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Philadelphia College of Osteopathic Medicine
School of Professional and Applied Psychology
Department of Clinical Psychology

GENDER DIFFERENCES IN COGNITIVE DISTORTIONS IN
ADULTS WITH ADHD

By Laura Salciunas

Submitted in Partial Fulfillment of the Requirements for the Degree of
Doctor of Psychology

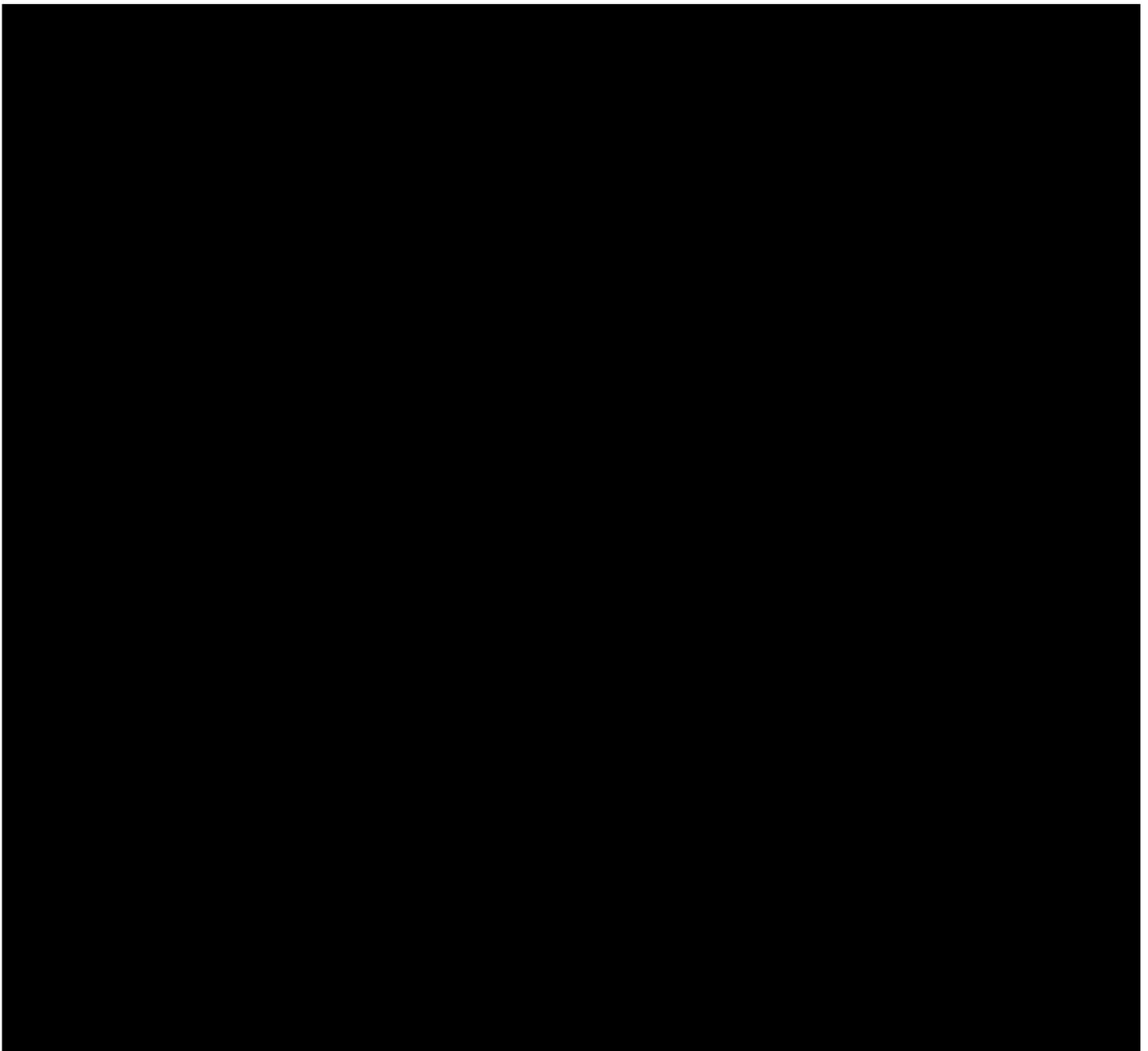
June 2021



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APPLIED PSYCHOLOGY™**



DISSERTATION APPROVAL



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TABLE OF CONTENTS

ABSTRACT	1
CHAPTER 1: INTRODUCTION	2
Statement of the Problem	2
Purpose of the Study	5
Hypotheses	6
CHAPTER 2: REVIEW OF THE LITERATURE	7
ADHD Diagnostic Criteria and General Features	7
Prevalence and Etiology.....	8
Comorbidities.....	9
Gender Differences in ADHD	10
Underdiagnosis in Women.....	10
Gender Differences in Age of Onset.....	11
Symptom Presentation.....	12
Gender Differences in Comorbidities.....	13
Underdiagnosis of Women in the ADHD Population.....	14
Additional Gender Differences.....	15
Gender Identity.....	16
Daily Impairments	17
Typical Impairments for Individuals with ADHD.....	17
Negative Effects/Challenges that Result from ADHD-Related Impairments.....	18
Executive Functioning and ADHD	21
Emotional Dysregulation.....	23

ADHD Medication and EFs.....	26
Gender Differences in Executive Functioning.....	29
Cognitive Distortions	30
ADHD and Cognitive Distortions.....	34
EF Deficits and Cognitive Distortions.....	37
Gender Differences in Cognitive Distortions.....	38
Cognitive Distortions that Remain After Medication Treatment.....	40
Confounding Variables.....	41
Summary of the Literature	43
CHAPTER 3: METHODS	44
Participants	44
Inclusion Criteria.....	44
Exclusion Criteria.....	45
Measures	45
Demographic Questionnaire.....	45
Inventory of Cognitive Distortions (ICD).....	45
Barkley Deficits in Executive Functioning – Long Form (BDEFS-LF).....	46
Barkley Functional Impairment Scale – Long Form (BFIS-LF).....	48
Beck Depression Inventory-II (BDI-II).....	49
Penn State Worry Questionnaire (PSWQ).....	49
Revised Neuroticism, Extroversion, Openness Personality Inventory.....	50
Procedure	51
CHAPTER 4: RESULTS	52

Demographics.....	52
Statistical Analysis.....	53
Hypothesis 1.....	53
Hypothesis 2.....	56
CHAPTER 5: DISCUSSION	65
Clinical Implications	67
Gender.....	67
Cognitive Distortions and ADHD.....	70
Limitations	84
Suggestions for Future Research	87
REFERENCES.....	90

ABSTRACT

Research has established that men and women with ADHD often manifest varying symptom constellations and are typically referred at different ages for initial evaluation. However, there is a dearth of research into how such gender differences may impact the manifestation of various psychological processes, such as cognitive distortions, even though the latter may explain up to half the variance in many clinical syndromes and personality disorders. The primary objective of this study was to identify whether there is a significant difference in the frequency of cognitive distortions between men and women with ADHD. The secondary objective was to determine the relationship between executive-functioning deficits, severity of functional impairment, and gender in relation to the frequency of cognitive distortions. Data were collected from an archival data set from an outpatient university-based adult ADHD specialty clinic in a large northeastern city. Participants were adults diagnosed with ADHD by a comprehensive evaluation including the Revised NEO Personality Inventory, Inventory of Cognitive Distortions, Barkley Deficits in Executive Functioning Scale, Barkley Functional Impairment Scale, Beck Depression Inventory-II, and Penn State Worry Questionnaire. A multiple logistic regression indicated that gender was not predicted by Big Five personality factors of neuroticism, agreeableness, and conscientiousness; depression; or cognitive distortions in adults with ADHD. However, a hierarchical multiple regression indicated a statistically significant, positive linear relationship between depressed mood, conscientiousness, and functional impairment on the one hand and frequency of cognitive distortions on the other hand. Implications for assessment and treatment of adult ADHD are discussed.

CHAPTER 1: INTRODUCTION

Statement of the Problem

Attention-deficit/hyperactivity disorder (ADHD) is composed of varying degrees of inattention, hyperactivity, and/or impulsivity (American Psychiatric Association, 2013). Once considered to be a strictly childhood disorder, 30%-50% of children and adolescents with ADHD continue to experience symptoms as adults, ultimately affecting 1%-7.3% of the adult population (Bálint et al., 2008; Simon et al., 2009; Ramsay & Rostain, 2005). Although the term “adult ADHD” reflects the older age status of a client with ADHD, the disorder is still developmental; consequently, onset does not simply emerge in adulthood (Simon et al., 2009).

Between 2011 and 2013, 13.3% of boys and 5.6% of girls in the United States had a current or previous diagnosis of ADHD, making the prevalence of ADHD twice as likely in male children (Pastor et al., 2015). The male-female ratio for the hyperactive-impulsive and combined subtypes is 2:1 in children, with the ratio for the combined subtype increasing to 3:1 in adolescence, signifying that boys tend to display both more inattentive and more disruptive hyperactive-impulsive symptoms of ADHD (Ramtekkar et al., 2010). Because hyperactive and impulsive symptoms are often the motivating force behind the decision to evaluate, diagnose, and treat a child, girls are often underdiagnosed and underrepresented in the childhood ADHD population. This bias becomes more balanced in the adult ADHD population likely because women begin self-referring for evaluations (Biederman et al., 2004). However, the referral bias leads to female individuals struggling with their symptoms without treatment for longer periods

of time, possibly contributing to the development of other impairments and disorders (Biederman et al., 1994).

Long-standing difficulties of women with ADHD have been greatly underreported, potentially because their symptoms tend to be less overt (Quinn, 2005; Ramsay & Rostain, 2005). Researchers have identified several factors that contribute to female individuals being underdiagnosed with ADHD, including later age of onset, different manifestations likely reflecting more inattention than hyperactivity/impulsiveness, and the American Psychiatric Association's (2013) *Diagnostic and Statistical Manual of Mental Disorders* (5th ed.; *DSM-5*) criteria (Woodman Taylor & Keltner, 2002). The *DSM* contributes to the gender bias because its diagnostic criteria are primarily influenced by studies in which subjects are mainly composed of boys with ADHD. The skewed sample does not consider the different presentation of ADHD in girls or the ages when symptoms typically first emerge, thereby possibly causing practitioners to view the presentation of girls with ADHD as atypical (Waite, 2010).

Specifically, female individuals with ADHD may have more comorbid internalizing problems, unlike their male counterparts, who are more likely to display more easily identifiable disruptive behavioral disorders (Bálint et al., 2008). The more frequent presentations of fewer visible internalizing problems contribute to an underidentification of female children with ADHD, a delay to treatment, and, subsequently, a higher rate of self-referrals as adults (Ramsay & Rostain, 2005; Simon et al., 2009). Additionally, a lack of early treatment and support contributes to exacerbation of internalizing symptoms, increased anxiety and depression, and greater emotional

dysregulation (Quinn, 2008). Girls may not display as many difficulties as boys during their early academic years as a result of working vigorously to compensate or hide symptoms to meet the demands and expectations of teachers and/or parents (Quinn, 2005). The need to overcompensate for these difficulties in female individuals may contribute to a decrease in self-esteem, which has been suggested to function as an indicator for internalizing psychopathology (Isomaa et al., 2012) and continues to contribute to negative views about the self and increases maladaptive thinking patterns and/or behaviors, as well as cognitive distortions.

Cognitive distortions are described as inaccurate self-statements that misperceive and/or misinterpret events (Beck, 1976). They are typically considered maladaptive because of negative effects on mood and potential to result in maladaptive behaviors based on an inaccurate and/or unhelpful cognition. A recent study found a significant positive correlation between ADHD diagnosis and self-reported cognitive distortions, the latter operationalized as scores on the Inventory of Cognitive Distortions (ICD; Strohmeier et al., 2016; Yurica & DiTomasso, 2001). However, another recent study identified that once personality pathology, anxiety, and depression were accounted for, the relationship between cognitive distortions and ADHD was not supported, at least as measured by the ICD (Serine, 2016).

Cognitive Behavioral Therapy (CBT) practitioners recognize the role of cognitive distortions in the development and maintenance of negative beliefs about the self, in avoidance behaviors, and in a decrease in motivation and self-efficacy (Mongia & Hechtman, 2012; Newark & Stieglitz, 2010). Despite the knowledge of the negative impact of cognitive distortions on overall mental health, of their prevalence in the ADHD

population, and of the differences of information processing between men and women, much of the current research on ADHD and cognitive distortions has primarily focused on the entire ADHD population, with infrequent attention to gender differences. A literature search revealed no published studies reviewing the gender differences in frequency of cognitive distortions in the adult ADHD population, a factor that may play a vital role in assessment, conceptualization, and treatment planning.

Purpose of the Study

The purpose of the study was to identify if there are significant gender differences in frequency of cognitive distortion in adults with ADHD. As noted, many studies have shown that men and women present differently in adult ADHD symptomatology. Additionally, many studies have replicated the finding of frequent comorbidity of ADHD with other disorders, as well as an increased rate of cognitive distortions in individuals with ADHD. However, despite a common knowledge that ADHD often presents differently in men and women, no research has explored the differences in cognitive distortions between the genders. In fact, Bruno's 2010 literature review of gender differences in cognitive distortions reported a minimal amount of research pertaining to the subject in general, let alone a more specific examination of the phenomenon in the adult ADHD population.

Considering the tendency to internalize symptoms, it is hypothesized that women will process events and information differently from men, potentially leading to more frequent cognitive distortions than in men. Additionally, it was hypothesized that greater deficits of executive functioning and greater functional impairment will lead to more frequent cognitive distortions in both genders. Gender was also added as a variable to

identify if it is a moderator in the relationship between the variables. Exploring this possibility provides the potential to gain a deeper understanding of how men and women process incoming information. Therefore, we hope that the results of this study can inform clinicians' assessment and treatment planning for both genders in adults with ADHD.

Hypotheses

Hypothesis 1: It was hypothesized that frequency of cognitive distortions, anxiety, depression, and the personality factors of agreeableness, conscientiousness, and neuroticism will predict gender in adults with ADHD. The frequency of cognitive distortions was operationalized as total scores on the Inventory of Cognitive Distortions (ICD). Anxiety was operationalized as total scores on the Penn State Worry Questionnaire (PSWQ). Depression was operationalized as total scores on the Beck Depression Inventory-II (BDI-II). Personality factors of agreeableness, conscientiousness, and neuroticism were operationalized by scores on the Neuroticism, Extraversion, Openness Personality Inventory – Revised (NEO-PI-R).

Hypothesis 2: It was hypothesized that deficits in executive functioning, functional impairment, and gender would predict total frequency of cognitive distortion in adults diagnosed with ADHD after accounting for anxiety, depression, and the personality factors of agreeableness, conscientiousness, and neuroticism. Deficits in executive functioning were operationalized as total scores on the Barkley Deficits in Executive Functioning Scale (BDEFS-LF). Functional impairment related to ADHD was operationalized as the mean impairment score on the Barkley Functional Impairment Scale (BFIS-LF).

CHAPTER 2: REVIEW OF THE LITERATURE

ADHD Diagnostic Criteria and General Features

The American Psychiatric Association's (2013) *Diagnostic and Statistical Manual of Mental Disorders* (5th ed.; *DSM-5*) diagnostic criteria for attention-deficit/hyperactivity disorder (ADHD) for a child or adolescent require six or more inattentive symptoms and/or six or more hyperactive-impulsive symptoms that are developmentally inappropriate. The requirement for number of symptoms is lowered to five for diagnoses of individuals presenting after the age of 17 years. These symptoms must emerge before the age of 12 years and remain present for at least 6 months. Symptoms must exist in two or more environments, must impact daily functioning, and may not be attributed to any other diagnosis (American Psychiatric Association, 2013). The behavioral deficits associated with the diagnosis arise relatively early in childhood and remain persistent throughout development (Barkley, 1997b).

Symptoms of ADHD are divided into two categories: inattention or hyperactivity/impulsivity (American Psychiatric Association, 2013). Inattention symptoms include making careless mistakes in work, not following through on instructions, and being forgetful in daily activities. Hyperactive and impulsive symptoms are composed of fidgeting, being unable to remain quiet during leisure activities, and interrupting others (American Psychiatric Association, 2013). If individuals endorse the required number of inattentive symptoms but do not display difficulties related to hyperactivity and impulsivity, the diagnosis is specified as a predominantly inattentive presentation. Similarly, individuals are specified as predominantly hyperactive/impulsive presentation if they endorse enough symptoms in that category, but report an insufficient

number of symptoms in the inattentive category. However, if clients report the minimum required symptom count for both inattentive and hyperactive/impulsive symptoms, they are specified as a combined presentation of ADHD (American Psychiatric Association, 2013). Additional specifiers include “in partial remission,” signifying that individuals once met criteria for ADHD but have been below the threshold of required symptoms for the previous 6 months. One should note that the *DSM-5* (2013) does not offer a full remission specifier. A client’s diagnosis of ADHD is also specified based on severity of impairments in functioning: mild, moderate, or severe (American Psychiatric Association, 2013). A meta-analysis of 86 studies of children and/or adolescents and 11 studies of adults indicated predominantly inattentive type is the most common subtype, though those with combined type are most likely to be referred for services (Willcutt, 2012).

Prevalence and Etiology

Recent studies estimate that 7%-8% of children and 4%-5% of adults meet criteria for an ADHD diagnosis (Antshel et al., 2011). Adults with a lifetime history of ADHD diagnosis maintain higher levels of ADHD symptoms compared to the general population, even if they no longer meet diagnostic criteria (Ramtekkar et al., 2010). The etiology of ADHD remains unclear, but its familial nature is strong, and its estimates of heritability at 60%-91% support genetic etiology, with first-degree relatives having an increased risk of 4 to 5 times more likely to be diagnosed with ADHD (Makris et al., 2008; Thapar et al., 2007). The genes that increase risk for ADHD susceptibility interact with environmental risk factors, supporting a diathesis-stress theory for the disorder (Thapar et al., 2007). Identified risk factors include male gender, family dysfunction,

urban living, low socioeconomic status, presence of a developmental impairment, and chronic health problems (Antshel et al., 2011). In a longitudinal study of 604 children followed from birth to 8 years old, Sagiv et al. (2013) identified pre- and postnatal risk factors for ADHD. Results indicated that ADHD behaviors are associated with prenatal exposures and psychosocial and socioeconomic factors. More specifically, prenatal smoking and illicit drug use, low education levels of the parents, and maternal depression were correlated to greater risk for ADHD behaviors (Sagiv et al., 2013).

Comorbidities

ADHD is often comorbid with other psychiatric and personality disorders (Jacob et al., 2007). A variety of comorbid conditions have been observed in both children and adults with ADHD. Two thirds of children diagnosed with ADHD in the United States have comorbid conditions, further impairing social and educational functioning (Larson et al., 2011). In a 2007 National Survey of Children's Health, 5,028 of the 61,779 children surveyed were identified as being diagnosed with ADHD (Larson et al., 2011). Parents reported that 27% of children with ADHD were diagnosed with conduct disorder, compared to 2% of children not diagnosed with ADHD. Additional differences include anxiety (18% vs. 2%) and depression (14% vs. 1%). Most children with ADHD had one comorbid diagnosis (33%), whereas others had two (16%), or three or more (18%) diagnoses (Larson et al., 2011).

As previously mentioned, there are several differences between the presentations of ADHD in adults versus in children. One such factor is a higher rate of psychiatric comorbidities in adults (Klassen et al., 2010). Grogan and Bramham (2016) found that 86.7% of adults with ADHD meet criteria for at least one comorbid disorder, and the

majority have more than two. In 85.6% of cases, ADHD develops prior to the comorbid disorder (Grogan & Bramham, 2016). Common comorbidities in adulthood include anxiety disorders, major depressive disorder, bipolar disorder, and substance abuse (Klassen et al., 2010).

Gender Differences in ADHD

Several differences between men and women with ADHD have been identified through research. These variances contribute to inaccurate diagnosis, inappropriate treatment approaches, and protracted impairments in daily functioning. Additionally, women are largely underdiagnosed in the ADHD population, especially as children.

Underdiagnosis in Women

According to the National Institute of Mental Health (2017), based on patient report data from the National Survey of Children's Health, 6.7% of girls between the ages of 4 and 17 years were diagnosed with ADHD in 2011, as opposed to 15.1% of boys. Approximately 4 million women with ADHD in the United States remain undiagnosed (Waite, 2007). A community sample study of 1,896 children between the ages of 4 and 17 years found that ADHD was 2.3 times more likely to be diagnosed in boys than in girls (Bauermeister et al., 2007). Because the symptoms of ADHD listed in the *DSM-5* (2013) are based on studies that primarily include Caucasian boys as subjects, insight into girls and women from ethnically diverse backgrounds is limited (Waite, 2010; Waite & Tran, 2010).

As the male to female ratio of ADHD is 3:1, the gender ratio of those who receive treatment is even greater, with six to nine male individuals receiving treatment to every one female individual (Bruchmüller et al., 2012). Women with ADHD tend to present

with higher rates of learning disorders, anxiety, mood disorders, and problems with substance abuse than males with ADHD (Quinn, 2005). Women with ADHD are underrepresented not only because of their less overt symptoms, but also because the presence of coexisting conditions often clouds the diagnostic picture (Quinn, 2008).

Gender Differences in Age of Onset

Later age of onset is identified as one specific factor leading to underdiagnosis in women. The later age of onset may be connected to some dopamine-related neurobiological differences between boys and girls (Woodman Taylor & Keltner, 2002). Though the exact cause is unknown, many experts more specifically hypothesize that ADHD is related to insufficient dopamine, as well as to dysfunction in related neural pathways. Boys have an overproduction of dopamine before and during puberty, thereby contributing to more frequent reports of hyperactivity when compared to girls (Woodman Taylor & Keltner, 2002). The prefrontal cortex plays a significant role in ADHD. The prefrontal cortex is principally responsible for executive functions (EFs) and requires a substantial amount of dopamine (Antshel et al., 2011). After puberty when boys' symptoms seem to diminish because of dopamine receptors reducing in density by 55%, girls' symptoms begin to appear with the increase of estrogen, which causes an increase of dopamine (Woodman Taylor & Keltner, 2002). This also suggests that ADHD development, symptoms, and treatment may be affected by fluctuating hormone levels, especially for female individuals (Quinn, 2005).

Adult men and women with ADHD have different neuropsychological markers, suggesting that etiology and the manifestation of ADHD may be sex specific (Fedele et al., 2012). Though core neurobiological deficits underlie ADHD in both male and female

individuals, Hermens et al. (2004) observed some gender differences in 35 adults with ADHD through the use of electroencephalography and skin conductance level during a resting activity. Male participants displayed excessive theta activity (often associated with daydreaming) during minimal cognitive demand periods. Women, however, showed a decrease in autonomic arousal (Hermens et al., 2004).

Symptom Presentation

Once girls enter puberty and, according to some research, begin exhibiting increased ADHD symptom severity, the diagnosis of ADHD often continues to be overlooked because of the different presentation of symptoms compared to that of their male counterparts. Girls with ADHD tend to present as shy and more withdrawn and may be very focused on pleasing the important people in their lives, perhaps as the result of sociocultural pressures (Woodman Taylor & Keltner, 2002). If the female child has a high IQ, the likelihood of diagnosis decreases further because clinicians assess for academic and behavioral disturbances. Protective factors, including high IQ, social skills, and supportive family members, may delay or obviate ADHD diagnosis by providing a form of compensation (Quinn, 2005). Similarly, most educators and mental health providers responsible for diagnosing ADHD assess for academic achievement, which many believe to be a typical result of ADHD symptoms. Therefore, girls with high IQs may not demonstrate the same difficulties academically as boys until environmental demands increase and exceed compensatory skills. For many female individuals, challenges related to academics may not reveal themselves until college or graduate-school settings (Quinn, 2005).

Moreover, when female individuals encounter barriers related to their ADHD, they often internalize the feelings of perceived inadequacy, subsequently increasing feelings of shame. Because symptoms are internalized, anxiety and depression may also increase, as may emotional dysregulation (Quinn, 2008). Unsurprisingly, female individuals who eventually seek treatment are often misdiagnosed or underdiagnosed with depression, anxiety, or even bipolar disorder, with clinicians failing to diagnose or even properly assess for ADHD (Woodman Taylor & Keltner, 2002).

Gender Differences in Comorbidities

Women with ADHD are vulnerable to early adversities and problems with both physical and mental health. Specifically, they are 3 times more likely than men to have experienced insomnia, generalized anxiety disorder, childhood sexual abuse, suicidal ideation, and chronic pain. They are also twice as likely as men to smoke, abuse substances, have experienced childhood physical abuse, and experience severe poverty (Fuller-Thomson et al., 2016). In a study of 3,559 individuals with ADHD, women had higher rates of depression (54% vs. 36%), anxiety disorders (28% vs. 15%), and dysthymic disorders (16% vs. 13%) than men. Additionally, compared to controls, adolescent girls diagnosed with ADHD are 3.6 times more likely to develop an eating disorder (Quinn, 2008). Women with ADHD are more likely to be diagnosed with a comorbid mental health condition. Compared to controls, women with ADHD had higher rates of anxiety and depression. When compared to men with ADHD, women were also more likely to develop cognitive impairments and low self-esteem (Biederman et al., 1994).

Underdiagnosis of Women in the ADHD Population

Disruptive behavior is often regarded as a contributing factor to, if not the primary reason for, boys' referrals for ADHD treatment, resulting in the overrepresentation of boys in the ADHD population. However, teachers, who are often the catalyst for evaluation referrals, are more likely to refer a male than a female student, even when both children display equal levels of impairment (Skogli et al., 2013). Conversely, Derks et al. (2007) found that nonreferred boys and girls with ADHD are rated with similar levels of disruptive behavior by their mothers. The authors obtained data from the mothers and teachers of a nonreferred sample of 283 boys and 291 girls with and without ADHD. Results indicated that mothers reported similar levels of aggression and attention problems in boys and girls with ADHD, while teachers rated boys consistently higher on the same variables.

In one study, Bruchmüller et al. (2012) provided 1,000 mental health professionals with four vignettes of ADHD cases. Vignette 1 met *DSM* criteria for ADHD, and Vignettes 2 through 4 contained some symptoms of ADHD but did not meet full criteria. Each of the vignettes assessed for gender-effects, by offering "boy" and "girl" versions. Results indicated that clinicians were twice as likely to diagnose a male character in a vignette as having ADHD than a female character in a vignette. The authors suggested that clinicians do not strictly adhere to diagnostic manuals and may be biased as a result of a representativeness heuristic. Essentially, if a client resembles what the mental health professional considers to be a prototypical child with ADHD, certain exclusions may be overlooked, thus possibly resulting in overdiagnosis. If male children are viewed as more prototypical, they may receive a diagnosis of ADHD more readily

than female children with the same presentation, thereby contributing to the underdiagnosis and underrepresentation of female individuals with ADHD (Bruchmüller et al., 2012).

Additional Gender Differences in ADHD

In a study of 874 college students, adult women with ADHD experienced higher levels of impairment than men with ADHD and controls (Fedele et al., 2012). More specifically, college-aged women reported greater impairment than men in their social and dating lives, within the home, in managing their finances, and in education, as well as in overall impairment in daily life. Fedele et al. (2012) observed that the environmental domains that female subjects self-reported as more impaired shared common elements. For example, the domains of daily life, home life, and social life relate to the differential value that women place on close relationships and social ties as compared to their male counterparts. Furthermore, this value suggests that ADHD symptoms, which lead to the aforementioned impairments, may be more distressing to women than to men. This raises the question of whether the greater impairment, or at least the distress about impairment in these circumstances, is subjective or objective (Fedele et al., 2012).

Young girls are aware of gender role differences and may develop a sense of inadequacy related to the struggle to meet gender role expectations as early as 8 or 9 years of age (Quinn, 2005). Gender differences in the reactions of partners to their spouses with ADHD have also been observed. Studies have shown that men show less tolerance to wives with ADHD, with 60% of non-ADHD men leaving their female partner in comparison to only 10% of women leaving their male partners with ADHD (Johnston et al., 2012).

Gender Identity

As gender is often considered to come in two forms, male or female, and to be congruent with the assigned sex at birth, conceptualizations of gender have rapidly expanded past traditional frameworks, and gender identities outside of the male/female binary are becoming increasingly recognized in medical, psychological, and legal systems (Frohard-Dourlent et al., 2016; Richards et al., 2016). According to Richards et al. (2016), “Some people have a gender which is neither male nor female and may identify as both male and female at one time, as different genders at different times, as no gender at all, or dispute the very idea of two genders” (p. 95). Thus, “genderqueer” or “non-binary” are identified umbrella terms. Most research has not included nonbinary response options, and population-based research on gender nonconformity is incredibly scarce, making an estimation of the number of people who identify as nonbinary incredibly difficult (Van Caenegem et al., 2015; Webb et al., 2015). However, existing research has indicated that adolescents and young adults who identify as nonbinary were more likely to report a current mental health condition, a history of childhood sexual abuse, a history of self-injurious behaviors, suicidality, and substance abuse than youth in general population studies (Rimes et al., 2019). Unfortunately, lack of appropriate preventative health care and fear of discrimination prevent many nonbinary individuals from receiving necessary treatment, further contributing to poorly managed conditions, such as posttraumatic stress disorder, depression, substance use, and suicidality (Reisner et al., 2016). Subsequently, these conditions contribute to a shorter lifespan compared to that of cisgender counterparts (Transgender Health, 2015).

LGBT+ individuals have reported a greater prevalence of learning, development, and behavioral differences, including ADHD, compared to cisgender and heterosexual individuals (Leven et al., 2020). In a study involving five cross-sectional data sets comprised of 641,860 individuals who provided information on neurodevelopmental and psychiatric diagnoses as well as on gender, Warrier et al. (2020) confirmed that transgender and gender-diverse individuals reported higher rates of neurodevelopmental diagnoses compared to cisgender individuals. Many individuals who identify outside of the typical cisgender realm who also have been diagnosed with ADHD have noted that they feel “doubly different,” making fitting in with peers even harder, further diminishing self-worth (Leven et al., 2020). As such, the combination of identifying as nonbinary and having a diagnosis of ADHD may very well contribute to greater difficulties in various domains.

Daily Impairments

Typical Impairments for Individuals with ADHD

Symptoms of ADHD may contribute to impairments in a variety of domains. For example, talking too much or out of turn may create consequences in college classrooms, and becoming distracted by applications on a cell phone during business meetings may lead to negative outcomes at work (Weiss & Weiss, 2004).

The symptoms congruent with the hyperactive subtype of ADHD may also have an impact on impairment. Children diagnosed with the hyperactive presentation are shown to exhibit more antisocial behavior, oppositional defiant behavior, failure in school, lack of success in college, greater employment problems, more relationship

problems, and increased rates of substance use when compared to non-hyperactive peers (Knouse et al., 2008).

Knouse et al.'s (2008) study required 206 university students enrolled in general psychology courses to complete a demographic questionnaire, the Attention Deficit/Hyperactivity Disorder Rating Scale (DuPaul et al., 1998), as well as assessments of mood and activities through the use of Personal Digital Assistants. Over the course of 1 week, participants answered as many as 56 assessments to evaluate the impact of ADHD symptoms on social functioning, emotional well-being, cognitive impairment, and activities and distress. Results indicated that the different symptom constellations, inattentive versus hyperactive-impulsive symptoms, related differently to daily experiences (Knouse et al., 2008). Specifically, individuals who exhibit more inattentive symptoms encounter more general distress, more negative moods, and greater concentration problems. Those with more hyperactive-impulsive symptoms were less sensitive to contextual factors when they were required to perceive a situation (Knouse et al., 2008). These results relate to the experience of many women with ADHD, the majority with inattentive type, who internalize symptoms of distress, thereby enhancing symptoms of anxiety and depression. Conversely, male counterparts, who more frequently display symptoms of hyperactivity/impulsivity, may have greater difficulty in regard to perceiving situational details, but are less likely to experience negative impacts on overall mood.

Negative Effects/Challenges that Result from ADHD-Related Impairments

ADHD and its associated challenges have been identified as contributing factors to low self-esteem, negatively impacting quality of life (O'Brien, 2016; Wehmeier et al.,

2010). Pitts et al. (2015) conducted a Lifetime Impairment Survey, a nonvalidated, online opinion survey, of 89 adults diagnosed with ADHD and 94 adults without ADHD in the United Kingdom. The groups completed symptom and impairment self-report rating scales, with higher scores suggesting greater impairment. The researchers found that the adults with ADHD reported greater impairments on every scale, except for the involvement scale (Pitts et al., 2015). The areas of significantly greater impairments included romantic and social relationships, self-organization and planning, personal finances, greater work difficulties, and greater number of jobs (Pitts et al., 2015). Furthermore, 50% of adults with ADHD who participated in this study reported that ADHD impacted academic achievement, 40.2% reported a negative effect on their careers, and 42.7% recognized an impact on daily life activities (Pitts et al., 2015).

Problems associated with ADHD can lead to a negative impact on socioeconomic status. For example, individuals with ADHD encounter double the annual medical costs and miss significantly more days of work when compared to adults without ADHD (Waite, 2010). Children with ADHD are more likely to be beaten up or assaulted with a weapon, and girls with ADHD have an increased risk of being sexually abused. In general, individuals with ADHD become sexually active at a younger age, have more sexual partners, have more casual sex, and are less likely to use contraception than individuals without ADHD, increasing the risk for sexually transmitted diseases and unplanned pregnancy (Wehmeier et al., 2010).

Impairments in ADHD commonly appear in health-related behavior. In 2014, Spencer et al. assessed the impact of ADHD on health risk indicators and lifestyle by comparing 100 untreated adults with ADHD and 100 non-ADHD adults. No differences

were found in many health habits (e.g., nutrition, alcohol and caffeine use, physical activity, sexual activity), but differences in adverse health risk indicators (e.g., tobacco use, poor sleep habits, drug use, lower frequency of medical and dental care, obesity) were identified. This study confirmed that ADHD is associated with adverse behavior and with impact on physical health. Medical staff in primary-care settings are often on the front lines of recognizing and intervening with ADHD symptoms. Unfortunately, many practitioners do not possess sufficient knowledge of adult ADHD (Waite, 2007).

Those with ADHD are more likely to experience setbacks in several domains across their lifetime versus neuro-typical adults. Early attention difficulties are associated with math, reading, and school performance difficulties (Arnold et al., 2015). Poor school performance is even more significant in children with untreated ADHD when compared to controls and those with ADHD undergoing treatment. Arnold et al.'s 2015 review of published data identified worse achievement and academic test outcomes in the untreated ADHD population when compared to non-ADHD controls. Once treated, both groups saw improvement, especially in achievement test scores (Arnold et al., 2015). Similarly, children with ADHD have shown lower work performance and more frequent job changes in adulthood. Lack of treatment in childhood and mental health or substance use comorbidities were found to further lower employment rates (Halmøy et al., 2009).

Individuals diagnosed with ADHD may also have less support from peers or family. Approximately more than 50% of children with ADHD have serious issues with peers. This may be influenced by ineffective social exchanges, such as problems with cooperation, sharing, and taking turns. Children with ADHD tend to be less well liked by classmates, are more often rejected, and develop fewer reciprocal friendships (Wehmeier

et al., 2010). With children diagnosed with ADHD being at a greater risk of rejection and bullying, they are more likely to develop negative perceptions of themselves and others, perhaps leading to behavioral problems and/or a tendency to internalize emotions.

Family support may also be limited, as many adolescents with ADHD are more avoidant of parents, less responsive, or even more hostile, creating more stress and conflict within the home (Wehmeier et al., 2010).

Executive Functioning and ADHD

Executive functions (EFs) are theoretical constructs that are uniquely human. They involve a hierarchically organized series of steps implicated in life activities and are generally considered to be the processes that allow humans to self-regulate thoughts, emotions, and actions (Barkley, 2011a; Séguin & Zelazo, 2005). Barkley (2012) explained that the concept of EF was first reported in the 1840s when scientists began attempting to understand the specific functions of the prefrontal cortex. However, it was not until 120 years later that the term EF was defined as the purpose and function of the prefrontal lobes (Barkley, 2012). However, EFs are not simply a function of the prefrontal cortex. Rather, the many networks of the prefrontal cortex connect to other regions, including the basal ganglia, cerebellum, limbic system, amygdala, and different cortical and subcortical regions (Barkley, 2012). Individuals with ADHD have deficits of executive functioning, which are linked to circuitry differences in the prefrontal cortex (Ramsay & Rostain, 2005). In normal human development, EFs emerge as early as the end of the first year of life, with the most important changes occurring between 2 to 5 years of age, whereas adult levels of EF are generally reached by approximately the age of 12 years (Séguin & Zelazo, 2005).

Barkley (1997b) conceptualized EF as self-regulation toward the future. Executive-control functions assist individuals in monitoring and controlling information processing necessary to produce voluntary action. These functions are required for decision making, strategizing, and troubleshooting. Impairment in executive functioning has been identified in ADHD (Fernandez-Duque et al., 2000). According to Ramsay (2010), “ADHD is generally understood as a disorder of impaired executive functions that result in downstream self-regulation problems” (Ramsay, 2010, p. 38). The disruptions in one’s executive functioning are associated with the inability to shift attention to deactivate a currently activated schema and to shift to a more appropriate schema for the present context, thereby contributing to perseveration, distractibility by irrelevant stimuli, poor planning, monitoring deficits, and impairment of memory retrieval (Fernandez-Duque et al., 2000). EFs also involve inhibition and impulse control, cognitive flexibility, working memory, and planning and organization strategies in order to regulate behavioral output (Seidman et al., 2004).

The executive functioning difficulties experienced by individuals with ADHD appear unique to the disorder. In a study of 25 children with a disruptive behavior disorder (DBD) and comorbid ADHD, 23 children with DBD but without a comorbid ADHD diagnosis, and 25 healthy control children, researchers aimed to gain a better understanding of the role of executive functioning in children with DBD. Results indicated that children with comorbid diagnoses of ADHD and DBD performed worse than the other children on self-report and neurocognitive measures of executive functioning. The children with DBD without ADHD diagnosis did not differ from the

control group in executive performance, demonstrating the relationship between ADHD and dysregulation in EF (Hummer et al., 2011).

Consistent with their theory of EFs, Barkley and Murphy (2011) created a 91-item EF rating scale based on EF theories representing five dimensions: self-organization/problem solving, self-motivation, self-management to time, self-discipline, and self-activation/concentration. In total, 146 adults with ADHD, 97 clinical control adults not diagnosed with ADHD, and 109 community control subjects completed the questionnaire. On all five scales, the EF ratings were significantly more severe for the ADHD group compared to both the community control and clinical group for both self- and other-reported forms (Barkley & Murphy, 2011).

Even individuals with ADHD and superior IQ report EF deficits (Brown et al., 2009). In a study of 157 adults with ADHD and an IQ greater than or equal to 120, participants were evaluated with eight normed measures of EF. Three tests were indexes of the Wechsler Adult Intelligence Scale (WAIS-III), a larger normed standardized test of cognitive ability and memory (i.e., Working Memory Index; Processing Speed Index; Story Memory Index). Five subscales of the Brown Attention Deficit Disorder scales, a self-report measure of EF impairments, were also included. Results indicated that impairments were significantly greater on all eight measures when compared to the general population, and 73% of participants were significantly impaired on at least five of the EF subtests (Brown et al., 2009).

Emotional Dysregulation

Emotional regulation has been defined as the ability to modulate the degree and speed of physiological, experiential, and behavioral expressions of emotions, that is, how

intensely an emotion is expressed and how quickly emotional expression de-escalates (Bunford et al., 2015). Emotional regulation is described as a two-part process. First, individuals must inhibit emotional reactions, and then they reorganize their emotions, which involves refocusing attention to move forward in goal-directed actions (Retz et al., 2012). Subsequently, emotional dysregulation is considered the “inability to exercise any or all aspects of the modulatory processes involved in regulating positive and negative emotions, to such a degree that the inability results in the individual functioning meaningfully below his or her baseline (Bunford et al., 2015, p. 209).

Impairment of psychosocial function has been repeatedly associated with ADHD (Wehmeier et al., 2010). Emotional dysregulation may contribute to this impairment through decreased arousal to stimulation, coping problems, poor self-regulation of emotions, and/or greater excessive emotional expression, especially socially maladaptive aggression and anger (Wehmeier et al., 2010). Children with ADHD tend to view their problematic behaviors as occurring more frequently than in their non-ADHD peers and report believing that these behaviors are less within their control (Harpin, 2005). These impairments may be related to the disorder itself, such as greater rates of impulsivity leading to more extreme emotional reactions and being less able to moderate, manipulate, and suppress emotional reactions because of a disruption in executive functioning. Emotional impairments may also be reciprocally influenced by comorbidities or be a result of the impact of ADHD or comorbidities on the social environment, thereby creating stress and further emotional response (Wehmeier et al., 2010).

Though emotional symptoms are common in most psychiatric diagnoses, emotional impulsivity and deficient emotional self-regulation are highly prevalent in

ADHD. Both of these symptoms cause clinically significant impairments (Faraone et al., 2018). Along with symptoms of inattention, hyperactivity, and impulsivity, adults with ADHD may have more diverse deficits than children with ADHD, including difficulties with emotional regulation and self-concept (Hirsch et al., 2018). Shaw et al. (2014) examined current literature to conduct a comprehensive review, in hopes of determining the prevalence of emotional dysregulation in the ADHD population. Their review identified that 34%-70% of adults with ADHD experience emotional regulation deficits, while approximately 25%-45% of children with ADHD experience the same difficulties (Shaw et al., 2014). According to Barkley (2015), ADHD's core symptoms of inattention and hyperactivity/impulsivity stem from the deficits in emotional-motivational regulation.

A body of evidence demonstrates that emotional dysregulation is a core feature of ADHD (Barkley, 2015; Hirsch et al., 2018; Retz et al., 2012; Shaw et al., 2014). Clients with ADHD often report rapidly changing mood swings, problems in dealing with stressful situations, and emotional excitability, as well as becoming frequently irritable, frustrated, annoyed, and impatient. Their greater emotional excitability often leads to interpersonal problems (Retz et al., 2012). Neuroimaging and neuropsychological studies support that emotional dysregulation is a core component of ADHD, in addition to cognitive deficits and the disturbance of motor activity. In fact, imaging has confirmed that the hypoactive prefrontal networks associated with EF difficulties in patients with ADHD are also involved in emotional regulation (Retz et al., 2012).

Emotional impairments are detrimental to individuals with ADHD and also impact social functioning (Wehmeier et al., 2010). Studies have consistently

demonstrated that individuals with ADHD show lower levels of conscientiousness (Avisar & Shalev, 2011). Clients with ADHD may also process information differently from individuals without ADHD and have less emotional competence. Studies have identified that boys with ADHD are less empathic than their non-ADHD peers (Friedman et al., 2003). Additionally, adults with ADHD tend to be more emotionally reactive than those without ADHD. The intensity of their own emotions may interfere with their ability to perceive another individual's emotions. Being less in tune with emotional stimuli also appears to create deficits in expressing emotions verbally (Friedman et al., 2003). Furthermore, poor self-esteem and self-perception are both related to ADHD (Wehmeier et al., 2010). Experiencing intense emotions that interfere with empathy, development of social skills, and fostering relationships, as well as the limited ability to communicate these emotions effectively, may further contribute to interpersonal difficulties, psychopathology, and the development of cognitive distortions.

ADHD Medication and EFs

Research has shown that ADHD medications have varying degrees of success in treating executive dysfunction (Antshel et al., 2011). Approximately two of every three individuals with ADHD respond well to a prescribed stimulant medication.

While pharmacotherapy for ADHD began with limited options of immediate-release stimulant medications, often taken multiple times a day, a variety of types of stimulant and nonstimulant medications are now available (Daughton & Kratochvil, 2009). While a benefit of short-acting stimulants, such as Adderall and Ritalin, is the noticeable effects as quickly as 30 minutes after ingestion, a disadvantage is a limit to consistent efficacy and compliance, as these medications are typically required to be

taken multiple times a day (Daughton & Kratochvil, 2009). On the other hand, long-acting stimulants, such as Concerta and Vyvanse, are also available and have been shown to be equally as effective as short-acting stimulants. These medications do not require multiple doses a day because of their longer half-life and therefore may also reduce stigma and necessity to remember needing to take additional doses in a school or office setting. However, long-acting medications are typically more expensive, and because the medication has a longer duration, side effects may also last longer. At times, short-acting stimulants are prescribed in conjunction with long-acting stimulants (Daughton & Kratochvil, 2009). Nonstimulant ADHD medications, such as Strattera, also have long-lasting effects and also reduce the risk of substance abuse. Disadvantages to nonstimulant medications include less efficacy and gradual therapeutic effects, typically peaking at 2 to 6 weeks after initiation (Daughton & Kratochvil, 2009).

Side effects to ADHD medications can often be a deterrent for clients to remain consistent with medication regimens. In a survey of approximately 325 patients with ADHD, 48% reported experiencing at least one side effect from an ADHD medication (i.e., amphetamine, dextroamphetamine, methylphenidate, atomoxetine, isdexamfetamine, or dexmethylphenidate). Of the participants, 21% described their side effects as bothersome or extremely bothersome. In this report, the most commonly mentioned side effects were mood disturbances, loss of appetite, and sleep problems (Cascade et al., 2010). The side effects were similar for both stimulant (48%) and nonstimulant (46%) medications. However, those taking stimulants reported greater mood disturbance, whereas those taking nonstimulants reported more frequent nausea and/or gastrointestinal problems (Cascade et al., 2010).

In a study using a computerized battery measuring executive functioning, Kempton et al. (1999) examined the difference in executive-functioning abilities between two groups of 15 children each, one with treatment-naïve children who had been diagnosed with ADHD and one group diagnosed with ADHD and treated with stimulant medications. Results indicated that the treatment-naïve group experienced significantly more impairments in executive functioning in several tasks, including set-shifting, planning, spatial working and short-term memory, and delayed matching and spatial recognition memory. The group of children treated with stimulant medication did not display impairments in executive functioning, except in spatial recognition memory (Kempton et al., 1999).

Semrud-Clikeman et al. (2008) studied a group of 94 children in four conditions: diagnosed with ADHD with a history of medication treatment, diagnosed with ADHD but treatment naïve, diagnosed with a learning disability, and a nonclinical control group. All children were evaluated while not medicated with measures of behavior, achievement, and neuropsychological functioning. The group of children receiving medication for their ADHD performed better than their treatment-medication-naïve counterparts on measures of attention, writing, and the Stroop interference. Children receiving medication treatment also performed just as well as the control group in terms of academics, verbal working memory, and executive functioning. Both ADHD groups displayed greater behavioral difficulties in regard to mood and externalizing behaviors when compared to the controls and learning-disabilities group, with the treatment-naïve group performing the worst (Semrud-Clikeman et al., 2008).

Fredriksen et al. (2014) studied 250 adults with ADHD who had never been treated with medication. After 1 year on a nonstimulant or stimulant medication, 232 of the remaining adults were evaluated for remaining symptoms with the Adult ADHD Self-Report Scale (ASRS) and the Global Assessment of Functioning (GAF). Participants were also assessed for mental distress on the ADHD-specific Clinical-Global- Impressions-Improvement Scale (ADHD CGI-I). Longitudinal results from baseline to 1-year follow-up showed that 70% of participants remained on medication. Those who remained on medication showed a significant reduction in ADHD symptoms, as measured by greater improvement on GAF scores (median 20% vs. 4%) and further reduction in ASRS scores (median 39% vs. 13%). CGI-I scores were endorsed as “much or very much improved” by 144 participants who remained on medication, compared to only two participants not on ADHD medication. Medication was also associated with improved functioning and less mental distress. Higher cumulated doses were associated with sustained improvement, while side effects and psychiatric comorbidities were related to less effectiveness and termination of medication (Fredriksen et al., 2014).

Gender Differences in Executive Functioning

Though there are many relevant differences between boys and girls with ADHD, there appear to be more similarities than differences between the genders in regard to the EFs (Sjöwall et al., 2013; Skogli et al., 2013). In a study of 101 girls and 103 boys with ADHD and a control group of 109 girls and 70 boys, all between the ages of 9 to 17 years, participants completed neuropsychological assessments. Results indicated that 71% of participants with ADHD had at least one neuropsychological impairment (i.e., Reaction Time variability 54%, EF 35%, and/or delay aversion 14%). While both boys

and girls with ADHD were significantly more impaired on measures of EF when compared to controls, they did not significantly differ from each other. These findings suggest that ADHD is responsible for executive-functioning difficulties, regardless of gender (Seidman et al., 2005).

In a study of 64 unmedicated adults diagnosed with ADHD and 73 non-ADHD controls, Seidman et al. (1998) found that those with ADHD were significantly impaired on measures of arithmetic, encoding of verbal memory, and vigilance. These results remained even after controlling for variables of learning disability, psychiatric comorbidity, age, and gender (Seidman et al., 1998). Though most studies focus on children and adolescents, the majority have found few or no gender differences in executive functioning across the lifespan (Rucklidge, 2010). However, one potential observed difference relates to gender and ADHD subtype. In a study of 54 boys and girls with ADHD and 69 boys and girls in a non-ADHD control group, Wodka et al. (2008) identified that boys diagnosed with the combined subtype of ADHD performed better on measures of verbal fluency than did girls with the combined subtype of ADHD. When the predominantly inattentive subtype was compared by gender, girls performed better on measures of verbal fluency than did boys. Wodka et al. (2008) suggested that these results may indicate that children who have been diagnosed with the less common ADHD subtype for their gender may have greater deficits on process measures on assessments, such as the Delis-Kaplan Executive Functioning System.

Cognitive Distortions

The cognitive model, formulated by Aaron Beck (1967), posits that individuals have learned how to think about stimuli, whether they be internal or external, based on

core beliefs or schema formed through life events. Negative core beliefs about the self, others, or the world support the development of cognitive distortions. Although some negative thinking may be accurate to the situation, the cognitive model proposes that maladaptive negative or inaccurate thinking about a situation or event is primarily responsible for problematic emotions, behaviors, and even physiological responses (Beck, 1967; Beck, 1976; Beck et al., 1979). Cognitive distortions contribute to misperceptions and misinterpretations of situations and resultant emotional distress and behavioral problems. In his seminal work, Beck (1967) defined cognitive distortions as systematic errors in reasoning, generally in a predictable manner. Different studies have supported the hypothesis that there are content-specific distortions, identifying specific associations between anxiety, depression, and aggression with different distortions (Leung & Poon, 2001; Rosenfield, 2004; Serine, 2016; Strohmeier et al., 2016).

A case conceptualization is considered an essential element of cognitive behavioral therapy (CBT; Beck, 2011). A cognitive case conceptualization describes a client's presentation, consists of theoretically informed hypotheses of what may be maintaining a client's problems, and informs interventions (Cronin et al., 2015; Kuyken et al., 2008). According to Cronin et al. (2015), "Although different formats of case conceptualization exist, most involve the elements of the client's belief system, including automatic/surface-level cognitions, assumptions, rules, and values, as well as core beliefs, schema, and relevant life history" (p. 441). Using this process, a CBT case conceptualization can identify patterns of cognitive distortions in automatic thoughts and begin to understand their connection to the client's core beliefs.

According to Ramsay (2010), although ADHD is not caused by negative thoughts, living with a neurodevelopmental disorder that causes impairments in daily life within multiple domains may negatively impact one's cognitions. As he posits, “in addition to the chronic functional difficulties associated with ADHD, recurring frustrations in these life domains can lead to the development of pessimistic outlooks, negative assumptions about one’s abilities, and dysfunctional belief systems” (Ramsay, 2010, p. 40). For many adults, these negative perspectives become overgeneralized; lead to distorted, self-defeating thoughts and maladaptive behaviors; and impede the development of positive coping strategies. In turn, adults with ADHD may begin developing maladaptive core beliefs, leading them to question their capabilities in managing life with ADHD symptoms.

Since Beck first described cognitive distortions in 1967, many types of distortions have been suggested by a variety of psychologists. The Inventory of Cognitive Distortions (ICD; Yurica & DiTomasso, 2002) is a comprehensive self-report measure that has been psychometrically validated for measuring cognitive distortions (Rosenfield, 2004; Yurica & DiTomasso, 2001). The ICD is one of only two self-report measures validated to test the frequency of cognitive distortions and measures more types of cognitive distortions than any other measure. Finally, a great benefit to the ICD is its ability “to span diagnostic categories, rather than being restricted to a particular diagnosis” (Rosenfield, 2004, p. 53).

The 11 distortions measured by the ICD are externalization of self-worth, fortune-telling, magnification, labeling, perfectionism, comparison with others, emotional reasoning, arbitrary inference/jumping to conclusions, emotional reasoning and decision

making, minimization, and mindreading. The following cognitive distortions are commonly experienced by all people but have the potential to negatively impact mood. In fact, cognitive distortions have been found to account for about half of the variance in the number and severity of psychological disorders, both clinical syndromes and personality disorders (Rosenfield, 2004), making them relevant to most psychopathology, including ADHD and frequent comorbidities (Serine, 2016; Strohmeier et al., 2016).

Arbitrary inference/Jumping to conclusions: This distortion describes an individual's tendency to jump to a conclusion without evidence supporting the conclusion. In fact, there may even be evidence contradictory to the conclusion they have drawn (Beck & Weishaar, 2007).

Magnification and minimization: Viewing an event as more or as less significant than it is in reality (Beck & Weishaar, 2007).

Mindreading: When individuals assume that someone is thinking negatively about them (Burns, 1980).

Emotional reasoning: Believing something is true because of an emotional response, rather than examining objective evidence (Burns, 1980).

Labeling: After an adverse event occurs, this distortion leads to individuals classifying themselves negatively (Burns, 1980).

Comparison with others: Comparing oneself to others, either positively or negatively (Freeman & DeWolf, 1992; Freeman & Oster, 1999).

Externalization of self-worth: This distortion causes individuals to believe that self-worth is based on others' views of themselves (Freeman & DeWolf, 1992; Freeman & Oster, 1999).

Fortunetelling: Predicting and believing a negative outcome of a future event (Burns, 1980).

Perfectionism: With this distortion, a person constantly tries to avoid a subjective experience of failure by attempting to be perfect, even when those standards are not reasonable (Freeman & DeWolf, 1992; Freeman & Oster, 1999).

Emotional reasoning and decision making: Relying on emotions or a “gut feeling” to make decisions (Roberts, 2015).

ADHD and Cognitive Distortions

In comparison to individuals without ADHD, individuals with ADHD experience more stressors in daily life, greater perceived stress, and less effective coping with stress. These factors contribute to an increase in negative automatic thoughts and beliefs about themselves, the world, and the future. Consequently, these negative beliefs lead to maladaptive schema that distort the perception and interpretation of events, which have a reciprocal relationship with cognitions (Miklósi et al., 2016). Schema is defined as a cognitive structure composed of associations that guide a person’s perception. This structure processes the abundance of incoming stimuli and assimilates information, imposing meaning based on previously formed schema. Essentially, one’s perception is a result of the interaction between preexisting schema and the incoming stimuli (Bem, 1981).

Maladaptive schemas have been associated with greater perceived stress for those with ADHD, thus contributing to a negative impact on emotional well-being (Miklósi et al., 2016). Impulsivity has also been identified as a significant predictor of cognitive distortions (Mobini et al., 2006). In a sample of 204 adults, Miklósi et al. (2016)

observed a positive correlation between ADHD symptoms and increased levels of stress and lower emotional well-being. Additionally, according to Miklósi et al. (2016), “symptom severity was strongly related to maladaptive schema of social isolation, defectiveness/shame, failure, and insufficient self-control/self-discipline, suggesting that ADHD psychopathology might contribute to the development and maintenance of these core beliefs” (p.367).

In childhood and moving into adolescence, individuals with ADHD report a distorted sense of self and disruption of normal development (Harpin, 2005). Negative experiences throughout the lifetime, such as problems related to inattention, impact clients' self-esteem, self-efficacy, development of adaptive core beliefs, and coping. Maladaptive coping strategies, such as avoidance and procrastination, are developed in response to negative views of the self. These strategies maintain and reinforce those same distorted, maladaptive beliefs and appear to confirm negative views of the self (Newark & Stieglitz, 2010), consequently creating a pathogenic confirmation bias. In a case example, Ramsay and Rostain (2003) suggested that negative views of the self, such as feeling defective, influence the formulation of conditional beliefs. These rules have the potential to contribute to avoidance behaviors. By restricting experiences that may prove otherwise, there may be no opportunity to find evidence to counter the belief of being defective. Furthermore, this scenario delineates how maintaining maladaptive beliefs about the self and restricting behavior can impede the development of strengths and reduce opportunities in life (Ramsay & Rostain, 2003). When ADHD continues into adulthood, many individuals develop and maintain a sense of mistrust of themselves and continue to have expectations of failure. Schema formed in childhood become easily

reactivated when problems are encountered as adults and are magnified by executive dysfunction (Ramsay, 2010).

Knouse et al. (2013) examined the degree to which cognitive-behavioral avoidance and dysfunctional attitudes accounted for variance in symptoms of depression in 77 adults with ADHD. Participants completed diagnostic interviews, self-report questionnaires, and symptom rating scales administered by a clinician, while controlling for recent negative life events. Results indicated that the variance between ADHD and depressive symptoms was fully accounted for by cognitive-behavioral avoidance and dysfunctional attitudes, with cognitive-behavioral avoidance being most strongly related to depressive disorders.

Philipsen et al. (2017) assessed dysfunctional beliefs of 78 adults with ADHD and 80 control subjects with the Young Schema Questionnaire (Young et al. 2003). Individuals with ADHD endorsed significantly higher rates of all maladaptive schemas compared to controls. The most pronounced differences were in the following schemas: “Emotional Deprivation” (i.e., belief that others will never meet their emotional needs), “Defectiveness/Shame” (i.e., belief that one is internally flawed, and others will realize this and leave them), “Subjugation” (i.e., submitting to the control of others leads to avoiding negative consequences), and “Failure” (i.e., incapable of performing well compared to peers). Though all schemas were significant, the failure schema displayed the largest effect size (Philipsen et al., 2017).

Originally, CBT typically focused on the effects of overly negative maladaptive thoughts and their contributions to internalizing disorders. However, there was early recognition that maladaptive patterns of thinking may not necessarily be completely

negative. This is especially the case with ADHD (Knouse et al., 2015). According to Knouse et al. (2015), adults with ADHD may actually experience overly positive but nonetheless distorted cognitions, negatively impacting self-regulation and causing further impairment. For example, the thought that one's best work gets done when left to the last minute, though not a negative thought, still contributes to poor self-management, increasing the probability of emotional distress and failure.

In an earlier article, Knouse and Mitchell (2015) explained that optimistic goals and overly positive automatic thoughts are associated with a failure to use effective compensatory behavioral strategies. In developing the ADHD Cognitions Scale (ACS), Knouse et al. (2019) observed that scores on the ACS correlated with problems related to time management, a tendency to employ avoidant coping, and greater overall functional impairment (Knouse et al., 2019). Although the short-term function of maladaptive positive cognitions negatively reinforces the relief of adverse emotions, the long-term results reflect an increase in behavioral avoidance patterns and a decrease in active coping (Knouse & Mitchell, 2015).

EF Deficits and Cognitive Distortions

Theoretically, EF deficits associated with ADHD may contribute to the development of cognitive distortions (Ramsay, 2007). As children continuously encounter scenarios of challenges or failures, they may develop maladaptive cognitive and behavioral patterns, connected to core beliefs about their abilities to navigate the world with ADHD. Understandably, repeated exposure to situations that activate failure schema and negative beliefs about the self further impedes the ability to develop more effective ways of coping (Ramsay, 2007). In cases when ADHD has gone undiagnosed

until adulthood, as is the case for many women, these schema and negative core beliefs about the self are further rooted and more challenging to treat.

Though research has supported that individuals with ADHD experience cognitive distortions and EF deficits are a hallmark of the ADHD diagnosis, a search of the literature produced no studies specifically examining the relationship between deficits in EF and cognitive distortions. However, Letkiewicz et al. (2014) examined the relationship between self-reported EF deficits and worsening depression symptoms in a population of adults with ADHD at risk for depression. Subjects were assessed at baseline and follow-up approximately 3 months later for working memory, shifting, and inhibition with the Behavior Rating Inventory of Executive Function—Adult Version (Roth et al., 2005). Depressive symptoms were evaluated at baseline and follow-up by the Anhedonic Depression subscale of the Mood and Anxiety Symptom Questionnaire (Watson et al., 1995a). Participants also completed the Rumination subscale of the Rumination–Reflection Questionnaire (Trapnell & Campbell, 1999) at follow-up. Poorer EF at baseline, specifically deficits in working memory, predicted an increase in symptoms of depression, beyond depressive symptoms at baseline and rumination at follow-up. Conversely, depressive symptoms did not predict EF changes. Results of this study suggest that deficits in EF are associated with the onset, maintenance, and recurrence of depression (Letkiewicz et al., 2014).

Gender Differences in Cognitive Distortions

According to Bem (1981), gender is also said to play a role in schema theorized to influence cognitive distortions. Gender schema theory suggests that sex-typing is a result of gender-based schematic processing. Sex-typing is the conversion from biological male

and female sex into what is considered society's view of masculine and feminine. Self-concept is also incorporated into gender schema (Bem, 1981). As a child develops, sex-related schema evaluates and assimilates incoming information. By learning what is related and acceptable to their own sex, children are also learning what is appropriate for themselves. This theory also proposes that individuals evaluate themselves in terms of gender schema, matching behaviors, attitudes, and attributes to prototypes. It is suggested that individuals are internally motivated to regulate behaviors to conform to what behaviors their culture considers to be appropriate for masculine or feminine, further reinforcing a gender-based self-concept (Bem, 1981).

Sowa and Lustman (1984) examined the gender differences in depression, cognitive distortion, and ratings of stressful events of 70 men and 70 women through the Beck Depression Inventory (Beck et al., 1961), Life Stress Questionnaire (Lustman et al., 1981), and Automatic Thoughts Questionnaire (Hollon & Kendall, 1980). Results indicated that although men experienced greater distortions in cognitions and numbers of stressful life changes, women were more impacted by their stressors and also endorsed higher rates of depression. The authors suggested that women may experience more depression because of their perception of stress, frequency of seeking medical help, approaches to socialization, and openness in expressing affective symptoms. Though Beck has suggested cognitive distortions contribute to depression, the results of this study showed that men endorsed higher levels of distorted thinking but significantly less depression than women. Furthermore, levels of cognitive distortions were 3 times more powerful in predicting depressed mood for women than for men (Sowa & Lustman, 1984).

In a study of community-based adolescents, Bruno (2010) observed that male adolescents endorsed greater rates of externalizing problems through the use of a self-serving bias, whereas female adolescents internalized problems by way of self-debasing distortions. Roberts (2015) validated the ICD with the use of a community sample of 474 adults: 108 male adults and 366 female adults. In this study, Roberts' findings supported that, in the community sample, a difference was observed in the frequency and intensity of cognitive distortions, with women endorsing significantly greater frequency and number of cognitive distortions.

Cognitive Distortions that Remain After Medication Treatment

While medication may improve certain symptoms of ADHD, this alleviation may not lead to overall functional improvement. Recent studies have identified that only 25%-50% of adults medicated for ADHD show improvement in core symptoms, and even with some improvement, residual symptoms continue contributing to functional impairment (Mongia & Hechtman, 2012). Functional impairments make the implementation of adaptive behaviors or compensatory strategies challenging. After repeated unsuccessful attempts, adults with ADHD tend to develop maladaptive cognitions and beliefs about themselves and their abilities, possibly leading to further decrease in motivation, an increase in avoidance strategies, and heightened mood disturbances (Mongia & Hechtman, 2012).

Medications improve symptoms by targeting the areas of the brain that play a role in executive functioning (Ramsay, 2010). However, these medications do not diminish the secondary effects of executive-functioning deficits or the tendency to engage in ineffective coping strategies. Adults with ADHD who experience symptom improvement

may very well continue to have difficulty with pessimistic thoughts, cognitive distortions, the expectation that they will continue to fail, avoidance, procrastination, disorganization, emotion regulation, and managing any coexisting problems (Ramsay, 2010).

Confounding Variables

Though several studies have identified a connection between cognitive distortions and ADHD (Abramovitch & Schweiger, 2009; Mitchell et al., 2013; Strohmeier et al., 2016; Torrente et al., 2014), most have not considered potentially confounding variables, such as personality. Strohmeier et al.'s 2016 study found a significant, positive correlation between ADHD diagnosis and self-reported cognitive distortions. However, in an important, recent study, Serine (2016) identified that once personality pathology, anxiety, and depression were accounted for, the relationship between cognitive distortions and ADHD was not supported. Rather, these comorbidities explained the relationship between cognitive distortions and ADHD, at least when cognitive distortions are measured by the ICD.

It has been suggested that individuals with ADHD tend to develop maladaptive schema related to shame, impaired self-discipline, and failure (Miklósi et al., 2016). In the field of psychology, examining causation is often problematic. For example, one such issue is the relationship between symptoms of ADHD and personality development. According to Nigg et al. (2002):

Some personality traits may represent the adult manifestation of early temperamental precursors for ADHD, such that both ADHD and adult personality reflect outcomes of a core temperamental propensity. In addition, some

personality traits may reflect a developmental endpoint of childhood ADHD symptoms in adulthood. (p. 452)

Nigg et al.'s 2002 study found that ADHD symptoms contributed to the development of personality traits by examining the relation of ADHD symptoms, associated problems from childhood, and the Big Five personality traits through self-reports and spousal reports. Results indicated a clear relationship between ADHD symptoms and personality factors of high Neuroticism, low Conscientiousness, and low Agreeableness. This relationship may be explained by the fact that both ADHD and such personality traits as low conscientiousness are associated with the same prefrontal neural network dysfunction that develops atypically in those with ADHD. Another theory is that ADHD symptoms, temperament, and experiential factors all contribute to the development of personality traits. ADHD symptom severity in childhood might shape the personality traits of adults (Nigg et al., 2002). Serine's (2016) dissertation supports this claim, especially in regard to the personality trait of neuroticism.

Early maladaptive schema may also result from early experiences with ADHD symptoms, such as failure and social rejection. Behavioral patterns congruent with ADHD can be detected as early as 3-5 years of age (Barkley, 1998). Deficits in executive functioning contribute to consistent adverse experience, negatively shaping the individual's view of the self, the world, and the future (Solanto, 2011). Furthermore, continuous negative experiences as a result of ADHD symptoms during the individual's formative years contribute to the development of early maladaptive schema, further increasing levels of perceived stress and lowering emotional well-being (Rosenfield et al., 2008; Thapar et al., 2007).

Summary of the Literature

Numerous studies have established that men and women with ADHD manifest different symptom constellations. Furthermore, male individuals are significantly more likely to be diagnosed with ADHD than their female counterparts, even when both genders meet diagnostic criteria. It has been repeatedly stated that such differences lead to development of comorbid conditions, as well as other adverse conditions or areas of impairments. However, research has not yet explored how living with the different symptom constellations of ADHD, both treated and untreated, as well as later diagnosis, is associated with different patterns of thinking, such as cognitive distortions, in women and men with ADHD. Similarly, a literature review revealed no studies exploring the relationship between gender, cognitive distortions, deficits of executive functioning, and areas of functional impairment.

CHAPTER 3: METHOD

This study used a quantitative, correlational, cross-sectional, and between groups design to assess archival data.

Participants

Data were collected from an archival data set from an outpatient university-based adult specialty attention-deficit/hyperactivity disorder (ADHD) clinic in a large metropolitan region in the northeastern United States. A power analysis determined that 109 participants were required for the effect size set at 0.30, which is considered a medium effect size for correlation (Cohen, 1988, 1992). The significance level was set at 0.05, and the power level was set at 0.80, as per conventional standards (Cohen, 1988, 1992). Participants were adults who received a comprehensive diagnostic evaluation for ADHD and other comorbidities and/or a clinical interview as part of outpatient psychiatric services, such as medication management or cognitive-behavioral therapy (CBT). Participants either were private pay or were members of the university's insurance plan. A diagnosis of ADHD and comorbidities were determined by a supervising psychologist at the specialty clinic considering a comprehensive evaluation, which included a clinical interview; self-report; and objective, widely accepted, psychometrically validated measures.

Inclusion Criteria

This study was archival. In order to be included in this study, participants needed to be 18-85 years of age or older at the time of their evaluation or intake. Participants met full criteria for ADHD, as diagnosed by the supervising psychologist conducting or overseeing the evaluation.

Exclusion Criteria

Participants were excluded from the larger study if they endorsed active, severe substance use disorders, exhibited signs of psychosis, or were unable to complete the evaluation independently. Participants were not eligible if they had not been diagnosed with ADHD or if any included self-report questionnaires were not completed.

Measures

Demographic Questionnaire

All participants completed a demographic questionnaire to gather such information as gender, age, family history, employment history, and medical and mental health history. The questionnaire provided additional information on difficulties participants had experienced throughout their education and employment histories.

Inventory of Cognitive Distortions (ICD)

The ICD, created by Yurica and DiTomasso (2001), is a self-report measure composed of 69 items. The ICD is one of the most recent empirically validated inventories to measure cognitive distortions. Each of the 69 self-report items item was previously factor analyzed into one of the 11 possible cognitive distortions. The ICD assesses for frequency of the following cognitive distortions: fortune-telling, externalization of self-worth, magnification, labeling, comparison to others, emotional reasoning, perfectionism, arbitrary inference/jumping to conclusions, minimization, mind-reading, and emotional reasoning and decision-making (Yurica, 2002). Participants responded to each item on a 5-point Likert scale based on how frequently they experience a specific thought, belief, or action (i.e., never, rarely, sometimes, often, or always). Responses were scored from 0 (*never*) to 4 (*always*) and added to reach a total score

ranging from 0 to 276, with a higher score indicating a greater frequency of cognitive distortions.

The ICD has been found to be valid and reliable in both adult clinical and nonclinical samples (Roberts, 2015; Yurica, 2002). Psychometric analyses showed internal consistency (Cronbach's $\alpha = .98$), test-retest reliability ($r = .998$), and excellent construct and content validity. The ICD has been correlated with other self-report measures, including the Beck Anxiety and Depression inventories, further establishing concurrent and construct validity. Roberts' (2015) analyses provided further evidence of internal consistency ($\alpha = .97$) and additional positive correlations with the Perceived Stress Scale (Cohen et al., 1983).

Barkley Deficits in Executive Functioning Scale (BDEFS-LF)

The BDEFS-LF, created by Russell A. Barkley (2011a), is an 89-item self-report questionnaire divided into five sections. The purpose of the BDEFS is to measure the respondent's capacity to self-regulate across time, especially in social contexts, in order to achieve future goals (Barkley, 2011a). Respondents answered on a 4-point Likert scale how often they experienced each problem within the prior 6 months, rating each item 1 (*never or rarely*), 2 (*sometimes*), 3 (*often*), or 4 (*very often*). Each section was added up, providing a score for that domain focusing on common deficits in the ADHD population: self-management to time, self-organization and problem solving, self-restraint, self-motivation, and self-regulation of emotions. Additionally, all domains were summed to provide a total score, and specific items were combined to generate an ADHD-Executive Function (EF) Index score. The EF Index score evaluates the likelihood of the participant having ADHD, with a score of 20 or higher correctly

identifying 94% of those in the normative sample with adult ADHD (Barkley, 2011a). Each domain, the total score, and the ADHD-EF Index score were compared to normative scores according to age and gender in order to find the corresponding percentile. Each percentile was then related to a level of deficit: 51-75 (not significant), 76-84 (marginal), 85-92 (borderline), 93-95 (mild), 96-98 (moderate), or 99+ (severe).

The BDEFS-LF has been normed for men and women of the United States from the ages of 18 to 81 years. The EF Index score has a positive predictive power of 94% and a negative predictive power of 87%. The BDEFS-LF has been identified as reasonably valid, reliable, and useful in assessing EF difficulties in daily life (Barkley, 2011a). It has high internal consistency (Cronbach's $\alpha = .91$ to $.96$) for all five subscales, and Pearson's r correlations across subscales ranged from $.55$ to $.80$. Test-retest reliability was also found to have a satisfactory correlation between each administration ($r = .62$ to $.80$, $p < .001$, across all indices; Allee-Smith et al., 2013). Because the BDEFS was based on Barkley's unique definition of EF, establishing convergent validity was challenging. The subscales of the prototype BDEFS (P-BDEFS) were correlated to the Conners Continuous Performance Test and the Stroop Color-Word Test, with correlations ranging from $.04$ to $.41$ and $-.01$ to $-.31$. Though the directions of correlations were theoretically appropriate, the correlations were in the moderate to weak range. The P-BDEFS was examined for its ability to differentiate individuals with ADHD from controls in order to establish discriminant validity. Those with ADHD were more likely to score in the clinically significant range when compared to controls. Criterion validity was also found to have statistically significant correlations ($p < .001$; Allee-Smith et al., 2013).

Barkley Functional Impairment Scale (BFIS-LF)

The BFIS-LF, created by Russell A. Barkley (2011b), is a 15-item self-report questionnaire. Individuals rated the level of difficulty they experienced in different major life activities, such as work, their relationships, and money management, within the prior 6 months. Items were rated on a Likert scale as 0 (*not at all*), 1 or 2 (*somewhat*), 3 or 4 (*mild*), 5, 6, or 7 (*moderate*), 8 or 9 (*severe*), or not applicable. If an item was rated as not applicable, it was not counted into the total score. Responses were averaged to identify the mean impairment score. Raw scores for each item were also related to a percentile, and each percentile was related to a level of deficit: 51-75 (not significant), 76-84 (marginal), 85-92 (borderline), 93-95 (mild), 96-98 (moderate), or 99+ (severe). Raw scores were compared to a normative sample based on age. A score listed in bold font suggests this domain is impaired at a clinically significant level. The domains that are clinically significant are then totaled and divided by the total number of applicable responses rated 0-9, calculating the percentage of domains impaired.

Psychometric analyses have found the BFIS-LF's internal consistency to be very satisfactory (Cronbach's $\alpha = .969$). Test-retest reliability results showed moderate-to-high reliability across the two testing sessions, with correlations ranging from .40 to .72 (Barkley, 2016). The BFIS-LF seems to have face validity because of the explicit instructions to rate functional ineffectiveness in each domain. Impairment ratings were also significantly associated with self-rated deficits on the BDEFS and degree of ADHD symptoms of the Barkley Adult ADHD Rating Scale (Barkley, 2016).

Beck Depression Inventory-II (BDI-II)

The BDI-II is a 21-item self-report measure on which clients endorsed scores on a 4-point Likert scale from 0 to 3 in order to measure the severity of depression (Beck et al., 1996). Endorsed items were totaled, ranging from a score of 0 to 63, resulting in an overall depression score. Total scores were categorized in four ranges: minimal (0-13), mild (14-19), moderate (20-28), or severe (29-63). Higher scores suggest greater levels of depression within the prior 2 weeks (Beck et al., 1996).

The BDI-II has been found to be both reliable and valid through psychometric analysis. It has high internal consistency (Cronbach's $\alpha = .91$) and test-retest reliability ($r = .93$; Beck et al., 1996). Furthermore, it correlated mildly ($r = .47$) with the Hamilton Anxiety Rating Scale-Revised (Hamilton, 1959), establishing sufficient discriminant validity (Beck et al., 1996).

Penn State Worry Questionnaire (PSWQ; Meyer et al., 1990)

The PSWQ is a self-report measure used to measure the frequency and severity of worry. The client endorsed 16 items on a 5-point Likert scale from 1 (*not at all typical of me*) to 5 (*very typical of me*). Total scores range from 16 to 80, resulting in a low (16-39), moderate (40-59), or high (60-80) amount of worry (Meyer et al., 1990). The PSWQ has been found to have excellent internal consistency (Cronbach's $\alpha = .83-.93$) and test-retest reliability ($r = .74-.93$; Brown et al., 1992; Molina & Borkovec, 1994).

Additionally, the PSWQ was able to discriminate between individuals with generalized anxiety disorder and those with another type of anxiety disorder (Brown et al., 1992).

Revised Neuroticism, Extroversion, Openness Personality Inventory (NEO-PI-R)

Based on the five factor model of personality (FFM), the NEO-PI-R measures five personality domains (i.e., openness to experience, conscientiousness, extraversion, agreeableness, and neuroticism; Costa & McCrae, 1992). The 240 items were rated on a 5-point Likert scale from *strongly disagree* to *strongly agree*. Items relate to one of the five domains, and each domain is comprised of six facet scales. The NEO-PI-R has been normed for male and female individuals, providing standardized *t* scores for the client's responses. Each score falls in a particular range: very high (*t* score of 65 or higher), high (*t* score of 55-65), average (*t* score of 45-55), low (*t* score of 35-45), or very low (*t* score of 35 or less; Costa & McCrae, 1992). The NEO-PI-R has been studied over many years by a variety of researchers. Specific to ADHD, the factors most commonly associated with individuals diagnosed with ADHD are low conscientiousness, low agreeableness, and high neuroticism (Parker et al., 2004).

Psychometric analyses have supported the reliability and validity of the NEO-PI-R. McCrae et al. (2011) examined data of 34,108 inventories to determine the differential reliability and validity of the NEO-PI-R's facet scales. Results indicated robust differential psychometric properties generalizable across ages and genders and showed similarities across different cultural contexts (McCrae et al., 2011). Internal consistency coefficients for both the self and observer forms are calculated at 0.86 to 0.95. All subtests have high short-term test-retest reliability, with the subtests for Neuroticism, Extraversion, and Openness to Experience having good long-term test-retest reliability (Costa & McCrae, 1992).

Procedures

This archival study was based on a data set collected from a larger study at a university-based adult specialty ADHD clinic in a large metropolitan region in the northeastern United States. As part of a comprehensive evaluation for adult ADHD and comorbidities, clients were provided with a packet of self-report questionnaires, including the BDI-II, PSWQ, ICD, BDEFS-LF, and BFIS-LF, prior to the initial in-clinic evaluation. The NEO-PI-R was administered during the evaluation. The completed packet was returned at the evaluation and was scored by clinical staff, along with the NEO-PI-R. Results were then provided to the treating clinician or incorporated into diagnostic reports. Final reports were provided to data entry staff who deidentified and entered the data into the data set to run analyses for a variety of studies. The responsible investigator received the deidentified data set for analysis. For the purpose of this study, data from the participants meeting inclusion and exclusion criteria were placed into a smaller data set for analyses.

CHAPTER 4: RESULTS

The primary objective of this study was to identify whether there was a significant gender difference in men and women with attention-deficit/hyperactivity disorder (ADHD) on a number of key variables. First, it was hypothesized that frequency of cognitive distortions, anxiety, depression, and the personality factors of agreeableness, conscientiousness, and neuroticism would predict gender in adults with ADHD. The secondary objective was to determine whether deficits in executive functioning, severity of functional impairment, and gender predict the frequency of cognitive distortions in adults diagnosed with ADHD after accounting for anxiety, depression, and the personality factors of agreeableness, conscientiousness, and neuroticism.

Demographics

The archival data gathered for this study included 114 adults (75 male, 39 female) with a mean age of 34.54 years ($SD = 14.374$), who presented at an outpatient university-based center in a large northeastern city in the United States specializing in the assessment and treatment of adult ADHD. This sample was predominantly Caucasian (78.26%), whereas others identified as African American (2.61%), Asian (2.61%), Hispanic (2.61%), or Other (13.04%); one participant did not disclose their race (0.87%). All participants met criteria for a *DSM-5* (2013) diagnosis of ADHD, with the specifiers of ADHD, predominantly inattentive presentation (23.7%); ADHD, Combined presentation (58.8%); and Unspecified Attention-Deficit/Hyperactivity Disorder (16.7%), meaning that sample demographics are largely consistent with the literature indicating most adults with ADHD meet criteria for combined presentation in clinical populations (Asherson et al., 2014). No participants met criteria for predominantly

hyperactive/impulsive presentation. Unlike typical percentages in literature, the majority of participants in this study who identified as female were diagnosed with ADHD, combined presentation (48.7%). The remaining female participants were diagnosed with ADHD, predominantly inattentive presentation (28.2%) and Unspecified Attention-Deficit/Hyperactivity Disorder (20.5%). More consistent with the current literature, the majority of participants who identified as male were diagnosed with ADHD, Combined presentation (64%), followed by ADHD, predominantly inattentive presentation (21.3%) and Unspecified Attention-Deficit/Hyperactivity Disorder (14.7%).

Statistical Analyses

The IBM Statistical Package for Social Sciences, version 26.0, was used to analyze correlations between the variables of interest.

Hypothesis 1

A multiple logistic regression was conducted to examine if the predictor variables of frequency of cognitive distortions, anxiety, depression, and the personality factors of agreeableness, conscientiousness, and neuroticism predicted the criterion variable of gender in adults with ADHD. Collinearity diagnostics indicated good tolerance and variance inflation factor, and there was no evidence of multicollinearity or homoscedasticity, suggesting that all statistical assumptions were met. Means and standard deviations for the variables can be found in Table 1.

Table 1

Means and Standard Deviations Neuroticism, Agreeableness, Conscientiousness, Anxiety, Depression, and Cognitive Distortions

	M	SD
Gender	-	-
Neuroticism	56.89	11.861
Agreeableness	50.55	10.897
Conscientiousness	37.81	13.438
Depression	16.70	11.524
Anxiety	53.12	16.868
Cognitive distortions (CD)	165.23	51.155

Correlation analysis indicated that, although the criterion variable of gender was not significantly predicted by the variables of cognitive distortions, anxiety, depression, conscientiousness, agreeableness, or neuroticism, several significant correlations were found between the predictor variables. As shown in Table 2, the Inventory of Cognitive Distortions (ICD) had a medium-sized correlation with the Beck Depression Inventory-II (BDI-II; $r = .459, p = .000$), a medium-sized correlation with the Penn State Worry Questionnaire (PSWQ; $r = .327, p = .000$), and a small correlation to the Neuroticism subscale of the Neuroticism, Extroversion, Openness Personality Inventory-Revised (NEO-PI-R; $r = .292, p = .002$). Additionally, neuroticism correlated significantly with depression ($r = .192, p = .041$) and anxiety ($r = .362, p = .000$), and depression correlated with anxiety ($r = .279, p = .003$).

Table 2

Correlations Matrix for Gender, Neuroticism, Agreeableness, Conscientiousness, Anxiety, Depression, and Cognitive Distortions

	Gender	Neuroticism	Agreeable.	Conscientious.	Depression	Anxiety	CD
Gender	-----	-.085	.117	-.041	.016	.121	.037
Neuroticism		-----	.155	.003	.192*	.362**	.292**
Agreeableness			-----	-.158	.061	-.041	-.012
Conscientiousness				-----	-.060	.009	.130
Depression					-----	.279**	.459**
Anxiety						-----	.327**
Cognitive distortions (CD)							-----

Note. The frequency of cognitive distortions was operationalized as total scores on the Inventory of Cognitive Distortions (ICD). Anxiety was operationalized as total scores on the Penn State Worry Questionnaire (PSWQ). Depression was operationalized as total scores on the Beck Depression Inventory-II (BDI-II). Personality factors of agreeableness, conscientiousness, and neuroticism were operationalized by scores on the NEO-PI-R.

*. Correlation is significant at the .05 level (2-tailed).

**. Correlation is significant at the .01 level (2-tailed).

A key benefit to conducting a correlation analysis prior to a regression is to predict the direction and strength of the relationship between variables that would be found with a regression analysis. Hypothesis 1 posed that the gender of adults with ADHD would be predicted by the frequency of cognitive distortions, anxiety, depression, and the personality factors of agreeableness, conscientiousness, and neuroticism. However, as seen in Table 2, a significant statistical relationship was lacking between gender and all other variables, and therefore, the regression analysis examining the additional comorbidities was not conducted.

In summary, Hypothesis 1 results indicated that predictor variables were not statistically significant in predicting gender (see Table 3), but small-to-moderate intercorrelations were found between the predictor variables themselves. Therefore, results suggest that women with ADHD did not endorse greater frequencies of cognitive distortions, anxiety, depression, or personality factors of agreeableness, conscientiousness, or neuroticism than those endorsed by men with ADHD. Consequently, no significant differences existed between male and females with ADHD on these particular measures.

Table 3

Variables in the Equation, Step 1^a

	B	SE	Wald	df	Sig.	Exp(B)
Neuroticism (t score)	-.035	.020	3.160	1	.075	.965
Agreeableness (t score)	.032	.020	2.470	1	.116	1.032
Conscientiousness (t score)	-.005	.016	.090	1	.764	.995
Depression	-.007	.021	.115	1	.734	.993
Anxiety	.025	.015	3.030	1	.082	1.026
Cognitive distortions (CD)	.002	.005	2.19	1	.640	1.002
Constant	-1.735	1.574	1.215	1	.270	.176

- a. Variable(s) entered on Step 1: NEO-PI-R Neuroticism *t* score, NEO-PI-R Agreeableness *t* score, NEO-PI-R Conscientiousness *t* score, BDI-II, PSWQ, and the ICD.

Hypothesis 2

A hierarchical multiple regression was used to examine whether executive function (EF) deficits, functional impairment, and gender predicted frequency of

cognitive distortions after controlling for anxiety, depression, neuroticism, agreeableness, and conscientiousness. Descriptive statistics of the number of participants, means, and standard deviations of the variables included in Hypothesis 2 can be seen in Table 4.

Table 4

Descriptive Statistics (Mean, Standard Deviation, Number of Participants) of Hypothesis 2 Variables: Cognitive Distortions, Depression, Anxiety, Neuroticism, Agreeableness, Conscientiousness, Gender, EF Deficits, and Functional Impairment

	Mean	SD	N
Cognitive distortions	164.52	50.822	113
Depression	16.55	11.458	113
Anxiety	53.08	16.937	113
Neuroticism (t score)	56.91	11.911	113
Agreeableness (t score)	50.65	10.891	113
Conscientiousness (t score)	37.80	13.497	113
Gender	1.35	.478	113
EF deficits	88.94	15.803	113
Impairment	4.2363	1.79225	113

Note. EF = Executive Functioning

Correlation analyses were conducted to examine relationships between the variables included in Hypothesis 2 (Table 5 and Table 6). According to a Pearson correlation (Table 5), cognitive distortions had a moderate correlation with depression ($r = .447$) and small correlations with anxiety ($r = .327$), neuroticism ($r = .299$), and functional impairment ($r = .376$). Depression had a small correlation to anxiety ($r =$

.278) and EF deficits ($r = .307$). Anxiety had a small correlation with neuroticism ($r = .363$), EF deficits ($r = .409$), and functional impairment ($r = .353$). EF deficits had a moderate correlation to functional impairment ($r = .444$). Lastly, a small negative correlation was found between EF deficits and conscientiousness ($r = -.260$); mean scores of these measures (Berkley Deficits in Executive Functioning Scale [BDEFS-LF] and NEO-PI-R, respectively) suggest that as EF deficits increase, conscientiousness levels decrease.

Table 5

Pearson Correlations Between the Variables of Cognitive Distortions, Depression, Anxiety, Neuroticism, Agreeableness, Conscientiousness, Gender, EF Deficits, and Functional Impairment

	<u>CD</u>	<u>Dep.</u>	<u>Anx.</u>	<u>Neurot.</u> <u>(t score)</u>	<u>Agree.</u> <u>(t score)</u>	<u>Conscient.</u> <u>(t score)</u>	<u>Gender</u>	<u>EF</u> <u>Def.</u>	<u>Impair.</u>	
Pearson Correlation	<u>CD</u>	-	.447*	.327*	.299*	.003	.131	.047	.235	.376*
	<u>Dep.</u>		-	.278*	.197	.076	-.062	.025	.307*	.184
	<u>Anx.</u>			-	.363*	-.038	.008	.124	.409*	.353*
	<u>Neurot.</u> <u>(t score)</u>				-	.154	.004	-.087	.101	.185
	<u>Agree.</u> <u>(t score)</u>					-	-.158	.111	.139	-.017
	<u>Conscient.</u> <u>(t score)</u>						-	-.040	-.260*	-.187
	<u>Gender</u>							-	.018	-.038
	<u>EF Def.</u>								-	.444*
	<u>Impair.</u>									-

Note: The following abbreviations were used: CD (cognitive distortions), Anx. (anxiety), Dep. (depression), Agree. (agreeableness), Conscient. (conscientiousness), Neurot. (neuroticism), EF Def. (Executive Functioning Deficits), and Impair. (Functional Impairment).

* indicates statistical significance

According to 1-tailed correlations (Table 6), cognitive distortions correlated significantly with depression ($p = .000$), anxiety ($p = .000$), neuroticism ($p = .001$), EF

deficits ($p = .006$), and functional impairment ($p = .000$). Depression correlated significantly with anxiety ($p = .001$), neuroticism ($p = .018$), EF deficits ($p = .000$), and functional impairment ($p = .026$). Anxiety was significantly correlated with neuroticism ($p = .000$), EF deficits ($p = .000$), and functional impairment ($p = .000$). Additional significant correlations included neuroticism with functional impairment ($p = .025$), agreeableness with conscientiousness ($p = .047$), conscientiousness with EF deficits ($p = .003$) and functional impairment ($p = .023$), and EF deficits with functional impairment ($p = .000$).

Table 6

1-Tailed Correlations Between the Variables of Cognitive Distortions, Depression, Anxiety, Neuroticism, Agreeableness, Conscientiousness, Gender, EF Deficits, and Functional Impairment

	<u>CD</u>	<u>Dep.</u>	<u>Anx.</u>	<u>Neurot.</u> (t score)	<u>Agree.</u> (t score)	<u>Conscient.</u> (t score)	<u>Gender</u>	<u>EF Def.</u>	<u>Impair.</u>	
Sig. (1-tailed)	<u>CD</u>	-	.000*	.000*	.001*	.488	.084	.309	.006*	.000*
	<u>Dep.</u>		-	.001*	.018*	.211	.257	.394	.000*	.026*
	<u>Anx.</u>			-	.000*	.343	.465	.096	.000*	.000*
	<u>Neurot.</u> (t core)				-	.052	.485	.179	.144	.025*
	<u>Agree.</u> (t score)					-	.047*	.122	.071	.427
	<u>Conscient.</u> (t score)						-	.336	.003*	.023*
	<u>Gender</u>							-	.424	.346
	<u>EF Def.</u>								-	.000*
	<u>Impair.</u>									-

Note: The following abbreviations were used: CD (cognitive distortions), Anx. (anxiety), Dep. (depression), Agree. (agreeableness), Conscient. (conscientiousness), Neurot. (neuroticism), EF Def. (Executive Functioning Deficits), and Impair. (Functional Impairment).

*Correlation is significant at the .05 level

With the ICD as the identified criterion variable, Level 1 analysis included the control variables of anxiety (PSWQ scores), depression (BDI-II scores), and personality factors (Neuroticism, Agreeableness, and Conscientiousness). Level 2 included the addition of gender, functional impairment (Barkley Functional Impairment Scale [BFIS] scores), and deficits in EF (BDEFS-LF scores). The Durbin-Watson statistic was 2.265, suggesting that autocorrelation of residuals and collinearity were within acceptable limits. Also included in the Model Summary (Table 7), the variables of Model 1 (i.e., anxiety, depression, neuroticism, agreeableness, and conscientiousness) accounted for 29.2% of the variance in distorted thinking; the percentage is increased to 37% with the addition of the variables in Model 2 (i.e., gender, functional impairment, and EF deficits). Thus, by adding in the additional variables in Model 2, most importantly the functional impairment scores, results accounted for an additional 7.8% variance over the Model 1 variables. Additionally, as seen in Table 8, a one-way analysis of variance (ANOVA) for the hierarchical multiple regression indicated significance at Model 1 and Model 2. Furthermore, the set of variables combined have high statistical significance on the variance in distorted thinking, $F(8, 104) = 7.630; p = .000$.

Table 7

Hierarchical Multiple Regression (with Cognitive Distortions as the Criterion Variable): Model 1 (Variables of Anxiety, Neuroticism, Agreeableness, and Conscientiousness) and Model 2 (Addition of Variables of Gender, Functional Impairment, and EF Deficits) Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.540 ^a	.292	.259	43.755	
2	.608 ^b	.370	.321	41.866	2.265

^a Predictors: (Constant), NEO-Personality Inventory-Conscientious-*t* Score, NEO-Personality Inventory Neuroticism-*t* Score, Beck Depression Inventory III, NEO-Personality Inventory-Agreeableness-*t* Score, Penn State Worry Questionnaire

^b Predictors: (Constant), NEO-Personality Inventory-Conscientious-*t* Score, NEO-Personality Inventory Neuroticism-*t* Score, Beck Depression Inventory III, NEO-Personality Inventory-Agreeableness-*t* Score, Penn State Worry Questionnaire, gender, BFIS Mean Impairment Score, Barkley Deficits in Executive Functioning Scale: Self Report - Total EF Summary (1-5), % score

Table 8

ANOVA for the Hierarchical Multiple Regression of Model 1 (Anxiety, Depression, Neuroticism, Agreeableness, and Addition of Gender, Functional Impairment, and EF Deficits): Overall Regression Analysis

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	84426.637	5	16885.327	8.820	.000 ^b
	Residual	204855.557	107	1914.538		
	Total	289282.195	112			
2	Regression	106995.154	8	13374.394	7.630	.000 ^c
	Residual	182287.041	104	1752.760		
	Total	289282.195	112			

- ^a Dependent Variable: Inventory of Cognitive Distortions
- ^b Predictors: (Constant), NEO-Personality Inventory-Conscientious-*t* Score, NEO-Personality Inventory Neuroticism-*t* Score, Beck Depression Inventory III, NEO-Personality Inventory-Agreeableness-*t* Score, Penn State Worry Questionnaire
- ^c Predictors: (Constant), NEO-Personality Inventory-Conscientious-*t* Score, NEO-Personality Inventory Neuroticism-*t* Score, Beck Depression Inventory III, NEO-Personality Inventory-Agreeableness-*t* Score, Penn State Worry Questionnaire, gender, BFIS Mean Impairment Score, Barkley Deficits in Executive Functioning Scale: Self-Report - Total EF Summary (1-5), % score

It was hypothesized that greater self-reported functional impairment and deficits in EF would positively correlate with cognitive distortions. Level 1 of the analysis included the control variables of anxiety, depression, neuroticism, agreeableness, and conscientiousness. At Level 2, gender, functional impairment, and EF deficits were added. As seen in Table 9, results indicated that depression ($r = .356; p = .000$), conscientiousness ($r = .211; p = .012$), and functional impairment ($r = .301; p = .001$) were significantly and positively associated with self-reported frequency of total cognitive distortions. The personality factor of neuroticism approached ($r = .163; p = .066$) but did not meet statistical significance. Anxiety ($r = .047; p = .630$), agreeableness ($r = -.018; p = .826$), deficits in EF ($r = .012; p = .900$), and gender ($r = .068; p = .399$) were not statistically significant with cognitive distortions. In sum, the linear combination of self-reported depression, conscientiousness, and functional impairment significantly predicted self-reported frequency of cognitive distortions.

Table 9

Predictor Variables for Cognitive Distortions from Model 1 (Anxiety, Depression, Neuroticism, Agreeableness, and Conscientiousness) and Model 2 (Addition of Gender, Functional Impairment, and EF deficits)

<i>Model</i>		<u>Unstandardized</u> <u>coefficients</u>		<u>Standardized</u> <u>coefficients</u>		<u>Collinearity statistics</u>		
		<i>B</i>	<i>Std. Error</i>	<i>Beta</i>	<i>t</i>	<i>Sig.</i>	<i>Tolerance</i>	<i>VIF</i>
<i>1</i>	(Constant)	54.579	30.758		1.774	.079		
	Depression	1.691	.379	.381	4.456	.000*	.904	1.106
	Anxiety	.472	.271	.157	1.745	.084	.813	1.230
	Neuroticism	.722	.381	.169	1.898	.060	.832	1.202
	Agreeableness	-.106	.392	-.023	-.270	.788	.938	1.067
	Conscientious	.559	.311	.149	1.800	.075	.971	1.030
<i>2</i>	(Constant)	16.308	38.587		.423	.673		
	Depression	1.579	.372	.356	4.250	.000*	.863	1.158
	Anxiety	.141	.291	.047	.483	.630	.643	1.555
	Neuroticism	.694	.373	.163	1.857	.066	.791	1.265
	Agreeableness	-.085	.385	-.018	-.220	.826	.892	1.121
	Conscientious	.794	.311	.211	2.555	.012*	.888	1.126
	Gender	7.265	8.572	.068	.848	.399	.934	1.071
	EF deficits	.039	.314	.012	.126	.900	.637	1.571
	Functional Impairment	8.526	2.564	.301	3.325	.001*	.741	1.350

Note. Outcome Variable: Inventory of Cognitive Distortions

* Significant correlations

In summary, results indicated a statistically significant positive linear combination of elevated scores on a self-report measure of depressed mood (BDI-II), greater self-report of functional impairment (BFIS), and greater perceived levels of conscientiousness as indicated on the NEO-PI-R. As such, elevation of these three variables would suggest a higher total frequency of cognitive distortions. Anxiety (PSWQ), Neuroticism (NEO-

PI-R), Agreeableness (NEO-PI-R), EF Deficits, and Gender were not significant in the regression model's prediction of total cognitive distortions.

CHAPTER 5: DISCUSSION

Research indicates that childhood attention-deficit/hyperactivity disorder (ADHD) is twice as likely to be diagnosed in male versus female children in the United States, most likely because the prevalence of hyperactive and impulsive symptoms is greater in males and that these highly recognizable and disruptive presentations are more often the motivating force to evaluate, diagnose, and treat children, as compared to more prevalent inattentive presentations in female children and adolescents (Biederman et al., 2004; Pastor et al., 2015). Although the referral bias abates in the adult ADHD population, when women begin self-referring for evaluations, the bias contributes to women with ADHD struggling with their symptoms without treatment for longer periods of time, potentially contributing to the development of additional distress, impairments, deficits in executive functions (EFs), and comorbid disorders (Biederman et al., 1994; Biederman et al., 2004). Furthermore, data indicate that in comparison to male individuals with ADHD, female individuals with ADHD have greater comorbid internalizing problems and are more likely to experience perceived inadequacy, subsequently increasing feelings of shame, anxiety, depression, and emotional dysregulation (Bálint et al., 2008; Quinn, 2008). These internalizing symptoms may be associated with facets of Neuroticism, Extraversion, Openness Personality Inventory – Revised (NEO-PI-R) neuroticism (Brandes & Tackett, 2019; Miller et al., 2018; Naragon-Gainey & Watson, 2018), and good empirical evidence shows that cognitive distortions are predicted by all of the aforementioned clinical phenomena (e.g., Rosenfield, 2004; Yurica, 2001), with the possible exception of “pure” ADHD (Serine, 2016). Moreover, previous research of a

nonclinical community sample found that women often report a greater frequency of cognitive distortions than men (Roberts, 2015).

Given the demonstrated gender differences, the present study was conducted to evaluate whether women would endorse more frequent cognitive distortions than men in an adult population with ADHD. Furthermore, this study sought to examine if severity of EF deficits, functional impairment, and gender would predict more frequent cognitive distortions. Although previous research identified significant positive correlations between ADHD and cognitive distortions (Strohmeier et al., 2016), another more recent study concluded that once additional variables of anxiety, depression, and personality factors of agreeableness, conscientiousness, and neuroticism were accounted for, the relationship between cognitive distortions (as measured by the Inventory of Cognitive Distortions [ICD]) and ADHD was no longer supported (Serine, 2016). Therefore, these additional variables were included in the present analyses.

Findings of Hypothesis 1 indicated that none of the predictor variables of cognitive distortions, anxiety, depression, or personality factors of agreeableness, conscientiousness, or neuroticism, were associated with gender. However, cognitive distortions were significantly correlated with depression, anxiety, and neuroticism. Additionally, neuroticism correlated significantly with depression and anxiety, and depression was significantly correlated with anxiety. These correlations are consistent with numerous previous findings on neuroticism, supporting the clinical significance of this five factor model of personality (FFM) factor (Bagby et al., 1995; Sen et al., 2003; Weinstock & Whisman, 2006). Therefore, results suggest that women with ADHD did not endorse greater frequencies of cognitive distortions, anxiety, depression, or

personality factors of agreeableness, conscientiousness, or neuroticism than men with ADHD, and no significant differences exist between male and female adults with ADHD on all measures.

Hypothesis 2 results indicated that depression, conscientiousness, and functional impairment were significantly and positively correlated with cognitive distortions. However, the personality factor of neuroticism and the factors of anxiety, agreeableness, deficits in EF, and gender were not significantly associated with cognitive distortions. Serine (2016) also determined that comorbidities, rather than deficits in EFs, were associated with cognitive distortions in adults with ADHD. The fact that Penn State Worry Questionnaire (PSWQ) anxiety and neuroticism were not significantly associated with cognitive distortions was a novel and unexpected finding. In sum, the linear combination of self-reported depression, conscientiousness, and functional impairment significantly predicted self-reported frequency of cognitive distortions.

Clinical Implications

Gender

Maladaptive schemas, or distorted or otherwise unhelpful cognitive structures composed of associations that guide perception and interpretation of events, have been associated with greater perceived stress and lower emotional well-being for those with ADHD (Miklósi et al., 2016). The seeds for maladaptive schema and related core beliefs are planted in childhood and shaped and reinforced in adolescence and throughout the lifespan. As an individual with ADHD enters into adulthood, schema formed earlier in life become easily reactivated (Ramsay, 2010). Many adults with ADHD continue to have expectations of failure, which research has indicated to be the most significant

schema for those with ADHD (Philipsen et al., 2017). Another layer of schema relevant to this study is related to gender schema theory, which posits that sex-typing, or the conversion from biological male and female sex into what is considered to be society's view of masculine and feminine, is a result of gender-based schematic processing (Bem, 1981). It is suggested that individuals are internally motivated to regulate behaviors to conform to what behaviors their culture considers to be appropriate for masculine or feminine, further reinforcing a gender-based self-concept (Bem, 1981).

As previously suggested in the literature, women often report a greater frequency of cognitive distortions (e.g., Roberts, 2015). To explain these differences, it has been hypothesized that gender differences may be the result, in part, of male individuals underreporting mental health symptoms in an effort to align with perceived societal expectations of masculinity. As indicated by clinical and community-based samples, underreported symptoms may be influenced by social desirability factors related to norms of masculinity (e.g., Smith et al., 2018). Furthermore, although men endorsed greater cognitive distortions and stressful life changes in Sowa and Lustman's 1984 study, the women reported greater impact by their stressors and higher rates of depression. Essentially, women's perceptions of stress and their greater openness in expressing affective symptoms may increase their reported rates of depression. In fact, in the same study, rates of cognitive distortions were 3 times more likely to predict depressed mood in women than in men (Sowa & Lustman, 1984).

In terms of gender-based schematic processing, children learn what is related to and acceptable in their own sex and, thus, themselves. Individuals evaluate themselves in terms of gender schema, matching behaviors, attitudes, and attributes to prototypes,

regulating behaviors to conform to what their cultures consider to be appropriate for masculine or feminine, further reinforcing a gender-based self-concept (Bem, 1981). Finally, Bruno's 2010 study of community-based adolescents observed that male adolescents endorsed greater rates of externalizing problems through the use of a self-serving bias to maintain their self-perception, whereas female adolescents internalized problems by way of self-debasing distortions. In sum, from a young age, individuals learn what is culturally appropriate for their gender and, thus, adapt their cognitions and behaviors to match, at varying levels. As a result, more traditionally gender-conforming male individuals may equate affective expression to the female sex and, therefore, underreport mental health symptoms, including cognitive distortions. It was hoped that this study would provide additional information on the differential frequency of cognitive distortions in self-identified genders in the adult ADHD population and, therefore, provide better insight to the assessment and specific treatment focus for the respective genders in therapy.

In the first hypothesis of this study of a sample of adults with ADHD, correlational analyses indicated that cognitive distortions were significantly related to depression, anxiety, and neuroticism. However, no statistically significant difference was observed between the self-identified genders of male and female individuals with adult ADHD regarding the frequency of cognitive distortions, both directly and after accounting for frequent comorbidities, including anxiety, depression, agreeableness, conscientiousness, and neuroticism. Thus, results suggest that a comprehensive assessment and individual case conceptualization, identifying each patient's unique clinical symptoms and cognitive schema, may be more informative than more nomothetic

overgeneralizations based on demographics, specifically gender, in this population. This sort of careful clinical assessment and treatment planning seems to be especially indicated when ameliorating cognitive distortions demonstrated to be frequent in adults with ADHD (Serine, 2016; Strohmeier et al., 2016).

The lack of gender difference in frequency of cognitive distortions also may be in the operational definition of cognitive distortions. Specifically, cognitive distortions were operationalized as total ICD scores. In previous studies of adults with ADHD, the ICD was originally associated with ADHD (Strohmeier et al., 2016); however, after controlling for comorbidities of anxiety, depression, agreeableness, conscientiousness, and neuroticism in a follow-up study, the ICD no longer was associated with ADHD (Serine, 2016). This means that cognitive distortions were accounted for by comorbidities seen in *most* patients with ADHD (Jacob et al., 2007; Klassen et al., 2010; Larson et al., 2011) and not adult ADHD, itself. Another possibility is that the ICD, with empirically demonstrated association with the almost ubiquitous comorbidities of ADHD, failed to assess for specific distortions associated with adult ADHD.

Cognitive Distortions and ADHD

Beck (1967) defined cognitive distortions as systematic errors in reasoning, generally in a predictable manner. Research has supported the hypothesis that there are content-specific distortions identifying specific associations between anxiety, depression, and aggression with different distortions (Beck & Haigh, 2014; Leung & Poon, 2001; Yurica & DiTomasso, 2005). Specific to ADHD, the chronic obstacles in various domains may develop and maintain negative assumptions and outlooks about one's abilities, which become overgeneralized and distorted, potentially contributing to self-

defeating thoughts and behaviors (Ramsay, 2010). However, not all maladaptive distortions are negative. Individuals with ADHD may also experience inappropriately positive and distorted cognitions that further contribute to areas of impairment, such as the belief that one's best work gets done when left to the last minute, contributing to poor self-management and procrastination and, thus, increasing the probability of emotional distress and failure in important life domains (Knouse et al., 2015).

To this end, Knouse et al. (2019) proposed the ADHD Thoughts Questionnaire to measure ADHD-specific cognitive distortions. Maladaptive ADHD-related cognitions on this self-report measure include, "I'll just do this one thing first," "I do better waiting until the last minute," and "I know I'm supposed to be doing something else, but I want to do this now" (Knouse et al., 2019). Thus, the ICD and the ADHD Cognitions Scale (ACS) may assess very different phenomena, and the extent to which these phenomena are related is unknown. Use of the ACS measure might have produced very different results.

In support of the need to assess clinical disorders and related phenomena, neuroticism, depression, and anxiety were significantly associated with overall frequency of cognitive distortions in adults with ADHD in the present study and in previous research (Serine, 2016; Strohmeier et al., 2016). Therefore, identification of these clinical syndromes should alert clinicians to the presence of, and the need to attend to, cognitive distortions. Conversely, the presence of cognitive distortions in adults with ADHD indicates the need to assess for comorbid conditions. Furthermore, beyond the mere frequency of cognitive distortions, the specific content of cognitive distortions varies for each individual. Moreover, cognitive distortions previously have been

demonstrated to be positively associated with the number of disorders for which one meets diagnostic criteria (i.e., both clinical syndromes and personality disorders) and more severe symptomatology (e.g., Rosenfield, 2004). Consequently, more frequent cognitive distortions are associated with greater psychopathology, a finding that has further implications for assessment and treatment planning.

Cognitive Distortions and Agreeableness

Analysis of the first hypothesis data showed that agreeableness was not significantly related with maladaptive cognitive distortions, consistent with current literature (Ehsan & Bahramizadeh, 2011; Koolen et al., 2012). Higher levels of agreeableness, which are related to adaptive characteristics, such as caring, altruism, trust, and sympathy, have been linked to more effective conflict resolution, reduced anger and aggression, and less interpersonal conflict (Ehsan & Bahramizadeh, 2011). Ehsan and Bahramizadeh's 2011 study of 186 children indicated that the personality trait of agreeableness was negatively associated with early maladaptive schemas, which "operate on the deepest level of cognition . . . and make the individual psychologically vulnerable to develop depression, anxiety, . . . personality disorders, [etc.]" (p. 548). As previously noted, all of these disorders have been associated with cognitive distortions.

Cognitive Distortions and Anxiety

In the current study, anxiety was operationalized as scores on the PSWQ, which was selected for this study because, as its title suggests, it measures worry rather than the more physiological symptoms of state anxiety, which are more accurately assessed by the Beck Anxiety Inventory (BAI; Brown et al., 1992). This distinction is important because research has indicated that distractibility, a frequent symptom of ADHD, is more likely

related to worry than to state anxiety (Lapointe et al., 2013). Additionally, admittedly anxious individuals with ADHD often score lower on the BAI than one would predict, based on their self-reports of anxiety levels. Lower scores may occur because they lack awareness of the physical anxiety symptoms, as measured by the BAI, versus the cognitive/worry symptoms that are measured on the PSWQ. However, while anxiety did have a small correlation with the ICD, once the hierarchical multiple regression was conducted, anxiety was not found to be part of the linear relationship of factors contributing to frequency of cognitive distortions.

Such results were not expected, as anxiety has been repeatedly associated with frequency of cognitive distortions (Kuru et al., 2018; Mathews & MacLeod, 2005; Rosenfield, 2004), including in adults with ADHD, when operationalized as BAI scores (Strohmeier, 2013). Although this sample had this surprising result, it may not be generalizable to the rest of the adult ADHD population. This particular sample was one of students, faculty, employees, and family members of a prestigious Ivy League university, or those who had the financial means to self-pay for an evaluation. The higher level of education and socioeconomic status could serve as an explanation for the results of this sample that are incongruent with the typical observations in the ADHD literature. Lastly, as the alpha of this study was set to 0.05, a 5% chance of a Type I error is possible.

Cognitive Distortions and Neuroticism

Neuroticism was a second variable that was surprisingly not significantly associated with frequency of cognitive distortions in the current study. Neuroticism has been described as negative affectivity and psychological instability contributing to

experiencing sadness, anger, and anxiety when facing novel situations that may or may not be threatening (Eysenck, 1967). Research has found that neuroticism has been correlated to both internalizing and externalizing problems, including an increase in psychopathology and cognitive distortions in children (Muris et al., 2006; Vasey & MacLeod, 2001). Such issues often persist into adulthood, when higher levels of neuroticism continue to maintain negative self-perceptions and stringent and demanding self-expectations and to contribute to the discrepancy between one's ideal self-perception and the actual self (Thomson, 2016). In Serine's 2016 study of an adult ADHD population, the severity of ADHD was highly positively correlated with neuroticism and contributed most significantly to the prediction of cognitive distortions. It is suggested that distortions in attentional and information processing produced by neuroticism, contribute to negative self-perception (Mogg et al., 1992; Thomson, 2016). Furthermore, high self-expectations influenced by neuroticism can subsequently increase anxiety and hinder adjustment and coping with stressful life events, further influencing negative appraisals of emotional well-being and a negative view of multiple life domains (Thomson, 2016).

Such consistent findings in research made it surprising that neuroticism, which approached but ultimately fell short of statistical significance, was not included in the linear relationship contributing to self-reported frequency of cognitive distortions in this study. This is compounded by the significant correlation between neuroticism and cognitive distortions as measured by the ICD observed in Hypothesis 1 results of this study. A potential explanation for this occurrence may be that depression, a facet of neuroticism and operationalized in the current study as Beck Depression Inventory – II

(BDI-II) total scores, sufficiently accounted for the variability of cognitive distortions. If true, the other facets of neuroticism (i.e., anxiety, hostility, self-consciousness, impulsiveness, and vulnerability to stress; Costa & McCrae, 1992, 2008) might not contribute to the variability in cognitive distortions. One should note that the current study measured only factors and not facets of the NEO-PI-R.

Cognitive Distortions and Conscientiousness

The personality factor of conscientiousness, which includes facets of competence, planning and organization, dutifulness, willpower, achievement striving, and caution, has been related to the ability to self-regulate and inhibit behaviors, better manage anger, and persist in tasks (Koolen et al., 2012). Perhaps the personality characteristics of agreeableness and conscientiousness support the development of emotional regulation skills, predict success, and, consequently, reduce stress, fostering more adaptive cognitions, emotions, and behaviors during earlier years, thus acting as protective factors against the development of cognitive distortions as one ages.

That being said, in this particular study, conscientiousness was identified as a variable contributing to self-reported frequency of cognitive distortions, a direct contradiction to typically suggestions in the literature (Gomez & Corr, 2014; Jacob et al., 2007; Nigg et al., 2002; Parker et al., 2004). The second hypothesis was supported in that a statistically significant, positive linear relationship was found between depressed mood, conscientiousness, and functional impairment, on the one hand, and frequency of cognitive distortions, on the other hand. Consistent with the literature (Mathews & MacLeod, 2005; Yurica, 2002), depressed mood, as measured by the BDI-II, was significantly associated with self-reported frequency of cognitive distortions. Specific to

the ADHD population, the consistent obstacles and challenges that tend to come with impairment and distress of the diagnosis foster recurring frustrations and failures that are often internalized, contribute to negative assumptions about efficacy and pessimistic expectations about the future (Ramsay, 2010). Although encountering repeated frustrations can contribute to depressed mood for even neuro-typical individuals, those with ADHD tend to encounter greater daily stressors, to experience greater perceived stress, to be less able to regulate emotion, and to cope less effectively with such obstacles. Subsequently, the same individuals may experience an exacerbation of negative automatic thoughts, cognitive distortions, and maladaptive schema (Miklósi et al., 2016).

A particularly interesting finding was the higher degree of conscientiousness associated with adult ADHD in the sample. As conscientiousness has been identified as a personality factor that helps with self-regulation (Koolen et al., 2012), finding this variable associated with an increase in frequency of cognitive distortions was not expected. Given that these characteristics are polar opposite to the symptom criteria of ADHD, one should not be surprised that previous studies consistently demonstrated that individuals with ADHD show lower levels of conscientiousness (e.g., Avisar & Shalev, 2011; Nigg et al., 2002). However, results of the current study indicating that conscientiousness was associated with functional impairment of ADHD contradicted previous findings. Several hypotheses for the higher than expected degree of conscientiousness in this particular sample are possible.

First, conscientiousness, in the current study, was measured by self-report. Empirical evidence has demonstrated that individuals with ADHD may underreport their

own symptoms, in comparison to reporting from collaterals, such as family, friends, teachers, and co-workers (Sibley et al., 2012), who may have very different perspectives on the individual's level of conscientiousness. To explain this discrepancy, adults with ADHD may lack self-awareness, self-reflection, and self-evaluation as a result of deficits in EF (Kooji et al., 2008). This lack of self-awareness may well lead to inaccurate reporting, including self-ratings regarding their level of conscientiousness. For this reason, a comprehensive assessment of adult ADHD generally includes collateral "other" report measures (e.g., Barkley Functional Impairment Scale: Other-Report, 2011; Barkley Adult ADHD Rating Scale-IV: Other Report: Childhood Symptoms, 2011). Moreover, one must acknowledge that this sample of adults with ADHD may be functioning at a higher level and be of higher socioeconomic status as compared to the mean population of adults with ADHD. Such differences may contribute to a higher degree of self-rated and objective conscientiousness than that of others with ADHD.

In addition, even the best self-report measures, including the NEO-PI-R, can be limited by patient self-concept and self-perception, explaining why multimethod assessments, such as informant reports, behavioral measures, or physiological assays, are often recommended (e.g., McCrae, 2020). In the case of individuals with ADHD, many may perceive and, therefore, endorse higher levels of conscientiousness than may neurotypical individuals. This is because the NEO-PI-R conscientiousness may indicate high levels of self-perceived effort in planning, organizing, dutifulness, willpower, and caution, all of which contribute to competence and actual achievement. Therefore, the level of self-perceived effort versus objective conscientiousness may have contributed to the relatively high ratings of conscientiousness in this sample. Conversely, individuals

without ADHD may be more likely to assess this personality facet in a way that is more consistent with others' perhaps more objective ratings.

One could theorize that both reactions are consistent with cognitive dissonance (Festinger, 1957) and self-perception theories (Bem, 1972). For example, a college student with ADHD might require significant cognitive effort and step-by-step planning to even initiate a task, such as beginning to write a paper. Cognitive dissonance and self-perception theory could lead to the assumption that "accomplishing such a difficult task indicates that I am conscientious." In other words, whereas a neuro-typical individual may take such a behavior for granted and even minimize it ("of course I can start the paper"), it may actually be adaptive for adults with ADHD to label themselves as conscientious and to reinforce such a step in a chain of behaviors leading to completion of a task, in this case, the assigned paper. Treatment can focus on shaping more adaptive cognitions and behaviors, specifically building a more adaptive schema and employing compensatory strategies to address deficits in executive functioning. This approach should increase competent behavior and reduce avoidance to lead to specific behaviors that promote actual success (Ramsay & Rostain, 2014).

To expand on self-perception theory, Bem (1972) posited that "individuals come to 'know' their own attitudes, emotions, and other internal states partially by inferring them from observations of their own overt behavior and/or the circumstances in which their behavior occurs" (p. 5). In this case, individuals may "come to know" that they are conscientious based on the amount of effort applied to a task, despite expectations that may differ from those of others or despite other even more objective measures, such as task completion. Building upon this perspective is the tendency of individuals with

ADHD to provide positive reports of their competence, even when other criteria suggest otherwise. Researchers refer to this phenomenon as the positive illusory bias (Owens et al., 2007).

As such, high-functioning adults with ADHD, as in this sample, may overcompensate for their deficits because of awareness of the impact of their difficulties on themselves and others. Becker et al. (2015) indicated that perfectionism and anxious coping may be related to conscientious social skills. Interestingly, Stroehmeier (2013) determined that perfectionism was the single most frequent cognitive distortion in adults with ADHD. Hence, putting forth great effort in focusing on procedures, tasks, needs of others, attempting to maintain order, and attempting to enforce self-discipline may be adaptive in that such an attempt at perfectionism compensates for deficits, reduces functional impairment, and increases the probability of success (Samuel et al., 2012; Trull & Widiger, 2013). However, perfectionism comes at a cost, including striving for unachievable/perfect goals; thus, when perfection is not achieved, it can ensure the perception of failure and is often associated with depression. In this way, according to Voltaire's adage, "perfect is the enemy of the good."

In fact, Rosenfield's (2004) research indicated that obsessive compulsive personality disorder (OCPD) symptoms, a common personality disorder in adults with ADHD (Miller et al., 2007), was one of the few personality disorders that did not correlate with frequency of cognitive distortions, as measured by total ICD score in a more general clinical sample in which ADHD was not assessed. However, OCPD symptoms may develop as a compensatory strategy early in life as a means of compensating for ADHD-related deficits and, to the extent to which they are adaptive,

may partially explain the relatively high functioning in the current sample, in addition to the distress, perception of failure, and functional impairment that individuals with ADHD experience.

Cognitive Distortions and Functional Impairment

Functional impairment as measured by the Barkley Functional Impairment Scale (BFIS-LF) was also strongly positively associated with an increase in frequency of cognitive distortions. The neurocognitive deficits associated with ADHD clearly are linked to functional impairment in various domains and further perpetuate emotional distress (Rosenfield et al., 2008). Although even neuro-typical adults may encounter functional inefficiencies periodically, such as when fatigued or stressed, individuals with ADHD tend to face persistent and pervasive difficulties, as well as greater challenges in using problem-solving strategies to modify behaviors, despite recognition that such compensatory strategies may be necessary (Ramsay, 2010). Furthermore, repeated frustrating experiences of impairment, whether they be problems in domains of school, work, social interaction, interpersonal relationships, legal, or financial, continue to impact malleable schema and behaviors. One can easily understand that repeated exposure to functional impairments can potentially increase the severity of depressed mood, which was another significant factor in the linear equation contributing to cognitive distortions. According to Ramsay (2010,), “These negative outlooks can be insidious for adults with ADHD because they tend to be overgeneralized and engender self-defeating thoughts and behaviors” (p. 40). Thus, maladaptive self-perceptions and negative experience influence distorted cognitions, interfere with coping strategies, and reduce resiliency (Beck, 1976; Ramsay, 2010; Rosenfield et al., 2008).

Cognitive Distortions and EF Deficits

Lastly, ADHD-related EF deficits, operationalized as Barkley Deficits in Executive Functioning Scale (BDEFS) scores, were also not significantly associated with frequency of cognitive distortions. EFs are conceptualized as a hierarchically organized series of steps implicated in life activities and are generally considered to be the cognitive processes that allow humans to self-regulate thoughts, emotions, and actions (Barkley, 2011a; Séguin & Zelazo, 2005). Those with ADHD have deficits in EF that are theorized to be linked to circuitry differences in the prefrontal cortex (Barkley, 1997a, 1997b; Faraone & Biederman, 1998). Apart from Letkiewicz et al. (2014), who found that poorer EF at baseline, specifically deficits in working memory, predicted an increase in symptoms of depression, a literature review revealed no other studies in the literature specifically examining the relationship between deficits in EF and cognitive distortions.

Theoretically, it is suspected that EF deficits have the potential to contribute to the development of cognitive distortions, as these deficits provide greater opportunities for children to encounter scenarios of challenges or failures that activate failure schema and negative beliefs about the self (Ramsay, 2007). Although a statistical correlation between EF deficits was moderate as measured by the BDEFS-LF and the ICD, once the hierarchical multiple regression was conducted controlling for variables of neuroticism, agreeableness, conscientiousness, anxiety, and depression, EF deficits did not have a significant relationship in predicting cognitive distortions. Therefore, the current study clearly differentiates that deficits in EFs (hallmarks of ADHD) do not automatically result in distortions in cognition (correlated with most common comorbidities with ADHD). Put another way, “pure” ADHD, that is, ADHD presenting without the almost

ubiquitous comorbidities, may be more accurately conceptualized as a disorder of deficit than distortion. As such, the results of this particular study, in which deficits in EF did not predict cognitive distortions but functional impairment, depressed mood, and conscientiousness did predict cognitive distortions, further support the theory that comorbidities are primarily responsible for the development and maintenance of cognitive distortions, not ADHD.

The Equation for Cognitive Distortions

Overall, results indicated a significant and positive relationship between depressed mood, conscientiousness, and functional impairment and frequency of self-reported cognitive distortions. A potential explanation of the relationship between these variables is that depressed mood can develop from a negative self-image related to a history of perceived failure, both personal (repeated failures on important tasks and failing to reach one's own goals) and perceived failure resulting from engaging in upward social comparison, specifically, unfavorable social comparison of one's own effort to that of neuro-typical individuals (Ramsay, 2017). Such actual and perceived failures are more likely in adults with ADHD as a result of deficits in executive functioning, functional impairment, and awareness that they may require a greater level of effort than their peers.

As noted previously, on the positive side, the awareness of the need for increased effort, in general and relative to others, may be viewed by adults with ADHD as evidence of their own conscientiousness. In many cases, the adult may conflate expended effort with succeeding. Upward social comparison, such as when individuals with ADHD recognize that they often require significantly more effort and time than others, may result in the intermediate belief that "life is unfair." For example, individuals with

ADHD commonly endorse the intermediate belief that it is patently “unfair” that they should require such additional time and effort to achieve the same tasks as their peers, for example, roommates comparing the time needed to study to achieve similar or even less desirable results on exams (Ramsay, 2017). This is consistent with maladaptive core beliefs of defectiveness and/or helplessness. Paradoxically, the additional effort required for goal attainment can be interpreted as evidence of conscientiousness, but also of defectiveness, resulting in dysphoria and avoidance of tasks and thereby creating a self-fulfilling prophecy of failure. Confirmation bias increases the likelihood that such an event will be perceived as further evidence for core beliefs of helplessness, worthlessness, and unlovability (Beck, 2011).

Emotional dysregulation, which has been correlated with neuroticism (Irastorza, 2016; Paulus et al., 2016), is a common deficit for many individuals with ADHD and is associated also with depressive symptoms and functional impairment (Bodalski et al., 2019). Though the majority of adults with ADHD also have a comorbid presentation, research indicates that comorbidities cannot be solely responsible for emotional problems; rather, emotional dysregulation may be a significant contributing, complicating, and exacerbating factor (Bodalski et al., 2019; Bunford et al., 2015; Reimherr et al., 2005). Therefore, the emotional dysregulation component seen in ADHD may be largely influential in the cyclical and linear relationship between depressed mood, conscientiousness, and functional impairment.

In summary, this study sheds light on gender differences and highlights the complex and challenging presentations seen in adult ADHD. Regardless of gender, in clinical practice, adults with ADHD report a high frequency of cognitive distortions.

However, research has indicated that the relationship between ADHD and cognitive distortions is no longer present after accounting for variables of anxiety, depression, and Big Five personality traits (Serine, 2016). Thus, the presence of cognitive distortions, as measured by the ICD, are likely indicative of the presence of comorbid symptoms and/or disorders. Furthermore, the prevalence of cognitive distortions and almost ubiquitous comorbidities support the use of evidence-based cognitive behavioral therapy (CBT). Hopefully, the results of the present study will contribute to the literature in assessment, case conceptualization, and treatment planning.

Limitations

The current study had a number of limitations. First, the study was correlational, making it inappropriate to infer causation. Additionally, participants included in the original data set were self-referred. Owing to the urban university setting of the study site, most participants were college students, faculty, staff, or relatives of employees of the university, or had the means to self-pay for the evaluation and treatment, as the clinic accepts only patients with university-based insurance or those able to make private payment. Consequently, participants may be of a higher level of functioning, socioeconomic status, education level, and general cognitive ability and, thus, less functionally impaired than the mean in the general adult ADHD population and beyond. This may limit external validity and generalizability of findings to the rest of the adult ADHD and more general clinical population (Halmøy et al., 2009; Pitts et al., 2015).

Another potential limitation is that some participants had a prior history of mental health treatment, for ADHD or other diagnoses, in the form of therapy and/or psychopharmacology. Additionally, current medication status is unknown. These

interventions may have impacted responses to the self-report questionnaires, especially if the individual had received an effective psychotherapeutic or psychopharmacological intervention recently (Anastopoulos et al., 2020; Emilsson et al., 2011; Knekt et al., 2016; Solanto et al., 2010; Steinert et al., 2014). A further limitation of this study is the almost exclusive use of self-report questionnaires as a means of examining the variables and hypotheses. Individuals with ADHD often underreport symptoms and difficulties because of a lack of self-awareness, varying in validity and reliability from observer reports or even more objective behavioral or neurological measures. Lack of sensitivity and self-awareness, as well as the aforementioned psychometric properties, may skew results (McCrae, 2020).

Additional limitations include the fact that ADHD was initially operationalized as a diagnosis of ADHD provided by a trained clinician of the university-based clinic. Furthermore, deficits in EF were operationalized as scores on the BDEFS-LF (Barkley, 2011a), and degree of functional impairment was operationalized as scores on the BFIS-LF (Barkley, 2011b). During analysis, the data were not analyzed by respective *DSM-5* (2013) ADHD presentations or subtypes (APA, 2013). Different *DSM-5* presentations of ADHD may manifest differently by gender and experience cognitive distortions and other ADHD-related challenges at different frequencies and/or intensities. Cognitive distortions in this study were operationally defined as scores on the ICD. Since the ICD's creation, Knouse et al. (2019) created the ACS, which is intended to be more specific to ADHD-related thoughts, many of which are overly optimistic and may be related to lack of self-regulation, which contributes to functional impairment.

This current study measured only factors and not facets of the NEO-PI-R. The FFM conceptualizes five domains of personality: openness to experience, conscientiousness, extraversion, agreeableness, and neuroticism. However, the FFM also breaks down each broad domain into facets, which include six lower-level traits per factor (Costa & McCrae, 1992, 2008; Kurylo & Stevenson, 2011; McCrae et al., 2002; Widiger & Costa, 2013). Analysis of the FFM facets would provide more nuanced information regarding the contribution of different elements of personality to cognitive distortions.

Lastly, this study had an operational definition of gender as self-reported biological sex. This limitation is present in the current study, in part, because of the relevant self-report measures providing the options of only male or female. Current conceptualization of gender has expanded, and continues to expand at a rapid rate, past the traditional framework of binary sex (Frohard-Dourlent et al., 2016). According to Division 44 of the American Psychological Association, the Society for the Psychology of Sexual Orientation and Gender Diversity, estimating the number of people who identify as nonbinary is difficult because most research has not included nonbinary as a response option when inquiring about gender (Webb et al., 2015). For example, the United States 2020 census included only male or female as options to respond to the sex of individuals within a residence (The National LGBTQ Task Force, 2019). Few population-based studies have attempted to estimate the prevalence of those who identify as nonbinary. A study in the United Kingdom estimated that approximately 0.4% of those in the United Kingdom identified as nonbinary when given a three-way choice between male, female, or another description (Practical Androgyny, 2014). A large

Dutch population sample found that of those who were assigned male at birth and those assigned female at birth, 4.6% and 3.2%, respectively, reported an “ambivalent gender identity,” or identifying equally with both sexes (Kuyper & Wijensen, 2014). A similar study in Belgium identified 1.8% natal men and 4.1% natal women as “gender ambivalent” (Van Caenegem et al., 2015). More information regarding percentages of nonbinary identification has been researched within the LGBTQ+ population.

Approximately 25% of LGBTQ+ youth identify outside of the gender binary (The Trevor Project, 2019). Additionally, according to the 2015 U.S. Transgender Survey (James et al., 2016), including 27,715 participants, over one third reported a nonbinary gender identity. The current study did not address the role one’s gender identity, or the cultural implications of that identity, may play.

Future Directions

Future studies may add to the literature by addressing the role gender, in a nonbinary sense, may play in cognitive distortions and adult ADHD. The use of different measures that allow individuals to select the gender they identify with, or the option for “other,” may be more accurate than requiring participants to select one option based on biological, binary sex, with which they may not identify.

Although no differences were observed between men and women regarding the overall frequency of cognitive distortions, exploration of variation of specific types of cognitive distortions reported by men and women with adult ADHD may be illuminating and provide further guidance to assess and treat this population. Replicating this study would be interesting with the ACS as a measure of cognitive distortion, focusing on more

ADHD-specific distortions, to identify any gender differences and the association with ADHD and/or comorbidities that may account for these errors in thinking.

Additionally, using a sample that is more representative of the general adult ADHD population, with more varied levels of education and socioeconomic status, would increase external validity. Furthermore, future studies would benefit from stratifying samples by *DSM-5* (2013) presentations and severity of ADHD to explore the potential relationship with variables of interest.

For future studies using the NEO-PI-R, analyzing facets of the FFM, not just factors, would provide richer results and potentially more nuanced information that can benefit clinicians treating adults with ADHD. Moreover, because of the atypical results of Hypothesis 2 indicating an increased level of self-perceived conscientiousness being one of the factors associated with cognitive distortions, future studies examining the relationship between conscientiousness and compensatory strategies, for one example, such as OCPD symptoms, in high-functioning ADHD would be relevant. Developmental research, conducted longitudinally, could explore if OCPD and other personality disorder symptoms are maladaptive attempts to compensate for ADHD. Furthermore, identifying the effects of OCPD treatment, when relevant, on adults with ADHD would be useful. For example, benefits might be gained from modifying OCPD symptoms to increase flexibility, reducing perfectionism and dichotomous thinking, and increasing pleasurable activities while observing how this affects the potentially adaptive quality the symptoms originally had to manage ADHD symptoms and impairments.

Finally, to account for lack of self-awareness and other limitations of self-report measures, future research could include a more multimethod assessment approach, particularly observer reports and other objective measures.

REFERENCES

- Abramovitch, A., & Schweiger, A. (2009). Unwanted intrusive and worrisome thoughts in adults with attention deficit/hyperactivity disorder. *Psychiatry Research, 168*(3), 230–233.
- American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders* (5th ed.).
- Anastopoulos, A. D., King, K. A., Besecker, L. H., O'Rourke, S. R., Bray, A. C., & Supple, A. J. (2020). Cognitive-behavioral therapy for college students with ADHD: Temporal stability of improvements in functioning following active treatment. *Journal of Attention Disorders, 24*(6), 863-874.
- Antshel, K. M., Hargrave, T. M., Simonescu, M., Kaul, P., Hendricks, K., & Faraone, S. V. (2011). Advances in understanding and treating ADHD. *BMC Medicine, 9*(72), 1-12.
- Arnold, L. E., Hodgkins, P., Kahle, J., Madhoo, M., & Kewley, G. (2015). Long-term outcomes of ADHD: Academic achievement and performance. *Journal of Attention Disorders, 24*(1), 1-13.
- Asherson, P., Manor, I., & Huss, M. (2014). Attention-deficit/hyperactivity disorder in adults: Update on clinical presentation and care. *Neuropsychiatry, 4*(2), 1-20.
- Avisar, A., & Shalev, L. (2011). Sustained attention and behavioral characteristics associated with ADHD in adults. *Applied Neuropsychology, 18*(2), 107–116.
- Bagby, R. M., Joffe, R. T., Parker, J. D., Kalembe, V., & Harkness, K. L. (1995). Major depression and the five-factor model of personality. *Journal of Personality Disorders, 9*(3), 224-234.

Bálint, S., Czobor, P., Komlósi, S., Mészáros, Á., Simon, V., & Bitter, I. (2008).

Attention deficit hyperactivity disorder (ADHD): Gender- and age-related differences in neurocognition. *Psychological Medicine*, *39*(8), 1-9.

Barkley, R. A. (1997a). *ADHD and the nature of self-control*. Guilford Press.

Barkley, R. A. (1997b). Behavioral inhibition, sustained attention, and executive functions: Constructing a unifying theory of ADHD. *Psychological Bulletin*, *121*(1), 65-94.

Barkley, R. A. (1998). Attention-deficit hyperactivity disorder. *Scientific American*, *279*(3), 66–71.

Barkley, R. A. (2011a). *Barkley deficits in executive functioning scale (BDEFS)*. Guilford Press.

Barkley, R. A. (2011b). *Barkley functional impairment scale (BFIS)*. Guilford Press.

Barkley, R. A. (2012). *Executive functions: What they are, how they work, and why they evolved*. Guilford Press.

Barkley, R.A. (Ed.). (2015). *Attention-deficit hyperactivity disorder: A handbook for diagnosis and treatment* (4th ed.). Guilford Press.

Barkley, R. A., & Murphy, K. R. (2011). The nature of executive function (EF) deficits in daily life activities in adults with ADHD and their relationship to performance on EF tests. *Journal of Psychopathology and Behavioral Assessment*, *33*(2), 137–158.

- Bauermeister, J. J., ShROUT, P. E., Chávez, L., Rubio-Stipec, M., Ramirez, R., Padilla, L., Anderson, A., Garcia, P., & Canino, G. (2007). ADHD and gender: Are risks and sequela of ADHD the same for boys and girls? *Journal of Child Psychology and Psychiatry*, 48(8), 831–839.
- Beck, A. T. (1967). *Depression: Clinical, experimental, and theoretical aspects*. Harper & Row.
- Beck, A. T. (1976). *Cognitive therapy and the emotional disorders*. International Universities Press.
- Beck, A. T., & Haigh, E. A. (2014). Advances in cognitive theory and therapy: The generic cognitive model. *Annual Review of Clinical Psychology*, 10, 1-24.
- Beck, A. T., Rush, A. J., Shaw, B. F., & Emery, G. (1979). *Cognitive therapy of depression*. Guilford Press.
- Beck, A. T., Steer, R. A., & Brown, G. (1996). *Beck Depression Inventory manual* (2nd ed.). The Psychological Corporation.
- Beck, A. T., & Weishaar, M. E. (2007). Cognitive therapy. In R. J. Corsini & D. Wedding (Eds.), *Current psychotherapies* (pp. 263-294). Thomson Brooks/Cole.
- Beck, J. S. (2011). *Cognitive behavior therapy: Basics and beyond* (2nd ed.). Guilford Press.
- Becker, S. P., Langberg, J. M., Evans, S. W., Girio-Herrera, E., & Vaughn, A. J. (2015). Differentiating anxiety and depression in relation to the social functioning of young adolescents with ADHD. *Journal of Clinical Child & Adolescent Psychology*, 44(6), 1015-1029.

- Bem, D. J. (1972). Self-perception theory. In *Advances in experimental social psychology* (Vol. 6, pp. 1-62). Academic Press.
- Bem, S. L. (1981). Gender schema theory: A cognitive account of sex typing. *Psychological Review*, 88(4), 354-364.
- Biederman, J., Faraone, S. V., Monuteaux, M. C., Bober, M., & Cadogen, E. (2004). Gender effects on attention-deficit/hyperactivity disorder in adults, revisited. *Biological Psychiatry*, 55(7), 692-700.
- Biederman, J., Faraone, S. V., Spencer, T., Wilens, T., Mick, E., & Lapey, K. (1994). Gender differences in a sample of adults with attention deficit hyperactivity disorder. *Psychiatry Research*, 53(1), 13-29.
- Bodalski, E. A., Knouse, L. E., & Kovalev, D. (2019). Adult ADHD, emotional dysregulation, and functional outcomes: Examining the role of emotion regulation strategies. *Journal of Psychopathology and Behavioral Assessment*, 41(1), 81-92.
- Brandes, C. M., & Tackett, J. L. (2019). Contextualizing neuroticism in the hierarchical taxonomy of psychopathology. *Journal of Research in Personality*, 81, 238-245.
- Brown, T. A., Antony, M. M., & Barlow, D. H. (1992). Psychometric properties of the Penn State Worry Questionnaire in a clinical anxiety disorders sample. *Behaviour Research and Therapy*, 30, 33-37.
- Brown, T. E., Reichel, P. C., & Quinlan, D. M. (2009). Executive function impairments in high IQ adults with ADHD. *Journal of Attention Disorders*, 13(2), 161-167.
- Bruchmüller, K., Margraf, J., & Schneider S. (2012). Is ADHD diagnosed in accord with diagnostic criteria? Overdiagnosis and influence of client gender on diagnosis. *Journal of Consulting and Clinical Psychology*, 80(1), 128-138.

- Bruno, T. (2010). *What are they thinking? Cognitive distortions and adolescent externalizing and internalizing problems*. [Unpublished doctoral dissertation]. University of British Columbia.
- Bunford, N., Evans, S. W., & Wymbs, F. (2015). ADHD and emotion dysregulation among children and adolescents. *Clinical Child and Family Psychology Review*, *18*(3), 185-217.
- Burns, D. D. (1980). *Feeling good: The new mood therapy*. Signet.
- Cascade, E., Kalali, A. H., & Wigal, S. B. (2010). Real-world data on attention deficit hyperactivity disorder medication side effects. *Psychiatry (Edgmont)*, *7*(4), 13-15.
- Costa, P. T., & McCrae, R. R. (1992). *Revised NEO Personality Inventory (NEO-PI-R) and NEO Five-Factor Inventory (NEO-FFI) professional manual*. Psychological Assessment Resources.
- Costa, P. T., & McCrae, R. R. (2008). The revised NEO personality inventory (NEO-PI-R). In G. J. Boyle, G. Matthews, & D. H. Saklofske (Eds.), *The SAGE handbook of personality theory and assessment: Personality measurement and testing*, volume 2. (pp. 179-198). Thousand Oaks, CA: SAGE Publications, Inc.
- Cronin, T. J., Lawrence, K. A., Taylor, K., Norton, P. J., & Kazantzis, N. (2015). Integrating between-session interventions (homework) in therapy: The importance of the therapeutic relationship and cognitive case conceptualization. *Journal of Clinical Psychology*, *71*(5), 439–450.
- Daughton, J. M., & Kratochvil, C. J. (2009). Review of ADHD pharmacotherapies: Advantages, disadvantages, and clinical pearls. *Journal of the American Academy of Child and Adolescent Psychiatry*, *48*(3), 240-248.

- Derks, E. M., Hudziak, J. J., & Boomsma, D. I. (2007). Why more boys than girls with ADHD receive treatment: A study of Dutch twins. *Twin Research and Human Genetics, 10*(5), 765–770.
- DuPaul, G. J., Power, T. J., Anastopoulos, A. D., & Reid, R. (1998). *ADHD Rating Scale IV: checklists, norms, and clinical interpretation*. Guildford
- Ehsan, H.B., & Bahramizadeh, H. (2011). Early maladaptive schemas and agreeableness in personality five factor model. *Procedia – Social and Behavioral Sciences, 30*, 547-551.
- Emilsson, B., Gudjonsson, G., Sigurdsson, J. F., Baldursson, G., Einarsson, E., Olafsdottir, H., & Young, S. (2011). Cognitive behaviour therapy in medication-treated adults with ADHD and persistent symptoms: A randomized controlled trial. *BMC Psychiatry, 11*(1), 1-10.
- Eysenck, H. J. (1967). *The biological basis of personality*. Thomas.
- Faraone, S. V., & Biederman, J. (1998). Neurobiology of attention-deficit hyperactivity disorder. *Biological Psychiatry, 44*(10), 951-958.
- Faraone, S. V., Rostain, A. L., Blader, J., Busch, B., Childress, A. C., Connor, D. F., & Newcorn, J. H. (2018). Practitioner review: Emotional dysregulation inattention deficit/hyperactivity disorder – implications for clinical recognition and intervention. *Journal of Child Psychology and Psychiatry, 60*(2), 133-150.
- Fedele, D. A., Lefler, E. K., Hartung, C. M., & Canu, W. H. (2012). Sex differences in the manifestation of ADHD in emerging adults. *Journal of Attention Disorders, 16*(2), 109–117.

- Fernandez-Duque, D., Baird, J. A., & Posner, M. I. (2000). Executive attention and metacognitive regulation. *Consciousness and Cognition, 9*(2), 288-307.
- Festinger, L. (1957). A theory of cognitive dissonance. Stanford University Press.
- Fredriksen, M., Dahl, A. A., Martinsen, E. W., Klungsøyr, O., Haavik, J., & Peleikis, D. E. (2014). Effectiveness of one-year pharmacological treatment of adult attention-deficit/hyperactivity disorder (ADHD): An open-label prospective study of time in treatment, dose, side-effects and comorbidity. *European Neuropsychopharmacology, 24*(12), 1873-1884.
- Freeman, A., & DeWolf, R. (1992). *The 10 dumbest mistakes smart people make and how to avoid them*. HarperCollins.
- Freeman, A., & Oster, C. (1999). Cognitive behavior therapy. In M. Hersen & A. Bellack. (Eds.). *Handbook of interventions for adult disorders* (2nd ed., pp. 108-138). Wiley and Sons.
- Friedman, S. R., Rapport, L. J., Lumley, M., Tzelepis, A., VanVoorhis, A., Stettner, L., & Kakaati, L. (2003). Aspects of social and emotional competence in adult attention-deficit/hyperactivity disorder. *Neuropsychology, 17*(1), 50-58.
- Frohard-Dourlent, H., Dobson, S., Clark, B. A., Doull, M., & Saewyc, E. M. (2016). "I would have preferred more options": Accounting for non-binary youth in health research. *Nursing Inquiry, 24*(1), 1-9.
- Fuller-Thomson, E., Lewis, D. A., & Agbeyaka, S. K. (2016). Attention deficit/hyperactivity disorder casts a long shadow: Findings from a population-based study of adult women with self-reported ADHD. *Child: Care, Health and Development, 42*(6), 918-927.

Gomez, R., & Corr, P. J. (2014). ADHD and personality: A meta-analytic review.

Clinical Psychology Review, 34(5), 376-388.

Grogan, K., & Bramham, J. (2016). Current mood symptoms do not affect the accuracy of retrospective self-ratings of childhood ADHD symptoms. *Journal of Attention Disorders, 20*(12), 1039–1046.

Halmøy, A., Fasmer, O. B., Gillberg, C., & Haavik, J. (2009). Occupational outcome in adult ADHD: Impact of symptom profile, comorbid psychiatric problems, and treatment. *Journal of Attention Disorders, 13*(2), 175-187.

Harpin, V. A. (2005). The effect of ADHD on the life of an individual, their family, and community from preschool to adult life. *Archives of Disease in Childhood, 90*(Suppl 1):i2–i7.

Hermens, D. F., Williams, L. M., Lazzaro, I., Whitmont, S., Melkonian, D., & Gordon, E. (2004). Sex differences in adult ADHD: A double dissociation in brain activity and autonomic arousal. *Biological Psychology, 66*(3), 221–233.

Hirsch, O., Chavanon, M., Riechmann, E., & Christiansen, H. (2018). Emotional dysregulation is a primary symptom in adult attention-deficit/hyperactivity disorder (ADHD). *Journal of Affective Disorders, 232*, 41-47.

Hummer, T. A., Kronenberger, W. G., Wang, Y., Dunn, D. W., Mosier, K. M., Kalnin, A. J., & Mathews, V. P. (2011). Executive functioning characteristics associated with ADHD comorbidity in adolescents with disruptive behavior disorders. *Journal of Abnormal Child Psychology, 39*(1), 11-19.

- Irastorza, L. J. (2016). Questions about adult ADHD patients: Dimensional diagnosis, emotion dysregulation, competences and empathy. *Acta Psychopathologica*, 2(5), 1-5.
- Isomaa, R., Väänänen, J., Fröjd, S., Kaltiala-Heino, R., & Marttunen, M. (2012). How low is low? Low self-esteem as an indicator of internalizing psychopathology in adolescence. *Health Education & Behavior*, 40(4), 392–399.
- Jacob, C. P., Romanos, J., Dempfle, A., Heine, M., Windemuth-Kieselbach, C., Kruse, A., Reif, A., Walitza, S., Romanos, M., Strobel, A., Brocke, B., Schäfer, H., Schmidtke, A., Böning, J., & Lesch, K-P. (2007). Co-morbidity of adult attention deficit/hyperactivity disorder with focus of personality traits and related disorders in a tertiary referral center. *European Archives of Psychiatry and Clinical Neuroscience*, 257(6), 309-317.
- James, S. E., Herman, J. L., Rankin, S., Keisling, M., Mottet, L., & Anafi, M. (2016). *The Report of the 2015 U.S. Transgender Survey*. National Center for Transgender Equality.
- Johnston, C., Mash, E. J., Miller, N., & Ninowski, J. E. (2012). Parenting in adults with attention-deficit/hyperactivity disorder (ADHD). *Clinical Psychology Review*, 32(4), 215–228.
- Kempton, S., Vance, A., Maruff, P., Luk, E., Costin, J., & Pantelis, C. (1999). Executive function and attention deficit hyperactivity disorder: Stimulant medication and better executive function performance in children. *Psychological Medicine*, 29(3), 527-538.

- Klassen, L. J., Katzman, M. A., & Chokka, P. (2010). Adult ADHD and its comorbidities, with a focus on bipolar disorder. *Journal of Affective Disorders, 124*(1-2), 1-8.
- Knekt, P., Virtala, E., Härkänen, T., Vaarama, M., Lehtonen, J., & Lindfors, O. (2016). The outcome of short- and long-term psychotherapy 10 years after start of treatment. *Psychological Medicine, 46*(6), 1-14.
- Knouse, L. E., & Mitchell, J. T. (2015). Incautiously optimistic: Positively-valenced cognitive avoidance in adult ADHD. *Cognitive and Behavioral Practice, 22*(2), 192–202.
- Knouse, L. E., Mitchell, J. T., Brown, L. H., Silvia, P. J., Kane, M. J., Myin-Germeys, I., & Kwapil, T. R. (2008). The expression of adult ADHD symptoms in daily life: An application of experience sampling methodology. *Journal of Attention Disorders, 11*(6), 652-663.
- Knouse, L. E., Mitchell, J. T., Kimbrel, N. A., & Anastopoulos, A. D. (2019). Development and evaluation of the ADHD Cognitions Scale for Adults. *Journal of Attention Disorders, 23*(10), 1090-1100.
- Knouse, L. E., Zvorsky, I., & Safren, S. A. (2013). Depression in adults with attention-deficit/hyperactivity disorder (ADHD): The mediating role of cognitive-behavioral factors. *Cognitive Therapy and Research, 37*(6), 1220–1232.
- Kooji, J. J. S., Boonstra, A. M., Swinkels, S. H. N., Bekker, E. M., de Noord, I., & Buitelaar, J. K. (2008). Reliability, validity, and utility of instruments for self-report and informant report concerning symptoms of ADHD in adult patients. *Journal of Attention Disorders, 11*(4), 445-458.

- Koolen, S., Poorthuis, A., & van Aken, M. A. G. (2012). Cognitive distortions and self-regulatory personality traits associated with proactive and reactive aggression in early adolescence. *Cognitive Therapy and Research, 36*(6), 776-787.
- Kuru, E., Safak, Y., Özdemir, I., Tulacı, R. G., Özdel, K., Özkula, N. G., & Örsel, S. (2018). Cognitive distortions in patients with social anxiety disorder: Comparison of a clinical group and healthy controls. *The European Journal of Psychiatry, 32*(2), 97-104.
- Kurylo, M., & Stevenson, J. (2011). NEO personality inventory. In J. S. Kreutzer, J. DeLuca, & B. Caplan (Eds.), *Encyclopedia of Clinical Neuropsychology* (pp. 1728-1731). New York, NY: Springer.
- Kuyken, W., Padesky, C. A., & Dudley, R. (2008). The science and practice of case conceptualization. *Behavioural and Cognitive Psychotherapy, 36*(6), 757-768.
- Kuyper, L., & Wijensen, C. (2014). Gender identities and gender dysphoria in the Netherlands. *Archives of Sexual Behavior, 43*(2), 377-385.
- Lapointe, M. L. B., Blanchette, I., Duclos, M., Langlois, F., Provencher, M. D., & Tremblay, S. (2013). Attentional bias, distractibility and short-term memory in anxiety. *Anxiety, Stress, & Coping, 26*(3), 293-313.
- Larson, K., Russ, S. A., Kahn, R. S., & Halfon, N. (2011). Patterns of comorbidity, functioning, and service use for US children with ADHD, 2007. *American Academy of Pediatrics, 127*(3), 462-470.

- Letkiewicz, A. M., Miller, G. A., Crocker, L. D., Warren, S. L., Infantolino, Z. P., Mimnaugh, K. J., & Heller, W. (2014). Executive function deficits in daily life prospectively predict increases in depressive symptoms. *Cognitive Therapy and Research, 38*(6), 612–620.
- Leung, P. W. L., & Poon M. W. L. (2001). Dysfunctional schemas and cognitive distortions in psychopathology: A test of the specificity hypothesis. *Journal of Child Psychology and Psychiatry, 42*(6), 755-765.
- Leven, T., de Caestecker, L., & McCallum, A. (2020). Health needs assessment of lesbian, gay, bisexual, transgender and non-binary people.
- Makris, N., Buka, S. L., Biederman, J., Papadimitriou, G. M., Hodge, S. M., Valera, E. M., Brown, A. B., Bush, G., Monuteaux, M. C., Caviness, V. S., Kennedy, D. N., & Seidman, L. J. (2008). Attention and executive systems abnormalities in adults with childhood ADHD: A DT-MRI study of connections. *Cerebral Cortex, 18*(5), 1210-1220.
- Mathews, A., & MacLeod, C. (2005). Cognitive vulnerability to emotional disorders. *Annual Review of Clinical Psychology, 1*, 167–195.
- McCrae, R. R. (2020). Get a second opinion: Comment on Bleidorn et al. (2019). *American Psychologist, 75*(5), 729-730.
- McCrae, R. R., Costa, P. T., Terracciano, A., Parker, W. D., Mills, C. J., De Fruyt, F., & Mervielde, I. (2002). Personality trait development from age 12 to age 18: Longitudinal, cross-sectional, and cross-cultural analyses. *Journal of Personality and Social Psychology, 83*, 1456–1468.

- Meyer, T. J., Miller, M. L., Metzger, R. L., & Borkovec, T. D. (1990). Development and validation of the Penn State Worry Questionnaire. *Behaviour Research and Therapy, 28*(6), 487-495.
- Miklósi, M., Máté, O., Somogyi, K., & Szabó, M. (2016). Adult attention deficit hyperactivity disorder symptoms, perceived stress, and well-being: The role of early maladaptive schemata. *The Journal of Nervous and Mental Disease, 204*(5), 364-369.
- Miller, J. D., Lynam, D. R., Vize, C., Crowe, M., Sleep, C., Maples-Keller, J. L., Few, L. R., & Campbell, W. K. (2018). Vulnerable narcissism is (mostly) a disorder of neuroticism. *Journal of Personality, 86*(2), 186-199.
- Miller, T. W., Nigg, J. T., & Faraone, S. V. (2007). Axis I and II comorbidity in adults with ADHD. *Journal of Abnormal Psychology, 116*(3), 519-528.
- Mitchell, J. T., Benson, J. W., Knouse, L. E., Kimbrel, N. A., & Anastopoulos, A. D. (2013). Are negative automatic thoughts associated with ADHD in adulthood? *Cognitive Therapy and Research, 37*(4), 851–859.
- Mobini, S., Pearce, M., Grant, A., Mills, J., & Yeomans, M. R. (2006). The relationship between cognitive distortions, impulsivity, and sensation seeking in a non-clinical population sample. *Personality and Individual Differences, 40*(6), 1153–1163.
- Mogg, K., Mathews, A., Eysenck, M. (1992). Attentional bias in clinical anxiety states. *Cognition and Emotion, 6*, 149–159.
- Mongia, M., & Hechtman, L. (2012). Cognitive behavior therapy for adults with attention-deficit/hyperactivity disorder: A review of recent randomized controlled trials. *Current Psychiatry Reports, 14*(5), 561-567.

- Muris, P., Meesters, C., & Rempelberg, L. (2006). Attention control in middle childhood: Relations to psychopathological symptoms and threat perception distortions. *Behaviour Research and Therapy*, *45*(5), 997-1010.
- Naragon-Gainey, K., & Watson, D. (2018). What lies beyond neuroticism? An examination of the unique contributions of social-cognitive vulnerabilities to internalizing disorders. *Assessment*, *25*(2), 143-158.
- National Institute of Mental Health. (2017). *Attention-deficit/hyperactivity disorder (ADHD)*. <https://www.nimh.nih.gov/health/statistics/attention-deficit-hyperactivity-disorder-adhd.shtml>
- The National LGBTQ Task Force. (2019). *The National LGBTQ Task Force's guide to the 2020 census: An introduction*. <https://www.thetaskforce.org/wp-content/uploads/2019/05/Guide-to-the-2020-Census-An-Introduction.pdf>
- Newark, P. E., & Stieglitz, R-D. (2010). Therapy-relevant factors in adult ADHD from a cognitive behavioural perspective. *ADHD Attention Deficit and Hyperactivity Disorders*, *2*(2), 59-72.
- Nigg, J. T., Blaskey, L. G., Huang-Pollock, C. L., Hinshaw, S. P., John, O. P., Willcutt, E. G., & Pennington, B. (2002). Big Five dimensions and ADHD symptoms: Links between personality traits and clinical symptoms. *Journal of Personality and Social Psychology*, *83*(2), 451– 469.
- O'Brien, D. R. (2016). *The Association of Cognitive Distortions, Problems with Self-Concept, Gender, and Age in Adults Diagnosed with Attention-Deficit/Hyperactivity Disorder (ADHD)*. [Unpublished doctoral dissertation]. Philadelphia College of Osteopathic Medicine.

- Owens, J. S., Goldfine, M. E., Evangelista, N. M., Hoza, B., & Kaiser, N. M. (2007). A critical review of self-perceptions and the positive illusory bias in children with ADHD. *Clinical Child and Family Psychology Review, 10*(4), 335-351.
- Parker, J. D., Majeski, S. A., & Collin, V. T. (2004). ADHD symptoms and personality: Relationships with the five-factor model. *Personality and Individual Differences, 36*(4), 977-987.
- Pastor, P. N., Reuben, C. A., Duran, C. R., & Hawkins, L. D. (2015). Association between diagnosed ADHD and selected characteristics among children aged 4–17 years: United States, 2011–2013. *NCHS Data Brief, Number 201*, 1-8.
- Paulus, D. J., Vanwoerden, S., Norton, P. J., & Sharp, C. (2016). From neuroticism to anxiety: Examining unique contributions of three transdiagnostic vulnerability factors. *Personality and Individual Differences, 94*, 38-43.
- Philipsen, A., Lam, A. P., Breit, S., Lücke, C., Müller, H. H., & Matthies, S. (2017). Early maladaptive schemas in adult patients with attention deficit hyperactivity disorder. *ADHD Attention Deficit and Hyperactivity Disorders, 9*(2), 101–111.
- Pitts, M., Mangle, L., & Asherson, P. (2015). Impairments, diagnosis and treatments associated with attention-deficit/hyperactivity disorder (ADHD) in UK adults: Results from the lifetime impairment survey. *Archives of Psychiatric Nursing, 29*(1), 56-63.
- Practical Androgyny. (2014). *How many people in the United Kingdom are nonbinary?*
<https://practicalandrogyny.com/2014/12/16/how-many-people-in-the-uk-are-nonbinary/>

- Quinn, P. O. (2005). Treating adolescent girls and women with ADHD: Gender-specific issues. *Journal of Clinical Psychology, 61*(5), 579-587.
- Quinn, P. O. (2008). Attention-deficit/hyperactivity disorder and its comorbidities in women and girls: An evolving picture. *Current Psychiatry Reports, 10*(5), 419-423.
- Ramsay, J. R. (2007). Current status of cognitive-behavioral therapy as a psychosocial treatment for adult attention-deficit/hyperactivity disorder. *Current Psychiatry Reports, 9*(5), 427-433.
- Ramsay, J. R. (2010). CBT for adult ADHD: Adaptations and hypothesized mechanisms of change. *Journal of Cognitive Psychotherapy: An International Quarterly, 24*(1), 37-45.
- Ramsay, J. R. (2017). The relevance of cognitive distortions in the psychosocial treatment of adult ADHD. *Professional Psychology: Research and Practice, 48*(1), 62-69.
- Ramsay, J. R., & Rostain, A. L. (2003). A cognitive therapy approach for adult attention deficit/hyperactivity disorder. *Journal of Cognitive Psychotherapy: An International Quarterly, 17*(4), 319-334.
- Ramsay, J. R., & Rostain, A. L. (2005). Girl, repeatedly interrupted: The case of a young adult woman with ADHD. *Clinical Case Studies, 4*(4), 329-346.
- Ramsay, J. R., & Rostain, A. L. (2014). *The adult ADHD tool kit: Using CBT to facilitate coping inside and out*. Routledge.

- Ramtekkar, U. P., Reiersen, A. M., Todorov, A. A., & Todd, R. D. (2010). Sex and age differences in attention-deficit/hyperactivity disorder symptoms and diagnoses: Implications for DSM-V and ICD-11. *Journal of the American Academy of Child and Adolescent Psychiatry, 49*(3), 217-228.
- Reimherr, F. W., Marchant, B. K., Strong, R. E., Hedges, D. W., Adler, L., Spencer, T. J., West, S. A., & Soni, P. (2005). Emotional dysregulation in adult ADHD and response to atomoxetine. *Biological Psychiatry, 58*(2), 125-131.
- Reisner, S. L., Biello, K. B., White Hughto, J. M., Kuhns, L., Mayer, K. H., Garofalo, R., & Mimiaga, M. J. (2016). Psychiatric diagnoses and comorbidities in a diverse, multicity cohort of young transgender women: Baseline findings from project lifeskills. *JAMA Pediatrics, 170*(5), 481-486.
- Retz, W., Stieglitz, R., Corbisiero, S., Retz-Junginger, P., & Rösler, M. (2012). Emotional dysregulation in adult ADHD: What is the empirical evidence? *Expert Review of Neurotherapeutics, 12*(10), 1241-1251.
- Richards, C., Bouman, W. P., Seal, L., Barker, M. J., Nieder, T. O., & T'Sjoen, G. (2016). Non-binary or genderqueer genders. *International Review of Psychiatry, 28*(1), 95-102.
- Rimes, K. A., Goodship, N., Ussher, G., Baker, D., & West, E. (2019). Nonbinary and binary transgender youth: Comparison of mental health, self-harm, suicidality, substance use, and victimization experiences. *The International Journal of Transgenderism, 20*(2-3), 230-240.

- Roberts, M. B. (2015). *Inventory of cognitive distortions: Validation of a measure of cognitive distortions using a community sample* [Unpublished doctoral dissertation]. Philadelphia College of Osteopathic Medicine.
- Rosenfield, B. M. (2004). *Relationship between cognitive distortions and psychological disorders across diagnostic axes*. [Unpublished doctoral dissertation]. Philadelphia College of Osteopathic Medicine.
- Rosenfield, B. M., Ramsay, J. R., & Rostain, A. L. (2008). Extreme makeover: The care of a young adult man with severe ADHD. *Clinical Case Studies*, 7(6), 471-490.
- Rucklidge, J. J. (2010) Gender differences in attention-deficit/hyperactivity disorder. *Psychiatric Clinics of North America*, 33(2), 357–373.
- Sagiv, S. K., Epstein, J. N., Bellinger, D. C., & Korrnick, S. A. (2013). Pre- and postnatal risk factors for ADHD in a nonclinical pediatric population. *Journal of Attention Disorders*, 17(1), 47–57.
- Samuel, D. B., Riddell, A. D. B., Lynam, D. R., Miller, J. D., & Widiger, T. A. (2012). A Five-Factor measure of obsessive-compulsive personality traits. *Journal of Personality Assessment*, 94(5), 456-465.
- Séguin, J. R., & Zelazo, P. D. (2005). Executive function in early physical aggression. In R. E. Tremblay, W. W. Hartup, & J. Archer (Eds.), *Developmental origins of aggression*

- Seidman, L. J., Biederman, J., Monuteaux, M. C., Valera, E., Doyle, A. E., & Faraone, S. V. (2005). Impact of gender and age on executive functioning: Do girls and boys with and without attention deficit hyperactivity disorder differ neuropsychologically in preteen and teenage years? *Developmental Neuropsychology, 27*(1), 79–105.
- Seidman, L. J., Biederman, J., Weber, W., Hatch, M., & Faraone, S. V. (1998). Neuropsychological function in adults with attention deficit hyperactivity disorder. *Society of Biological Psychiatry, 44*(4), 260–268.
- Seidman, L. J., Doyle, A., Fried, R., Valera, E., Crum, K., & Matthews, L. (2004). Neuropsychological function in adults with attention-deficit/hyperactivity disorder. *Psychiatric Clinics of North America, 27*(2), 261–282.
- Semrud-Clikeman, M., Pliszka, S., & Liotti, M. (2008). Executive functioning in children with attention-deficit/hyperactivity disorder: Combined type with and without a stimulant medication history. *Neuropsychology, 22*(3), 329-340.
- Sen, S., Nesse, R. M., Stoltenberg, S. F., Li, S., Gleiberman, L., Chakravarti, A., Weder, A. B., & Burmeister, M. (2003). A BDNF coding variant is associated with the NEO personality inventory domain neuroticism, a risk factor for depression. *Neuropsychopharmacology, 28*(2), 397-401.
- Serine, A. (2016). *The relationship between cognitive distortions and ADHD after accounting for depression, anxiety, and personality pathology* [Unpublished doctoral dissertation]. Philadelphia College of Osteopathic Medicine.

- Shaw, P., Stringaris, A., Nigg, J., & Leibenluft, E. (2014). Emotion dysregulation in attention deficit hyperactivity disorder. *Emotion Dysregulation in Attention Deficit Hyperactivity Disorder*, 171(3), 276-293.
- Sibley, M. H., Pelham Jr., W. E., Gnagy, E. M., Waxmonsky, J. G., Waschbusch, D. A., Derefinko, K. J., Garefino, A. C., Molina, B. S. G., Wymbs, B. T., Babinski, D. E., & Kuriyan, A. B. (2012). When diagnosing ADHD in young adults emphasize informant reports, DSM items, and impairment. *Journal of Consulting and Clinical Psychology*, 80(6), 1052-1061.
- Simon, V., Czobor, P., Bálint, S., Mészáros, Á., & Bitter, I. (2009). Prevalence and correlates of adult attention-deficit hyperactivity disorder: Meta-analysis. *The British Journal of Psychiatry*, 194(3), 204-211.
- Sjöwall, D., Roth, L., Lindqvist, S., & Thorell, L. B. (2013). Multiple deficits in ADHD: Executive dysfunction, delay aversion, reaction time variability, and emotional deficits. *Journal of Child Psychology and Psychiatry*, 54(6), 619–627.
- Skogli, E. W., Teicher, M. H., Andersen, P. N., Hovik, K. T., & Øie, M. (2013). ADHD in girls and boys: Gender differences in co-existing symptoms and executive function measures. *BMC Psychiatry*, 13(1), 298-310.
- Smith, D. T., Mouzon, D. M., & Elliott, M. (2018). Reviewing the assumptions about men's mental health: An exploration of the gender binary. *American Journal of Men's Health*, 12(1), 78-89.
- Solanto, M. V. (2011). *Cognitive behavioral therapy for adult ADHD: Targeting executive dysfunction*. Guilford Press.

- Solanto, M. V., Marks, D. J., Wasserstein, J., Mitchell, K., Abikoff, H., Alvir, J. M. J., & Kofman, M. D. (2010). Efficacy of meta-cognitive therapy for adult ADHD. *The American Journal of Psychiatry*, *167*(8), 958-968.
- Sowa, C. J., & Lustman, P. J. (1984). Gender differences in rating stressful events, depression, and depressive cognition. *Journal of Clinical Psychology*, *40*(6), 1334-1337.
- Spencer, T. J., Faraone, S. V., Tarko, L., McDermott, K., & Biederman, J. (2014). Attention-deficit/hyperactivity disorder and adverse health outcomes in adults. *The Journal of Nervous and Mental Disease*, *202*(10), 725–731.
- Steinert, C., Hofmann, M., Kruse, J., & Leichsenring, F. (2014). Relapse rates after psychotherapy for depression – stable long-term effects? A meta-analysis. *Journal of Affective Disorders*, *168*, 107-118.
- Strohmeier, C. (2013). *Adult ADHD and the relationship between self-reported frequency of cognitive distortions, anxiety, and depression* [Unpublished doctoral dissertation]. Philadelphia College of Osteopathic Medicine.
- Strohmeier, C., Rosenfield, B., DiTomasso, R. A., & Ramsay, J. R. (2016). Assessment of the relationship between self-reported cognitive distortions and adult ADHD, anxiety, depression, and hopelessness. *Psychiatry Research*, *238*, 153-158.
- Thapar, A., Langley, K., Asherson, P., & Gill, M. (2007). Gene-environment interplay in attention-deficit hyperactivity disorder and the importance of a developmental perspective. *British Journal of Psychiatry*, *190*(1), 1-3.
- Thomson, W. (2016). Depression, neuroticism, and the discrepancy between actual and ideal self-perception. *Personality and Individual Differences*, *88*, 219-224.

- Torrente, F., López, P., Alvarez Prado, D., Kichic, R., Cetkovich-Bakmas, M., Lischinsky, A., & Manes, F. (2014). Dysfunctional cognitions and their emotional, behavioral, and functional correlates in adults with attention deficit hyperactivity disorder (ADHD): Is the cognitive-behavioral model valid? *Journal of Attention Disorders, 18*(5), 412–424.
- Transgender Health. (2015, November). Retrieved from American Medical Student Association. <https://www.amsa.org/advocacy/action-committees/gender-sexuality/transgender-health/>
- The Trevor Project. (2019). *Research brief: Diversity of youth gender identity*. <https://www.thetrevorproject.org/2019/10/29/research-brief-diversity-of-youth-gender-identity/>
- Troop-Gordon, W., & Ladd, G. W. (2005). Trajectories of peer victimization and perceptions of the self and schoolmates: Precursors to internalizing and externalizing problems. *Child Development, 76*(5), 1072-1091.
- Trull, T. J., & Widiger, T. A. (2013). Dimensional models of personality: The Five-Factor model and the *DSM-5*. *Dialogues in Clinical Neuroscience, 15*(2), 135-146.
- Van Caenegem, E., Wierckx, K., Elaut, E., Buysse, A., Dewaele A., Van Nieuwerburgh, F., De Cuypere, G., & T'Sjoen, G. (2015). Prevalence of gender nonconformity in Flanders, Belgium. *Archives of Sexual Behavior, 44*(5), 1281-1287.

- Vasey, M. W., & MacLeod, C. (2001). *Information-processing factors in childhood anxiety: A review and developmental perspective*. In M. W. Vasey & M. R. Dadds (Eds.), *The developmental psychopathology of anxiety* (pp. 253–277). Oxford University Press.
- Waite, R. (2007). Women and attention deficit disorders: A great burden overlooked. *Journal of The American Academy of Nurse Practitioners*, 19(3), 116-125.
- Waite, R. (2010). Women with ADHD: It is an explanation, not the excuse du jour. *Perspectives in Psychiatric Care*, 46(3), 182-196.
- Waite, R., & Tran, M. (2010). ADHD among a cohort of ethnic minority women. *Women & Health*, 50(1), 71-87.
- Warrier, V., Greenberg, D. M., Weir, E., Buckingham, C., Smith, P., Lai, M-C., Allison, C., & Baron-Cohen, S. (2020). Elevated rates of autism, other neurodevelopmental and psychiatric diagnoses, and autistic traits in transgender and gender-diverse individuals. *Nature Communications*, 11(1), 1-12.
- Webb, A., Matsuno, E., Budge, S., Krishnan, M., & Balsam, K. (2015). Non-binary gender identities fact sheet. *The Society for the Psychological Study of Lesbian, Gay, Bisexual, and Transgender Issues*.
- Wehmeier, P. M., Schacht, A., & Barkley, R. A. (2010). Social and emotional impairment in children and adolescents with ADHD and the impact on quality of life. *Journal of Adolescent Health*, 46(3), 209-217.

- Weinstock, L. M., & Whisman, M. A. (2006). Neuroticism as a common feature of the depressive and anxiety disorders: A test of the revised integrative hierarchical model in a national sample. *Journal of Abnormal Psychology, 115*(1), 68-74.
- Weiss, M. D., & Weiss, J. R. (2004). A guide to the treatment of adults with ADHD. *The Journal of Clinical Psychiatry, 65*(Suppl 3), 27–37.
- Willcutt, E. G. (2012). The prevalence of *DSM-IV* attention-deficit/hyperactivity disorder: A meta-analytic review. *Neurotherapeutics, 9*(3), 490–499.
- Wodka, E. L., Mostofsky, S. H., Prahme, C., Gidley Larson, J. C., Loftis, C., Denckla, M. B., & Mahone, E. M. (2008). Process examination of executive function in ADHD: Sex and subtype effects. *The Clinical Neuropsychologist, 22*(5), 826–841.
- Woodman Taylor, E., & Keltner, N. L. (2002). Messy purse girls: Adult females and ADHD. *Perspectives in Psychiatric Care, 38*(2), 69-72.
- Young, J., Klosko, J. S., & Weishaar, M. E. (2003). *Schema Therapy. A practitioner's guide*. Guilford Press.
- Yurica, C. (2002). *Inventory of Cognitive Distortions: Validation of a psychometric instrument for the measurement of cognitive distortions* [Unpublished doctoral dissertation]. Philadelphia College of Osteopathic Medicine.
- Yurica, C., & DiTomasso, R. (2001). Inventory of Cognitive Distortions. In Yurica, C. (2002). *Inventory of Cognitive Distortions: Validation of a psychometric test for the measurement of cognitive distortions* [Unpublished doctoral dissertation]. Philadelphia College of Osteopathic Medicine.

Yurica, C. L., & DiTomasso, R. A. (2005). Cognitive distortions. In *Encyclopedia of cognitive behavior therapy*. Springer.