentation (Hinshaw et al., 2022). Only a comprehensive evaluation can rule out ADHD in girls (Young et al., 2020). People may be under the impression that these disorders are sex-specific and less frequent in the opposite sex (Hinshaw et al., 2022).

These beliefs are dangerous, inaccurate, and may lead to serious dysfunction because of undertreatment.

ADHD is a complex disorder with multiple treatment options available (Evans et al., 2018; David et al., 2021; Woraich et al., 2019). Some families might choose a treatment method of behavioral interventions, psychosocial interventions, pharmacological treatment, or any combination of these. Treatment needs may vary from family to family depending on accessibility, environmental, or biological needs, but treatment of any kind is superior to no treatment (Woraich et al., 2019). This study recommends adequate research of ADHD treatment options, and the appropriate dismissal and addition of treatment methods as needed. Adolescence is a complex part of development and is often marked by an increased desire for independence and individuation from family (Antshel et al., 2014). This study recommends allowing adolescents to participate in their treatment plan. CBT may allow for adolescents to be directly included in their treatment process. Children and adolescents with ADHD are complex, and finding an effective treatment plan may prove difficult.

The problems associated with ADHD go far beyond issues of academics and peer relationships (Hinshaw et al., 2022; Young et al., 2020). Comorbidity is strong in adolescents with ADHD, which further complicates treatment methods (Ottosen et al., 2019). Symptoms from multiple disorders may mute or exacerbate one another. The possibility of comorbidity should always be considered during the identification of a child or adolescent with ADHD. The presence of a comorbid condition can only be ruled out using a multifactored evaluation from a qualified professional (Young et al., 2020). ADHD is a complex disorder with multiple presentations and frequent comorbidity. Comorbid conditions may need to be considered during the treatment of ADHD. Treatment may need to include issues of anxiety, depression, substance

abuse, self-harm, learning disabilities, social skills, and other complications (Ottosen et al., 2019; Young et al., 2020).

Future Research Opportunities

There is limited research that focuses specifically on adolescent girls with ADHD (Hinshaw et al., 2022; Young et al., 2020). There is even less information for adolescents that are nonbinary. Understanding sex and gender differences in ADHD presentation is necessary to understand which groups are at the most risk and what preventative treatment methods should be targeted.

Treatment of any environment benefited adolescents with ADHD. Girls may have benefited more from individual CBT compared to group CBT. A possible hypothesis for this observed trend is the sensitive nature of problems associated with ADHD dysfunction and mediation. Girls may be less willing to discuss experiences of maltreatment, self-harm, substance abuse, sexual engagement, or difficulties with academics and peers in the group setting. Future studies may focus on the preferred treatment environment for girls with ADHD.

The complexity of profiles associated with adolescents with ADHD is fertile ground for future research. Sex differences emerged when the participants were further divided by sex and subtype. Boys with hyperactivity and comorbid depression benefited the most from CBT in comparison to all other groups. The group differences between boys with hyperactive ADHD and anxiety and boys with hyperactive ADHD and depression equates to an effect size of 1.03, which cannot be ignored. Further research must be completed dealing with the complex profile types of adolescents with ADHD to optimize treatment.

Future research may surround the inclusion of emotional skills in ADHD treatment for girls and boys. Adolescents with ADHD are likely to display additional problems with

internalizing symptoms in the form of anxiety or depression (Ottosen et al., 2019). The results from this study found that girls with anxiety and boys with depression responded the best to CBT as a treatment method for ADHD. These profiles may have responded positively to treatment because of the emphasis that CBT places on internalizing problems. Research surrounding emotional skills training is a future direction of research for adolescents with ADHD. Although, the practice of including emotional skills training in ADHD treatment may need to look different for girls and boys. Greater emphasis may need to be placed on emotional regulation for girls, who are more likely to display impairment in this area compared to boys (Beauchanie et al., 2019; Young et al., 2020). While greater emphasis may need to be placed on emotional awareness for boys, who may be less likely to perceive and display emotions compared to girls (Shi et al., 2021).

Results from this study found that combined type ADHD did not follow the established trends for girls or boys. This highlights the fact that combined type ADHD is complex in nature and requires special consideration in treatment planning. Future research may surround tailored intervention for adolescents with combined type ADHD.

Like girls with ADHD, boys with depression experience the adverse effects of the Gender Paradox. This study began as an examination of CBT as a treatment for ADHD for adolescent girls, but the most significant finding was not for girls. This study rests on the foundation that effective treatment starts with the adequate identification of the problem. This is true for both girls with ADHD and boys with depression. Adolescents will continue to be underserved if teachers, parents, and practitioners continue to inaccurately believe that ADHD and depression are limited to sex-specific disorders.

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