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

THE ASSOCIATION BETWEEN SLUGGISH COGNITIVE TEMPO, BIG  
FIVE PERSONALITY FACTORS, AND COMORBID CLINICAL  
SYNDROMES IN ADULTS SEEKING TREATMENT FOR ADHD

By Lauren Truskey

Submitted in Partial Fulfillment of the Requirements for the Degree of

Doctor of Psychology

September, 2021

## DISSERTATION APPROVAL

This is to certify that the thesis presented to us by Lauren Truskey on the 29th day of July, 2021, in partial fulfillment of the requirements for the degree of Doctor of Psychology, has been examined and is acceptable in both scholarship and literary quality.

### COMMITTEE MEMBERS' SIGNATURES

, Chairperson

, Chair, Department of Clinical Psychology

Dean, School of Professional & Applied Psychology

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**ABSTRACT**

Sluggish cognitive tempo (SCT) is a cluster of symptoms, including daydreaming, mental confusion, slowed thinking, and hypoactivity, that are believed to overlap and be frequently comorbid with attention deficit/hyperactivity disorder (ADHD). Research examining the relationship between personality and symptoms of SCT in adults with ADHD is limited. The purpose of the current study was to determine whether a relationship exists between SCT, Big Five personality factors, and ADHD, after accounting for comorbid anxiety and depression in a clinical adult sample. Archival data from a university-based outpatient clinic specializing in the assessment and treatment of adult ADHD were collected from an existing database. The sample included 204 participants who met inclusion criteria for the study. Big Five personality factors were assessed using the Revised NEO Personality Inventory, SCT and current ADHD symptom severity were assessed using the Barkley Adult ADHD Rating Scale-IV, depression was assessed using the Beck Depression Inventory-II, and anxiety was assessed using the Penn State Worry Questionnaire. The results of this study demonstrated that self-reported depression, anxiety, and Conscientiousness predicted SCT severity. An inverse relationship between inattentive ADHD symptoms and Conscientiousness was also found. When SCT in participants diagnosed with inattentive and combined presentations of ADHD were compared, no significant difference was found. Hopefully, the present study is an informative addition to the understanding of SCT and will improve assessment and treatment recommendations for this complex and challenging disorder.

## CHAPTER 1: INTRODUCTION

### Statement of the Problem

Attention-deficit/hyperactivity disorder (ADHD) is categorized as a neurodevelopmental disorder according to the *Diagnostic and Statistical Manual of Mental Disorders* (5th ed.; *DSM-5*; American Psychiatric Association [APA], 2013), with characteristics of inattention, hyperactivity, and/or impulsivity. Inattention, hyperactivity/impulsivity, and combined presentation have been identified as the three presentations of the disorder. At this time, no standard assessment is used in practice to diagnose ADHD, and most of the literature has investigated symptoms in children as opposed to adults (Wilens et al., 2009).

In 2006, the National Comorbidity Survey Replication was administered to approximately 9,000 adults aged 18 to 44 years. The survey's results indicated that approximately 3,000, or 4.4%, of respondents endorsed symptom criteria for adult ADHD (Kessler et al., 2006). Additionally, commercial insurance claims and databases revealed 342,284 employed, insured adults in the United States have filed one or more insurance claims for reimbursement of treatment or medication for ADHD (Montejano et al., 2011). As a result of the high prevalence of adult ADHD, the total cost for treatment has totaled approximately 266 billion dollars over a 21-year period, and costs are estimated to be 3 times greater for affected adults than for children and adolescents (Sayal et al., 2018).

In addition to dealing with the high cost of treatment, adults with ADHD have lower quality of life, more impaired relationships, higher rates of unemployment, more impaired driving, and more comorbid conditions, such as depression, anxiety, and

substance use, than so-called neurotypical individuals (Geffen & Forster, 2017). In a sample of 79 Norwegian adults with ADHD, participants with ADHD endorsed more unemployment, learning disabilities in reading and writing, and self-reported impairment in childhood than an adult control group without ADHD (Halleland et al., 2019).

It is believed by mental health professionals that the burden of psychosocial stressors contributes to increased rates of comorbid clinical syndromes. Adults with ADHD are more likely than individuals without ADHD to be diagnosed with major depressive disorder (MDD) and anxiety disorders (APA, 2013; Fischer et al., 2007; Katzman et al., 2016). Those with ADHD and comorbid MDD have been noted to face greater negative social and occupational outcomes than individuals with ADHD only (McIntosh et al., 2009). In a sample of 320 adults with ADHD, 25.31% met the criteria for MDD. Participants with ADHD and MDD demonstrated a higher demand for psychotherapy or psychopharmacological treatment than individuals with ADHD only. Regarding anxiety, Schatz and Rostain (2006) conducted a review of the literature between 1998 and 2004 and reported that anxiety had adverse implications on working memory and inattention, overlapping with and exacerbating ADHD symptoms.

Sluggish cognitive tempo (SCT) is conceptualized as a cluster of comorbid characteristics, including daydreaming, mental confusion, slowed thinking, and hypoactivity, that are hypothesized to overlap with several ADHD symptoms (Barkley, 2012). Considering prevalence, a literature search revealed that between 4%-5% of the U.S. population endorsed approximately 3 to 4 symptoms of SCT (Barkley, 2012). In a recent sample of college students, 12% of the 158 students without clinical diagnoses reported high rates of social isolation as an outcome of SCT, as opposed to being

attributed to ADHD, anxiety, and depression symptoms (Flannery, et al., 2016). Barkley (2014) speculated that SCT may occur separately from ADHD based on similar results from a nationwide, adult sample. Adults with SCT only and SCT with ADHD endorsed greater difficulties with executive functioning and psychosocial responsibilities than individuals with ADHD only and a control group. Individuals with ADHD and SCT, who have a tendency to internalize, are at risk for developing comorbid disorders, such as anxiety and depression, thus complicating treatment (Fischer et al., 2007).

Aside from common comorbid psychiatric diagnoses, significant Big Five personality factors have been found elevated in patients with either ADHD or SCT. For example, Nigg et al. (2002) found that ADHD symptoms contributed to the development of personality traits by examining the relation among ADHD symptoms, associated problems from childhood, and the Big Five personality factors 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. Parker et al. (2004) also analyzed the relationship between self-reported ADHD symptoms and the NEO Five-Factor Inventory (NEO-FFI). Results showed that high Extraversion was a significant predictor for individuals with hyperactive/impulsive ADHD, and high levels of Neuroticism, low levels of Agreeableness, and low Conscientiousness were predictors for both inattentive and hyperactive/impulsive symptom profiles. In contrast, a sample of 3,172 undergraduate students reporting high levels of SCT were associated with high Neuroticism and low Conscientiousness and Extraversion, contradicting the previously determined positive association between Extraversion and ADHD and the overlap between Neuroticism and SCT, ADHD, anxiety,

and depression. Consequently, personality factors influence the presentation of adult ADHD and SCT, creating further diagnostic and treatment challenges.

Overall, research has indicated depression, anxiety, and maladaptive personality factors affect the presentation and pathology of both ADHD and SCT in adults. Although ADHD and SCT have been studied extensively in children, little is known about SCT in adults. This lack of research and empirical knowledge hinders adequate assessment and treatment of a complex and challenging constellation of symptoms and disorders.

### **Purpose of the Study**

An abundance of research exists on the relationship between adult ADHD and such personality factors as the FFM, depression, and anxiety (Allen et al., 2018; Bennett, 2015; Kaplan et al., 2015; Koorevaar et al., 2017; Nigg et al., 2002; Parker et al., 2004; Serine et al. 2020; Shi et al., 2015; Stanton & Watson, 2016). However, a literature review of eBook Collection (EBSCOhost), PsycARTICLES, PsycBOOKS, PsycEXTRA, Psychology and Behavioral Sciences Collections, Psycinfo, and Google Scholar found only one study considering the relationship of Big Five personality factors with SCT in college-aged adults. Although this study was impressive, it did not use a clinical sample, and the age range was limited to 18- to 29-year-olds (Becker, Schmitt et al., 2018). Several studies with children with ADHD and SCT have noted significant clinical differences in internalization, anxiety, mood, social withdrawal, self-monitoring, and working memory (Barkley 2012; Barkley, 2019; Bauermeister et al., 2012; Becker et al., 2016; Becker, Burns et al., 2018; Becker & Barkley, 2018; Becker et al., 2013; Capdevila-Brophy et al., 2014; Garner et al., 2017; Wood et al., 2017).

Therefore, the purpose of the current study was to expand on previous literature and determine whether a relationship exists between the Big Five personality factors; SCT; ADHD, inattentive presentation; and ADHD, combined presentation in a clinical adult sample, after accounting for comorbid anxiety and depression. Hopefully, this information will help to guide future assessment and treatment recommendations for this complex and challenging disorder and provide further insight and awareness regarding SCT.

### **Research Questions and Hypotheses**

#### **Research Questions**

1. Is there a relationship between SCT and Big Five personality factors?
2. Does a relationship exist between ADHD, inattentive presentation and Big Five personality factors?
3. Does SCT symptom severity differ in adults with ADHD, inattentive presentation versus ADHD, combined presentation?

#### **Hypotheses**

1. It is hypothesized that clinically significant SCT symptoms will be positively associated with Neuroticism and negatively associated with Extraversion and Conscientiousness, after accounting for anxiety and depression, in adults with ADHD. SCT symptoms were operationalized as the SCT percentile as measured by the Barkley Adult ADHD Rating Scale-IV (BAARS-IV); Neuroticism, Extraversion and Conscientiousness was operationalized as *t* scores as measured by the NEO Personality Inventory-Revised (NEO-PI-R).

2. It is hypothesized ADHD, inattentive presentation symptoms, will be positively associated with Neuroticism and negatively correlated with Conscientiousness. Inattentive symptoms were operationalized as a total inattentive symptom score as measured by the Barkley Adult ADHD Rating Scale-IV (BAARS-IV).
3. It is hypothesized that SCT scores will differ significantly in adults with ADHD, combined presentation, as compared to adults with ADHD, inattentive presentation.

## CHAPTER 2: REVIEW OF THE LITERATURE

### Adult Attention-Deficit/Hyperactivity Disorder (ADHD)

#### History

ADHD symptoms were first noted in the literature in 1798 (as cited in Lange et al., 2010), and since then, the recognition and conceptualization of related symptom clusters have undergone multiple revisions that evolved to the diagnosis of three presentations of ADHD in the *DSM-5* (APA, 2013; Lange et al., 2010). Specifically, in the 16<sup>th</sup> century, Sir Alexander Crichton, a Scottish physician, described abnormal inattention, impulsivity, and restlessness in children in his published work, *On Attention and its Diseases* (as cited in Lange et al., 2010). Further evidence of the recognition of ADHD symptoms was published in German children's stories titled *Fidgety Phillip* (*Zappelphilipp*) by Henireich Hoffman in 1844 (as cited in Lange et al., 2010). The story illustrates the restless behavior of a young boy eating dinner with his family. The boy is described as not listening to his father, "wiggling" in his chair, and rocking backward and forward. Phil's father is suggested to be expecting his son's behavior, implying this behavioral pattern is constant. The stories of *Fidgety Phil* are assumed to be one of the first illustrations of ADHD in children (Lange et al., 2010).

Following the early portrayals of ADHD by Crichton and Hoffman, British pediatrician Sir George Frederic Still published a book on a chronic joint disease, later renamed Still's disease (Lange et al., 2010; Still, 1987), in his publications of medical textbooks about children's diseases. Aside from his research with physically ill children, Still reported approximately 20 cases of children having symptoms related to a condition that he described as a "defect of moral control" (Lang et al., 2010, p. 246). Still

hypothesized that the lack of control he observed was a result of a dysregulation of attention. Other explanations for absence of control included spitefulness, jealousy, lawlessness, dishonesty, and immodesty. Still's theoretical conceptualization of the disorder that would later be labeled ADHD did not fully match the operationalization of the disorder today, but the symptoms he recorded included traits of inattention, hyperactivity, and impulsivity, all hallmarks of the disorder ADHD (Lang et al., 2010).

Still's work preceded the observations and diagnostic formulation of Franz Kramer and Hans Pollnow in 1932. These physicians noted cases in which children appeared to be affected by motor restlessness, the inability to sit still, constant movement (e.g., running up and down the exam room), and displeasure when scolded for misbehaving. Kramer and Pollnow also observed children with complaints of working aimlessly, to which the physicians attributed environmental distractions. They later labeled the observed motor symptoms hyperkinetic disease of infancy (Kramer & Pollnow, 1932; Lang et al., 2010), with symptoms similar to today's ADHD, hyperactive/impulsive presentation (Lang et al., 2010). To understand the evolution of the conceptualization of ADHD further, a review through each edition of the *DSM* is provided.

### **Review of Relevant *DSM* Diagnoses over Time**

Diagnostic criteria or even a relevant symptom cluster for ADHD was completely absent in the first edition of the *DSM* and has gradually evolved since its first appearance in the second edition in 1968 (APA, 1952; APA, 1968). Beginning with the second edition of the *DSM*, hyperkinetic reaction of childhood was included as a disorder "characterized by symptoms of overactivity, restlessness, distractibility, and short

attention span, especially in young children” (APA, 1968, pp. 49-50). Ross and Ross (1976) cited research in the 1930s and 1940s that found evidence that supported a causal relationship between brain damage and hyperactivity (as cited in Lange et al., 2010). To further support the research noted by Ross and Ross (1976), Rosenfeld and Bradley (1948) reported the following atypical behaviors observed in children who suffered from asphyxiant illness in infancy: mood variability, hypermotility, impulsiveness, short attention span, difficulty recalling previously learned material, and difficulty with mathematics (as cited in Lange et al., 2010). In summary, hyperactivity was viewed as a result of brain damage, which was specified in the diagnosis of hyperkinetic reaction of childhood (APA, 1968; Lange et al., 2010).

The causal relationship between minor brain damage and symptoms of hyperactivity was challenged as the rate of children with hyperactivity without asphyxiating diseases or other identifiable brain damage increased. Some studies no longer supported the theory that injury or birth complications resulting in a lack of oxygen to the brain were etiologically responsible for hyperactive behaviors. As of 1963, the Oxford International Study Group of Child Neurology requested a shift in terminology from brain damage to brain dysfunction (Lange et al., 2010).

Not until the third edition of the *DSM* were the symptoms of hyperactivity and inattention recognized as separate entities. Virginia Douglas, a researcher affiliated with the Canadian Psychological Association, argued the differences between attentional challenges and hyperactivity, explaining that deficits in attention were more significant than hyperactive criteria. Her research was influential and stimulated the reconceptualization of the disorder, resulting in the revision of the diagnosis from

hyperkinetic reaction of childhood to the first *DSM* diagnosis approximating the current nomenclature: attention deficit disorder (ADD), with or without hyperactivity (APA, 1980; “Douglas, 1972; Lange et al., 2010). The *DSM-III* was also the first edition to standardize an age of onset (7 years old) and the number of symptoms necessary (eight) to be diagnosed with ADD (APA, 1980).

The *DSM-IV* reorganized the concept of ADD, officially implementing the diagnostic label of attention deficit hyperactivity disorder (ADHD; APA, 1994). The APA (1994) based this revision on research findings that children with inattentive symptoms were more daydreamy, more hypoactive, less aggressive, and less impaired in academic achievement in comparison to children with symptoms of hyperactivity. Perhaps more importantly, the fourth edition was most notable for recognizing that the syndrome occurred in both children and adults. In the *DSM-IV-TR* (APA, 2000), the definition had not changed from that used in the previous version, as professionals in the field searched for more information on ADHD in adults (as cited in Lange et al., 2010).

Adult symptoms continued to be integrated in the manual’s fifth edition. The definition and organization of ADHD was not changed in the *DSM-5* (APA, 2013). Noteworthy changes occurred within the number of criteria requirements for ADHD, as individuals aged 18 years or older were required to endorse only five symptoms as opposed to six symptoms needed for children to be diagnosed. Other edits included incorporating non-school-related examples in criteria descriptions (e.g., “for adolescents and adults, preparing reports, completing forms, reviewing lengthy papers”; APA, 2013, p. 32). The APA intends to include further consideration of both children and adults with ADHD in ongoing revisions of the *DSM*, as prevalence in adults continues to increase.

### **Prevalence of Adult ADHD Today**

Research regarding the prevalence of adult ADHD is limited in comparison to information available for child diagnostic rates. The most recent estimate was derived from the results of the Composite International Diagnostic Interview carried out by the World Health Organization. A global sample of 26,744 adults aged 18 to 99 years was screened for psychiatric diagnoses via clinical interview. The prevalence of adult ADHD was significant in 2.8% of the participants. The authors also noted that individuals who endorsed ADHD symptoms were primarily male, were divorced or separated, had low levels of education, and were less likely to seek treatment for ADHD than others with ADHD and comorbid syndromes (Fayyad et al., 2017). Other international studies with children suggested 3%-7% of youth worldwide have been diagnosed with ADHD (Polanczyk et al., 2007). Approximately 50% of children diagnosed with ADHD continue to experience symptoms in adulthood, and research suggests that approximately 3.4%-4.4% of adults worldwide have diagnosable ADHD (Fayyad et al., 2007; Kessler et al., 2006; Kessler et al., 2010).

In 2006, the National Comorbidity Survey Replication was administered to approximately 9,000 adults in the United States aged 18 to 44 years. The survey's results indicated that approximately 3,000, or 4.4%, of respondents endorsed symptom criteria for adult ADHD (Kessler et al., 2006). Additionally, commercial insurance claims and databases revealed 342,284 employed, insured adults in the United States had filed one or more insurance claims for reimbursement of treatment or medication for ADHD (Montejano et al., 2011). As a result of the high prevalence of adult ADHD, the total cost for treatment has totaled approximately 266 billion dollars over a 21-year period, and

costs are estimated to be 3 times greater for affected adults than children and adolescents (Sayal et al., 2018).

Researchers in Australia reported similar prevalence rates within a sample of 88 Australian prisoners. Participants were administered the Adult ADHD Self-Report Scale (ASRS), a self-report symptom checklist. One third of the sample endorsed clinically significant levels of symptoms for adult ADHD (Moore et al., 2016). The ASRS was also incorporated into Deberdt et al.'s (2015) review of adult ADHD prevalence in outpatient facilities throughout Europe. The investigators paired the ASRS with the Diagnostic Interview for ADHD in Adults to estimate frequency based on *DSM-IV* and *DSM-5* criteria. Of the 1,986 patients included, 15.8% met *DSM-IV* criteria, and 17.4% met criteria according to the *DSM-5*.

### **Sluggish Cognitive Tempo**

ADHD is one of the most widely researched and controversial neurodevelopmental diagnoses in the *DSM-5*, with more than 50,000 research articles published to date (Barkley, 2019). A constellation of symptoms known as sluggish cognitive tempo (SCT) is believed to be related to ADHD, and is characterized by day dreaminess, mental confusion or fogginess, and delayed thinking and behavior (Becker & Barkley, 2018). As of 2018, 100 articles regarding SCT had been published, and a PubMed search in 2020 revealed 169 studies pertaining to SCT. Interest in SCT can be traced back to Crichton in 1775, with a hypothesized “second disorder of attention” characterized by low power of attention and arousal and lack of engagement with the environment (Barkley, 2019).

Initial factor analytic work at the University of Georgia considered SCT as a separate factor that revealed a cluster of unique symptoms in children that were unrelated to symptoms of ADD without hyperactivity (Lahey et al., 1988). The term *sluggish cognitive tempo* was coined by Benjamin Lahey in 1984 but was excluded from the *DSM-III-R* (APA, 1987; Barkley, 2019; Becker & Barkley, 2018). Few analyses examined SCT between 1985 and 1999 (Becker et al., 2013). Symptoms of SCT were lacking in the literature until the release of the *DSM-IV-TR* in 2000, which incorporated characteristics of SCT within a *not otherwise specified* category of ADHD. Consequently, a diagnosis of ADHD, not otherwise specified, was given to individuals who did not meet full criteria for ADHD but displayed inattentiveness and “a behavioral pattern marked by sluggishness, daydreaming, and hypoactivity” (APA, 2000, p. 93; Becker et al., 2013).

McBurnett et al. (2001) were among the first to bring symptoms of SCT back to the attention of the field. The authors suggested that symptoms of SCT and ADHD, inattentive type, were two separate and distinguishable subtypes of ADHD. Nonetheless, ADHD, inattentive type, and SCT symptoms have been found to be highly correlated. Individuals with inattentive symptoms are more likely to have higher levels of SCT symptoms when compared to individuals with other ADHD subtypes (Willcutt et al., 2012).

Despite the strong relationship between SCT and inattentive symptoms, there is more support in the literature for the internal validity of SCT as a separate construct from ADHD, inattentive presentation (Barkley 2012; Barkley, 2013; Barkley, 2014; Barkley, 2019; Bauermeister et al., 2012; Becker et al., 2013; Becker et al., 2016; Becker &

Barkley, 2018; Garner et al., 2017; Wood et al., 2017). Symptoms of SCT in adults, measured by the Barkley Adult ADHD Rating Scale-IV (BAARS-IV), were positively correlated with characteristics of day dreaminess, confusion, sluggishness, fatigue, and lethargy ( $r = .75$ ), while these characteristics were only moderately associated with inattention ( $r = .40-.50$ ; Barkley, 2011; Barkley 2012; Barkley, 2019). The difference between SCT and ADHD, predominantly inattentive presentation, was supported in both children and adults and when considering cultural and ethnic differences (Becker & Barkley, 2018).

Factor analyses in both children and adult populations revealed that ADHD and SCT have little shared variance of symptoms. Specifically, symptoms of daydreaming and hypoactivity are conceptualized as unique to SCT versus to ADHD, inattentive presentation (Barkley, 2014). A nationwide meta-analysis of 19,000 adults and children with ADHD found that the following 12 SCT symptoms consistently loaded onto an SCT factor as opposed to an ADHD factor: sluggish behavior, in a fog, stares blankly into space, sleepy/drowsy during the day, daydreams, underactive, gets lost in own thoughts, easily tired or fatigued, easily confused, spaces or zones out, gets mixed up, and slow thinking (Becker & Barkley, 2018; Becker et al., 2014).

Although SCT as a diagnosis continues to lack widely accepted and well-defined criteria, the literature indicates that the most commonly agreed upon and prominent symptoms include the following: mental fogginess, daydreaming, inconsistent alertness, confusion, thinking or behaving slowly, appearing fatigued after an adequate night of sleep, decreased energy, and absentmindedness (Barkley, 2019; Becker et al., 2016; Becker & Barkley, 2018; Becker, Burns, Leopold et al., 2018; Garner et al., 2017). The

question of the number of symptoms needed to define SCT still lingers, and a single, agreed upon definition of SCT in the field does not exist.

### **Prevalence of SCT**

Just as SCT lacks a universal definition, the prevalence rates of SCT are also vague. During a presentation at the University of Gothenburg, Barkley (2019) discussed the results of a national survey screening adults and children in the United States for symptoms of SCT. He reported that 4%-5% of participants in the general population endorsed at least three or four symptoms of SCT, and in clinical ADHD-related settings, 7%-10% of children and 3%-5% of adults also experienced SCT. A more recent study, including 3,000 school-aged children in Spain, indicated an 11% prevalence rate of SCT based on responses to the SCT-Child Behavior Checklist (Camprodon-Rosanas et al., 2017). Similarly, in a clinical, outpatient mental health sample of 515 non-ADHD individuals, completion of the SCT-Child Behavior Checklist indicated 20.8% of the sample endorsed high SCT (Barkley, 2019; Camprodon-Rosanas et al., 2017). In summation, evidence shows SCT presence in both children and adults, and the data also have suggested equality among demographic occurrences.

Demographically, no correlation between SCT and gender, age, or ethnicity has been reported, but in emerging studies by Russell Barkley, patterns of equal rates of SCT in both children and male and female adults were demonstrated (Barkley 2012; Barkley, 2013; Barkley, 2014). No association between SCT and the age of adults was indicated, but considering children, SCT symptom prevalence was higher in older children, aged approximately 13 years (Barkley, 2013). Some of the most apparent associations found are between SCT and cultural or psychosocial factors. Barkley (2013) revealed SCT was

highly associated with children from low-income families, children with parents who had little formal education, and children who had a disabled, nonworking parent. A similar survey distributed to adults with SCT yielded results consistent with the previous study by Barkley: SCT in adults was associated with low socioeconomic status and fewer years of education (Barkley, 2012).

### **Psychosocial Implications**

Barkley (2012, 2013) found that SCT was associated with challenging psychosocial factors and that symptoms of SCT are associated with impairment in the domains of daily functioning and social abilities. Social withdrawal and avoidance continued to be linked with symptoms of SCT when statistically accounting for ADHD (Barkley 2012; Barkley, 2013). Willcutt et al. (2013) confirmed the link between SCT and social isolation after considering anxiety, depression, and behavioral symptoms. It is hypothesized by Barkley (2014) that the absentminded characteristic of SCT contributes to difficulty socializing and increased self-consciousness. Combs et al. (2014) further examined impairment by assessing quality of life, including health, psychological well-being, social satisfaction, and environment satisfaction, in adults with ADHD and SCT. Results indicated that adults with SCT had lower physical, psychological, and overall quality of life than adults with ADHD. Additionally, SCT predicted increased rates of chronic physical and emotional challenges.

Studies with children provided further information regarding impairment, adding to the adult findings. Capdevila-Brophy et al. (2014) noted that children with predominantly inattentive type ADHD and high levels of SCT were unique from children without SCT or ADHD, combined presentation. Children with inattentive type ADHD

and high SCT experienced greater difficulties with internalization of problems, anxiety, depression, social isolation, self-monitoring, and working memory than children diagnosed with only ADHD. From a parenting perspective, the authors also suggested that a child with SCT may appear socially withdrawn, isolated, lacking motivation to socialize, or anxious in social situations. Barkley (2019) described children with SCT as being “neglected” as opposed to rejected, which he defined as being involved in fewer social interactions and attempts to be engaged.

Both ADHD and SCT disorders have been reported to impair academic performance. The major difference found between the two conditions is that children with ADHD are less likely to be productive and follow through with assignments, whereas children with SCT complete assignments but tend to make more errors. Individuals with SCT are diagnosed with a comorbid learning disorder in mathematics at higher rates than children with ADHD and are less likely to demonstrate disruptive, aggressive, impulsive, or hyperactive behaviors in the classroom (Barkley, 2019).

Other key differences between SCT and ADHD that are important to note include the high prevalence of ADHD in male individuals and the onset of ADHD in younger children, a contrast to findings regarding SCT; specifically, rates are equal between both genders and the onset of SCT begins at the approximate age of 13 years in children as opposed to ADHD, which has an average age of onset between 6 and 7 years (Barkley 2012; Barkley 2013; Barkley 2014). Demographic and psychosocial impairments are just a few factors considered when distinguishing ADHD and SCT. Discrepancies in clinical comorbidities have also been reviewed, with externalizing disorders being more common

in individuals with ADHD and internalizing disorders more common in those with SCT (Barkley, 2019).

### **Comorbid Conditions in ADHD**

Barkley (2012) inferred that SCT occurs comorbid with ADHD, for example, comorbid anxiety or depression. Comorbid conditions have been known to complicate the presentation and treatment of ADHD. In a sample of 367 adults seeking outpatient services for ADHD, 66.2% were also diagnosed with another psychiatric illness. The most common diagnoses included substance use, anxiety, and mood disorders (Pineiro-Dieguez et al., 2016). Comorbidities are thought to be influenced by the subtype of ADHD; specifically, individuals with inattentive type are at greater risk to be diagnosed with an internalizing disorder, including anxiety and depression. An individual with hyperactive/impulsive presentation is at greater risk to be diagnosed with an externalizing condition, such as oppositional defiant or conduct disorder and substance or alcohol use disorders (Oguchi & Takahashi, 2019; Yoshimasu et al., 2018). Friedrichs et al. (2012) recruited 17,899 Swedish twins to determine coexisting psychiatric diagnoses in adults with ADHD. A significant difference between hyperactive/impulsive type ADHD and generalized anxiety further supported a connection between internalizing disorders and inattentive-type ADHD. For the purpose of the current study, a review of the implications anxiety and depression have on ADHD is provided.

### **Anxiety**

Gray's reinforcement sensitivity theory (Gray, 1982) suggests that two neurological systems, behavioral inhibition (BIS) and behavioral approach (BAS), are involved in the decisional basis for individuals to avoid or engage with aversive stimuli (Gray, 1982). According to the BIS, individuals are driven to avoid aversive stimuli, and

the BAS suggests that one will engage in a chosen consequence to achieve a desired goal (Gray, 1982; Oguchi & Takahashi, 2019). Those with ADHD, inattentive presentation, are hypothesized to have highly activated inhibition systems, meaning that those individuals are more aversive to and, therefore, more likely to avoid an undesired scenario. The BIS is also perceived to be overactive in individuals with internalizing disorders. More specifically, the BIS is positively associated with anxiety and symptoms of inattention, which are hypothesized to contribute to internal challenges commonly comorbid with inattentive type ADHD (Oguchi & Takahashi, 2019).

Approximately 49% of adults diagnosed with ADHD in the United States also meet criteria for an anxiety disorder, which is associated with decreased academic or occupational performance and relationship challenges (Grogan et al., 2018; Kessler et al., 2006). Respondents to a community survey further revealed the prevalence of anxiety in a sample of 367 adults with ADHD, with 23% qualifying for an anxiety disorder (Pineiro-Diequez et al., 2016). Symptoms of anxiety and ADHD can look similar. Individuals with anxiety are also reported to experience feelings of restlessness, irritability, difficulty concentrating, decreased attention and increased distractibility, mood swings, and outbursts of anger (Grogan et al., 2018). When overlapping symptoms were statistically accounted for, adults continued to meet criteria for both anxiety and ADHD (Reimherr et al., 2017).

Past research demonstrated the impact of anxiety in the presentation of ADHD, although results were not always consistent. For instance, children with ADHD and comorbid anxiety showed decreased impulsivity on a continuous performance task compared to children with ADHD alone, a finding contradicted by other studies that used

continuous performance measures and found equal impairment in reaction time scores (Jarrett et al., 2016; Newcorn et al., 2001; Pliszka, 2019). Adults with ADHD and comorbid anxiety typically report more ADHD symptoms in childhood and currently than those without anxiety (Reimherr et al., 2017). In a college-aged, female sample, Dan and Raz (2015) examined the association between test anxiety and ADHD, reporting that participants with ADHD experienced greater test anxiety because of a positive association with low self-esteem. A separate college sample of young adults diagnosed with ADHD endorsed greater symptoms of anxiety than individuals that were not diagnosed with ADHD, and anxiety symptoms were positively associated with impaired cognitive functioning and working memory (Jarett et al., 2016; Prevatt et al., 2015).

These findings raise the question as to whether treatment for individuals with ADHD and anxiety should target each diagnosis separately (Pliszka, 2019). Reimherr et al. (2017) examined medication treatment outcomes for adults with ADHD taking psychostimulants and reported that as ADHD symptoms decreased, anxiety symptoms decreased. Based on these findings, a definitive statement cannot yet be made as to whether unmanaged ADHD is linked to a diagnosis of anxiety.

### **Major Depressive Disorder**

Mood disorders, including major depressive disorder (MDD), also complicate diagnostic and therapeutic considerations when assessing and treating adults with ADHD. Approximately between 16%-31% of adults with ADHD are diagnosed with MDD, with overlapping symptoms of difficulty concentrating or paying attention, memory challenges, and irritability (APA, 2013; Knouse et al., 2013;).

MDD is characterized by a depressed mood and/or a lack of pleasure or loss of interest in previously enjoyed activities most of the day, nearly every day, for a 2-week duration (APA, 2013). Adults with ADHD and comorbid MDD (ADHD/MDD) are at greater risk for experiencing negative social and occupational outcomes, for they create a significant financial burden for society as unemployment rates are typically higher in ADHD/MDD groups (McIntosh et al., 2009). ADHD/MDD is positively associated with an early age of onset of MDD, longer illness duration, and increased severity of symptoms and functional impairment. Young adults and adolescents with comorbid diagnoses have also been noted to have increased rates of suicidal ideation and attempts (Knouse et al., 2013).

Patients with ADHD/MDD have been noted to suffer from impaired cognitive functioning, as evidenced by cognitive distortions (Knouse et al., 2013; Strohmeier et al., 2016). Knouse et al. (2013) reported that dysfunctional attitudes and behavioral avoidance facilitated the relationship found between ADHD and MDD, demonstrating that MDD symptoms are not attributed to stressful life events, but are relevant to ADHD. Strohmeier et al. (2016) further added to these findings, reporting that adults with ADHD/MDD may perceive themselves in a “negative light” when faced with setbacks. In a sample of 1,382 Taiwanese men, poor quality of life, when considering productivity, psychological health, relationships, and life outlook, was found to be mediated by ADHD/MDD. Strong associations between childhood ADHD and adult ADHD/MDD were also found to be correlated (Yang et al., 2013).

When screening for adult ADHD, one should consider comorbid MDD. Authors compared ADHD assessments for adults with ADD/MDD and with MDD only.

Neuropsychological testing revealed that participants with comorbid MDD underperformed in the areas of verbal and nonverbal working memory, verbal memory, sustained attention, processing speed, and executive functioning when compared to the MDD only group (Hoelzle et al., 2019). Serine et al. (2020) reported strong associations between adult ADHD severity and depression, as individuals with more severe ADHD presented with more complex comorbidities than those with milder ADHD. Understanding comorbidity is critical to comprehending the overall clinical picture of individuals with ADHD.

### **Comorbid Conditions and Sluggish Cognitive Tempo**

As mentioned previously, children with SCT are less likely than children with ADHD to engage in disruptive behaviors. One should note that SCT has been found to be negatively associated with oppositional defiant and conduct disorders. In fact, the risk of children with SCT being diagnosed with oppositional defiant or conduct disorders is lower than the risk for individuals in the general population (Barkley, 2019; Becker & Langberg, 2013).

SCT is positively correlated with internalizing comorbid conditions, even after accounting for inattentive type ADHD (Barkley, 2019; Becker & Langberg, 2013). Skirbekk et al. (2011) compared SCT severity in 141 children separated into four groups: ADHD with comorbid anxiety, ADHD, anxiety, and an undiagnosed control condition. The authors found a significant difference in SCT among all four groups, and the group with both comorbid anxiety and ADHD endorsed the highest levels of SCT. This group also had greater difficulty performing neurocognitive tasks measuring spatial memory abilities. The study noted that it was unclear whether the high severity level was solely

attributed to SCT or if symptoms of inattention played a role. Becker and Langberg (2013) considered this limitation and conducted a similar study with 57 adolescents. Statistically accounting for symptoms of ADHD reinforced the association between SCT and internalizing symptoms, such as anxiety.

A review of the literature revealed a stronger association between SCT and depression (Barkley, 2019). In a youth sample of 73 children assessed for learning difficulties, parent-reported depression was positively associated with SCT, influencing symptom presentation and severity (Becker et al., 2014). Parent and teacher ratings of 2,142 Spanish children revealed 27%-35% of children met clinical criteria for SCT, with 1.4%-2.3% of children with SCT also having elevated depression (Servera et al., 2018).

The relationship between SCT, ADHD, and internal related disorders was disputed by Wood et al. (2017). In a sample of 458 college-aged individuals, 13% of participants endorsed high-severity levels of SCT. Statistical analyses revealed that symptoms of SCT occurred separate from ADHD, anxiety, and depression symptoms. This finding is unique because support is greater for an overlap between SCT and depression (Servera et al., 2018).

In summation, internalization is a key characteristic of SCT, and high prevalence rates of anxiety and depression, which are internalizing disorders, add to the complicated presentation, psychosocial impairments, and treatment planning for SCT. Aside from comorbid clinical syndromes in individuals with ADHD and SCT, understanding and assessing for personality factors can provide valuable information when evaluating or treating individuals with these complex and challenging cases. The following is an

overview of the Five-Factor model (FFM; Costa & McCrae, 1992) of personality, a model previously applied to adults with ADHD and SCT.

### **The Five-Factor Model**

Substantial evidence shows that the FFM accounts for significant variability in individual differences (McCrae et al., 2014). Although the conceptualization of personality can vary widely, Costa and McCrae (1992) factor-analyzed five broad dimensions in the FFM to serve as a consistent way of explaining personality. Based on the tenets of trait theory, the FFM assumes that individuals evince consistent patterns of thoughts, feelings, and actions that they term *traits*, or stable characteristics (Costa & McCrae, 2008). These traits can be explained by multiple adjectives. For example, Neuroticism may be described as apprehensive, depressed, or hostile, and despite the clear semantic differences between these traits, one must consider that individuals experiencing anxiety are also frequently depressed. Therefore, the FFM was developed to organize and manage the structure of traits through statistical relationships as determined by a factor analysis (Widiger & Costa, 2013). Briefly, the five factors, also known as the Big Five, include Neuroticism, Extraversion, Openness to Experience, Agreeableness, and Conscientiousness.

According to Costa and McCrae (1995), personality factors cannot be adequately described by one sole trait. Each factor of the FFM is composed of six subfactor or facet scales. Facets included in the NEO Personality Inventory-Revised (NEO-PI-R) were chosen after a series of item analyses and on reviews of the literature (Costa & McCrae, 1995). Fein and Klein (2011) examined the relationship between self-regulation and personality facets with an ADHD population, reporting several facets of

Conscientiousness that corresponded with specific ADHD symptoms of inattentiveness. The five dimensions or factors of the FFM and their associated facets can be found in Table 1.

The NEO-PI-R was developed by Costa and McCrae (1992) as a reliable and valid measure to assess Big Five traits of individuals. Some studies have examined NEO-PI-R profiles of adults with ADHD. Research on the relationship between ADHD and personality has indicated valuable information in terms of symptom presentation and diagnostic and treatment implications (Stanton & Watson, 2016).

### **ADHD and the Five-Factor Model**

Nigg et al. (2002) examined the relationship between personality and ADHD symptoms in adults by assessing 1,620 adult undergraduates using the NEO Five-Factor Inventory (NEO-FFI; Costa & McCrae, 1992), a personality self-report, and other self-report measures, including the Wender-Utah Rating Scale for recalled childhood symptoms (Wender, 1985); the Swanson, Nolan, and Pelham Rating Scale (Swanson, 1992; Swanson et al., 1999) for *DSM-IV* childhood symptoms; and Achenbach's Young Adult Self-Report (Achenbach, 1997), an ADHD self-report. Specifically, the study considered the different subtypes of ADHD to identify a specific relationship between Big Five traits and adult ADHD. To ensure diagnostic criteria for ADHD were met, participants were asked to recall ADHD symptoms from childhood. Results determined that ADHD symptoms were positively related to high Neuroticism but inversely related to both Conscientiousness and Agreeableness. Reports from participants' spouses demonstrated a pattern similar to that of the self-reports, thus supporting convergent validity of the findings. Difficulty with attention was associated more highly with low

**Table 1***Big Five Personality Factors and Associated Facet Subscales*

Big Five Factor	Definition	Facets	Facets Cont.
Neuroticism	A general tendency to feel psychological distress.	Anxiety Hostility Depression	Self-Consciousness Impulsiveness Vulnerability
Extraversion	The ability to be sociable.	Warmth Gregariousness Assertiveness	Activity Excitement-Thinking Positive Emotions
Openness to Experience	A general interest in new things or ideas.	Fantasy Aesthetic Feelings	Actions Ideas Values
Agreeableness	Tendency to be sympathetic toward others and to be altruistic.	Trust Straightforwardness Altruism	Compliance Modesty Tendermindedness
Conscientiousness	The ability to be organized and to plan.	Competence Order Dutifulness	Achievement Self-Discipline Deliberation

*Note.* Costa and McCrae's (1992) Big Five personality traits defined. Each factor is paired with six facet scales.

Conscientiousness in both self-reports and other reports. The association between overall ADHD symptoms and Neuroticism was smaller in both self-reports and spouse reports. One should consider that this study did not control for comorbid clinical conditions, such as anxiety or depression, that could explain the elevation of Neuroticism.

Parker et al. (2004) also examined adult ADHD and Big Five personality traits. In a sample of 587 adults, the NEO-FFI and the Conners Adult ADHD Rating Scale (CAARS; Conners et al., 1998) were administered. Participants were separated into three groups based on ADHD diagnosis and presentation (i.e., inattentive, hyperactive/impulsive, and a non-ADHD control group). The authors found that Extraversion was predictive of hyperactive/impulsive ADHD symptoms, and Neuroticism was a significant predictor of both ADHD subtypes but not the control group.

A more notable finding from the study was the relationship between low Conscientiousness and inattention. More than 50% of the variance of attention scores on the CAARS was accounted for by low Conscientiousness. The inattention scores fell approximately two standard deviations below the mean of the non-ADHD control group. As for hyperactive/impulsive type of ADHD, low Agreeableness was the strongest predictor. This study is noteworthy, as it demonstrated the difference in personality profiles in relation to ADHD subtype, and unlike Nigg et al.'s (2002) study, this study appears to have recognized that comorbid diagnoses were not solely related to Neuroticism.

More recently, Bennett (2015) examined the interaction between facets of the FFM and adult ADHD. The NEO-PI-R consists of 30 total component facets, related to

the Big Five personality factors previously mentioned. Six additional facets were factor-analyzed to be associated with each of the five factors (Costa & McCrae, 1992). Self-reported symptoms on the inattention/memory, hyperactivity, and impulsivity subscales of the CAARS and NEO-PI-R facets for 155 adults were analyzed to determine the predictive utility of the facets in comparison to Big Five factors alone. Neuroticism accounted for approximately 40% of the variance of the CAARS Inattentive subscale, meaning that comorbid Neuroticism is strongly associated with ADHD, inattentive symptoms. This study highlighted the importance of a more thorough, in-depth assessment and treatment formulation for individuals with ADHD and the utility of the Five Factors of the FFM in the investigation of personality in adults with ADHD.

Another interesting finding using the same archival data used by Bennett (2015) revealed a positive correlation between Neuroticism and ADHD symptom severity and a negative relationship between Conscientiousness and ADHD severity (Serine et al., 2020). The authors measured ADHD severity using the Brown Attention-Deficit Disorder Scale (BADDS; Brown, 2001). Another strong correlate with ADHD was depression as measured by the Beck Depression Inventory-II (BDI-II; Beck et al., 1996b). This study further supported the relationship between personality pathology and comorbid diagnoses on ADHD symptomatology and corroborated results mentioned in previous literature (BADDS; BDI-II; Parker et al., 2004; Serine et al., 2020).

Stanton and Watson (2016) further illuminated the relationship between Big Five personality factors and ADHD in a community sample of 294 adults. Participants were recruited through an online Amazon Mechanical Turk and asked to complete the ASRS, the International Personality Item Pool-NEO (IPIP-NEO; Maples et al., 2014), the

Personality Inventory for *DSM-5* (PID-5; Krueger et al., 2012), and an expanded version of the Inventory of Depression and Anxiety Symptoms (IDAS-II; Watson et al., 2012). One should note that the participants were not screened for past or current ADHD symptoms or diagnoses. Findings from the study revealed that 58% of the variance in ADHD symptoms could be explained by Conscientiousness, which, for this study, was stronger than any other personality factor because of the strong inverse relationship with inattentive symptoms. Extraversion also had a negative relationship with inattentive symptoms, accounting for 23% of the variance. On the other hand, a positive relationship was found between ADHD, inattentive and hyperactive/impulsive presentations, and Neuroticism. A regression analysis indicated that Neuroticism accounted for 47% of the variance in ADHD symptoms. The strong negative association between inattentiveness and Extraversion was not anticipated by the authors; however, it is consistent with previous studies that reported strong negative associations between ADHD, inattentive presentation, and shyness (Canu & Carlson 2003, 2007; Stanton & Watson, 2016).

Stanton and Watson's (2016) research could be furthered by exploring ADHD and personality factors using a clinical sample, incorporating clinical interviews and observer ratings, and assessing for ADHD with concrete, generalizable measures. Thus far, only one study has examined the association between SCT and Big Five personality factors in adults (Becker et al., 2018). Personality and SCT have been mostly studied in children, but such research is sparse in adult populations.

### **Sluggish Cognitive Tempo and the Five-Factor Model**

Martel et al. (2011) provided support for a bifactor model of ADHD, which differed from the current *DSM-5* diagnostic presentation criteria, as it suggests that

ADHD could be explained on a continuous spectrum composed of statistically significant domains and characteristics. Conceptualizing ADHD continuously is believed to expand understanding of the variation and severity of symptoms that individuals experience. Criteria for ADHD in the current and past *DSMs* conceptualize subtypes and presentations from a categorical standpoint. The bifactor model categorizes ADHD as a general factor with two specifiers: inattention and hyperactivity/impulsivity. In the model, the general ADHD factor can exist simultaneously with the two specifiers or with one alone. To validate the bifactor model, the authors used a continuous symptom severity approach using *DSM-IV* ADHD symptom domains, thus characterizing ADHD on a spectrum, and a categorical approach using profiles derived from existing *DSM-IV* subtypes. Heterogeneity within ADHD in relation to problem behaviors, cognitive control, and temperament and personality of both the continuous and categorical approaches was then examined in a sample of 548 children.

The categorical approach revealed five groups, with and without ADHD (i.e., low symptoms, high specific inattention, normative levels of ADHD symptoms, general ADHD, and general ADHD with specific hyperactivity/impulsivity). The continuous analysis revealed distinct profiles similar to *DSM-IV* diagnostic criteria, revealing a high specific inattention, general ADHD, and general ADHD with specific hyperactivity/impulsivity group. The authors hypothesized that because the study did not find a hyperactive/impulsive specific group, one could argue that children with inattentive symptoms only should be distinguished further because inattention in this study was characterized by “poor sustained effort, low arousal, poor attention, and perhaps sluggish cognitive tempo” (Martel et al., 2011, p. 1120).

Regarding personality, the continuous, specific inattention group was associated with high Agreeableness and low Extraversion, while participants with general ADHD with hyperactivity/impulsivity were associated more with low Agreeableness and high Extraversion, as measured by the Early Adolescent Temperament Questionnaire (John et al., 1994). The authors did not report any notable relationships between the general ADHD group and personality (Martel et al., 2011). The first hypothesis of the current study predicts that SCT will be negatively correlated with Extraversion. Martel et al. (2011) included traits of SCT when defining the specific inattention group. The negative association between specific inattention and low Extraversion provides corroboration for the present study's hypothesis.

An extensive literature review of eBook Collection (EBSCOhost), PsycARTICLES, PsycBOOKS, PsycEXTRA, Psychology and Behavioral Sciences Collections, Psycinfo, and Google Scholar revealed only one study that examined a relationship between SCT symptoms and Big Five personality factors in adults (Becker et al., 2018). To a sample of 3,172 college-aged students from five separate U.S. universities, Becker administered the BAARS-IV (Barkley, 2011), the Adult Concentration Inventory (ACI; Becker et al., 2015), the Depression Anxiety Stress Scales-21 (DASS-21; Antony et al., 1998; Lovibond & Lovibond, 1995), the BIS/BAS Scales (Carver & White, 1994), and the Big Five Inventory (BFI; John et al., 1991; John et al., 2008). Measures were used to evaluate ADHD symptoms, SCT symptoms, anxiety, depression, behavioral approach and inhibition systems, and Big Five personality traits, respectively. Ages of participants included in the study ranged from 18 to 29 years old.

Becker determined that symptoms of SCT were strongly related to inattentive type ADHD and comorbid diagnoses of anxiety and depression, providing corroboration for internal symptom prevalence (Becker, Schmitt et al., 2018). To account for these relationships, subtypes of ADHD and anxiety and depression were statistically controlled for separately. Results concluded that high levels of SCT symptoms were significantly and inversely related to Extraversion and Conscientiousness. Neuroticism was significantly related to a SCT. Lower Extraversion and Agreeableness and high Neuroticism were evident for individuals with anxiety or depression. Similar to individuals with high SCT, inattentive-type ADHD symptoms were associated with low Extraversion and Conscientiousness, but unlike SCT, inattentive-type ADHD symptoms were not associated with Neuroticism. Participants with hyperactive/impulsive type ADHD had high Extraversion and Conscientiousness, but low Agreeableness.

Finally, college students with SCT endorsed increased behavioral inhibition system activity, defined as inhibition and avoidance, and Neuroticism. A negative correlation between Extraversion and Conscientiousness supported previous research suggesting that individuals with SCT may be more introverted and prone to internalize, as compared to those with other ADHD presentation (Becker, Schmitt et al., 2018).

### **Comorbid Conditions and the Five-Factor Model**

Personality assessments have been incorporated into neuropsychological evaluations for ADHD, and specifically, the NEO-PI-R has demonstrated excellent reliability and validity for gauging personality in clinical, medical, vocational, and school settings. Research has determined that individuals with ADHD tend to score high on Neuroticism and low on Conscientiousness. The NEO-PI-R has also been proved to have

divergent validity in distinguishing individuals with autism spectrum disorder (ASD; APA, 2013) from a control group. Participants with ASD scored higher in Neuroticism and lower for Extraversion and Conscientiousness than controls. In relevance to the present study, a review of research supporting the relationship between the FFM and anxiety and depression is provided.

MacLaren and Best (2009) used the NEO-PI-R with the Eating Attitudes Test to assess its predictability for personality type in young female individuals with eating disorders and determined that bulimia symptoms correlated strongly with Neuroticism. Furthermore, facets of Neuroticism, hostility, and impulsivity were strong predictors of a lack of oral control and preoccupation with food, symptoms associated with bulimia nervosa.

### *Anxiety*

The relationship between anxiety disorders and their relationship to the FFM is well established in the literature. Social anxiety is positively associated with Neuroticism and negatively associated with Extraversion. In two separate adult samples, Kaplan et al. (2015) found that social anxiety had weak relationships with Agreeableness and Openness to Experience. This study was unique, as it also examined the facets associated with the Big Five factors, revealing that trust (a facet of Agreeableness) was negatively related to Openness to Experience, suggesting that individuals with social anxiety low on the trust factor may perceive others negatively.

Additionally, Shi et al. (2015) examined a sample of 2,925 medical students in China who completed the Zung Self-Rating Anxiety Scale, the BFI, and a self-report measuring resiliency to determine the relationship between anxiety symptoms and

personality traits. The authors determined that Extraversion, Agreeableness, Conscientiousness, and Openness to Experience were all negatively related to anxiety. On the other hand, Neuroticism was positively associated with anxiety. Resiliency was negatively related to Neuroticism.

### *Depression*

The relationship between MDD and the FFM has also been studied at length (Allen et al., 2018; Karsten et al., 2012; Koorevaar et al., 2017; Stanton & Watson, 2015). Individuals with MDD have been found to endorse high Neuroticism and low Extraversion during depressive episodes. Considering the other three Big Five factors, a study of 2,596 citizens of the Netherlands indicated depressive disorder symptoms were associated with low Conscientiousness (Karsten et al., 2012). Evidence also supports the predictive validity of the FFM and depressive symptoms in clinical samples (Allen et al., 2018). Allen et al. (2018) administered the NEO-PI-R and BDI-II to 354 patients diagnosed with MDD and compared their findings to 376 nonclinical participants who completed the Big Five Aspect Scales (BFAS; as cited in Allen et al., 2018) and the PID-5 (Krueger et al., 2012). The results confirmed the previously reported interaction between Neuroticism, Extraversion, and Conscientiousness and MDD.

A study with a geriatric population noted that Agreeableness was negatively associated with late-life depression (Koorevaar et al., 2017). Meta-analyses have shown that low Agreeableness tends to have a higher association with conduct and substance use disorders, but personal histories of trauma or disabilities may influence this factor's relationship with mood (Koorevaar et al., 2017).

Stanton and Watson (2016) asked participants to complete the IDAS-II, a self-report measure assessing for depression, bipolar, and anxiety disorders. Results yielded a strong positive association between internalizing factor scores, operationalized as dysphoria, lassitude, social anxiety, and symptoms of depression. The authors interpreted ADHD, inattentive presentation's significant negative relationship with Conscientiousness and Extraversion and positive relationship with Neuroticism as a personality profile consistent with individuals who experience internal distress. In summation, ADHD is a prevalent, heterogeneous, highly comorbid disorder that can result in marked psychosocial dysfunction and other associated problems. SCT is a less firmly established construct typically associated with ADHD, inattentive presentation, and is only beginning to be understood. The current study determined whether a relationship exists between ADHD, inattentive presentation; ADHD, combined presentation; SCT; and the Big Five personality factors in a clinical adult outpatient sample. The literature has reported that inattentive ADHD symptoms inversely relate to Conscientiousness and Extraversion and positively relate to Neuroticism, but little is known regarding the relationship between SCT and personality. The present study also considered the role of comorbid conditions that can influence ADHD, SCT, and personality factors, such as Neuroticism. Adults with ADHD and SCT are more likely than individuals without ADHD to be diagnosed with MDD and anxiety disorders (APA, 2013; Barkley, 2019; Fischer et al., 2007; Katzman et al., 2016). It is hoped by the present authors that expanding the understanding of these phenomena may help to guide future assessment and treatment recommendations for this complex and challenging disorder.

### **CHAPTER 3: METHOD**

This archival, cross-sectional, correlational study used a hierarchical multiple regression analysis to determine the predictability of NEO Personality Inventory-Revised (NEO-PI-R) Big Five personality factors, specifically Neuroticism, Extraversion, Conscientiousness, depression, and anxiety in individuals reporting symptoms of sluggish cognitive tempo (SCT).

#### **Participants**

Archival data were initially gathered from 211 adults aged 18 to 79 years who presented at a university-based outpatient clinic in a large northeastern city of the United States that specialized in the assessment and treatment of adult ADHD. Further examination of the data revealed six outlier scores more 3 standard deviations from the mean, and those scores were removed for the regression analysis, making the final sample size 205 adults. Patients within the clinic are typically self-referred or internally referred by the university or are other referred adults seeking a formal assessment and diagnosis related to ADHD or suspected of having symptoms consistent with ADHD. Clinic fees are primarily private payments and university-based insurance.

#### **Inclusion Criteria**

Inclusion criteria required a diagnosis of ADHD that fulfilled diagnostic criteria based on a comprehensive evaluation, or subthreshold ADHD-related symptoms that did not meet full diagnostic criteria but fulfilled criteria for other specified ADHD, and/or no diagnosis of ADHD but clinically prominent SCT symptoms at the level of or above the 76<sup>th</sup> percentile on the SCT module of the Barkley Adult ADHD Rating Scale-IV

(BAARS-IV), to the degree that any one of these categories warrants consideration of follow-up treatment.

### **Exclusion Criteria**

Individuals who endorsed severe posttraumatic stress disorder, traumatic brain injury, severe and current substance use, bipolar disorder, schizophrenia or other psychotic disorders and active suicidality or homicidality were generally referred to a higher level of care and were excluded from this study. Participants younger than 18 years of age were excluded because the clinic specializes in adult ADHD and therefore has an 18-year-old age requirement. Additionally, measures used in the current study are normed on adults. The upper age limit was determined by the ceiling for norm groups for the measures included in this study. Individuals who did not meet the percentile threshold on the BAARS-IV SCT subscale (< 76th percentile) were also excluded.

### **Recruitment and Screening**

Archival data were used. Patients were previously screened during initial intake with the program prior to the assessment appointment. At the time of the evaluation, patients signed a release of information and informed consent, allowing the data from the assessment to be de-identified and used for research purposes. Research assistants and clinicians then organized the data into a comprehensive spreadsheet.

### **Measures**

#### **Barkley Adult ADHD Rating Scale-IV (Barkley, 2011)**

The BAARS-IV is a psychometrically sound, 27-item self-report measure used to assess current and childhood ADHD symptoms. Based on *DSM-IV* diagnostic criteria, the scale is available in both self-report and other report versions (e.g., spouse/partner,

parent, sibling). The present study utilized the BAARS-IV, Current Symptoms, Self-Report, which takes approximately 5-7 minutes for patients to complete. Items are rated a 1 (*never or rarely*), 2 (*some stress*), 3 (*often*), or 4 (*very often*), with ratings of a 3 or 4 qualifying as a symptom endorsement. The self-report version includes individual subscales for inattention, hyperactivity, impulsivity, and SCT. A total score is formulated using only the inattention, hyperactivity, and impulsivity subscales, and can range from 0 to 108, with larger scores indicating greater symptom endorsement (Barkley, 2011). For the present study, only the total ADHD and SCT total score was considered.

A unique property of the BAARS-IV, Current Symptoms, Self-Report is a subscale with items assessing for SCT, also referred to as concentration deficit disorder (Barkley, 2014). For the present study, only the SCT total score was considered. Items in this section, assessment for hypoactivity, lethargy, and slow movement, and total score can range from 0 to 36, with higher scores indicating greater SCT symptoms. Total scores are transformed to percentile ranks of marginally symptomatic (> 76th percentile), borderline symptomatic (84th to 92nd percentile), mildly symptomatic (93rd to 95th percentile), moderately symptomatic (96th to 98th percentile), or severely symptomatic (> 99th percentile; Barkley, 2011).

The BAARS-IV was developed following 20 years of research. The normative sample ( $N = 1,249$ ) is said to be representative of the U.S. population, accounting for religion, socioeconomic status, education, race/ethnicity, and gender. Norms are provided for three age groups of adults (i.e., 18-39, 40-59, and 60-89 years old). Reliability of scores has been found to be excellent, as evidenced by high internal consistency (Cronbach's  $\alpha = .92$  for current ADHD and  $\alpha = .95$  for childhood symptom scores),

interobserver agreement (.67 to .75 across scales), and high test-retest reliability over a 2- to 3-week period ( $r = .75$  for current ADHD and  $r = .79$  for childhood ADHD scores). A Pearson product-moment correlation revealed statistically significant correlation coefficients for inattention and SCT ( $r^2 = .77$ ) and for hyperactivity and impulsivity ( $r^2 = .42$ ). Validity of factors was supported in a variety of different factor analyses, correlations with other ADHD symptom measures, and high correlations between self-report and other report ratings (Barkley, 2011).

**Revised NEO Personality Inventory** (Costa & McCrae, 1992)

The NEO-PI-R is a 240-item personality inventory used to measure the five personality domains of the Five-Factor model (FFM): Openness to Experience, Conscientiousness, Extraversion, Agreeableness, and Neuroticism. Items are presented in sentences and rated on a Likert scale ranging from *strongly disagree* to *strongly agree*, and scores are translated into standardized  $t$  scores based on male and female normative data.  $T$  scores are expressed in the following ranges: Very High ( $> 65$ ), High (65-55), Average (55-45), Low (45-35), and Very Low ( $< 35$ ; Costa & McCrae, 1992). Items are then categorized into groups of the five factors, with six facets per factor to provide extended information.

The NEO-PI-R has excellent reliability and validity, likely because the normative sample was chosen considering age, gender, and race at rates consistent with the 1995 U.S. Census (Costa & McCrae, 1992). McCrae et al. (2011) reported internal consistency and test-retest reliability of the 30 facet scales across 51 cultures and 28 languages. For instance, congruence coefficients of .95 to .96 were achieved for all five factors within a Russian sample (Allik et al., 2013). Several studies carried out by NEO-PI-R developers

and colleagues identified good construct, convergent, and divergent validities with other equivalent measures that represent career interests, motives and wants, psychopathology, and personality (Costa, 1996; Costa & McCrae, 2008; Hesselmark et al., 2015; MacLaren & Best, 2009). The NEO-PI-R has been used to examine personality factors of adults with ADHD, concluding that individuals with ADHD tend to report high Neuroticism and low Conscientiousness (Bennett, 2015; Knouse et al., 2013; Nigg & Hinshaw, 1998; Nigg et al., 2002; Parker et al., 2004; Ranseen et al., 1998; Serine et al., 2020; Van Dijk et al., 2017).

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

The PSWQ is a 16-item self-report measure used to determine the severity and frequency of apprehension. Items range from 1 (*not at all typical of me*) to 5 (*very typical of me*). Reverse scoring is required for five items, which are then totaled with the other 11 items. Score totals range from 16 to 80, with higher scores indicating greater perceived worry. Classification ranges for a totaled score are interpreted as low (16-39), moderate (40-59), or high (60-80). Psychometric analyses revealed that the PSWQ demonstrated strong internal consistency (Cronbach's  $\alpha = .83-.93$ ) and test-retest reliability ( $r = .74-.93$ ; Molina & Borkovec, 1994).

The PSWQ has been used previously in conjunction with the NEO-PI-R and Beck Depression Inventory-II (BDI-II) when assessing for symptoms of adult ADHD. Serine et al. (2020) indicated a relationship between cognitive distortions and personality pathology, anxiety, and depression in adults diagnosed with ADHD. Importantly, the relationship between cognitive distortions and ADHD was no longer significant after accounting for the aforementioned comorbidities. The advantage of using the PSWQ in

an adult population with ADHD is noted in findings that worry, as opposed to anxiety, is associated with distractibility (Lapointe et al., 2013). Additionally, in comparison to the Beck Anxiety Inventory (BAI), the PSWQ has been used to identify non somatic anxiety symptoms in adults with ADHD as opposed to physical symptoms measured by the BAI. Patients with ADHD are more likely to experience non somatic symptoms related to apprehension as opposed to physical symptoms (Ramsay & Rostain, 2015a).

**Beck Depression Inventory, Second Edition** (Beck et al., 1996b)

The BDI-II is a 21-item self-report questionnaire used to measure the severity of depression. Items are rated from 0 to 3 and are totaled to indicate an overall depression score between 0 and 63. The total score is then interpreted as minimal (0-13), mild (14-19), moderate (20-28), or severe (29-63). Higher scores are indicative of greater perceived depression. The BDI-II demonstrated high internal consistency (Cronbach's  $\alpha = .91$ ) and test-retest reliability ( $r = .93$ ; Beck et al., 1996a).

In adults with ADHD, depression has been reported to magnify ADHD symptoms of procrastination and difficulty concentrating. Ramsay and Rostain (2015a) indicated that the primary difference between symptoms of ADHD and depression is that symptoms of depression decrease as mood increases. In a clinical sample of adults with ADHD, Serine (2015) used the BDI-II to assess for symptoms of depression and reported a positive association between ADHD symptom severity, depression, and Neuroticism. Further, a negative correlation between ADHD symptom severity, depression, and Conscientiousness was also noted. The study provided evidence of the influence of clinical comorbidities and ADHD severity, and supported the utility of the BDI-II when assessing adult patients for ADHD.

### **Procedures**

The study used archival data. All patients at the ADHD center had previously completed a comprehensive clinical interview and evaluation upon intake. Data were collected from each client and entered in an archival data set by research assistants and clinicians at the clinic. Data collected until 2021 were extracted from the data and contained all participants who met inclusion criteria, as previously described. The author of the present study also extracted demographic information and information from the BAARS-IV, NEO-PI-R, PSWQ, and BDI-II and transferred scores into a separate spreadsheet. Data were de-identified on the spreadsheet to respect privacy and ensure confidentiality. The anonymous data were loaded into Statistical Package for Social Sciences, version 27.0 (SPSS 27.0), and psychometric analyses were carried out to evaluate the previously indicated hypotheses.

## CHAPTER 4: RESULTS

Statistical analyses were computed to examine whether personality pathology (i.e., Neuroticism, Extraversion, and Conscientiousness) was predictive of the severity of SCT, after accounting for anxiety and depression. Additionally, the present study aimed to determine whether ADHD, inattentive presentation, correlated positively with Neuroticism and negatively with Conscientiousness. Differences in SCT severity were also considered between individuals diagnosed with ADHD, inattentive presentation symptoms or ADHD, combined presentation. The hyperactive/impulsive presentation of ADHD was not included in the present study because previous research has shown that impulsivity is less likely to be associated with SCT (Barkley, 2019). Also, no adults were diagnosed with this presentation in the sample used.

### Statistical Analyses

The variables of interest were analyzed using SPSS 27.0. The first power analysis was for a multiple, hierarchical regression with five predictors. In this analysis, as per Cohen (1988; 1992), the effect size was set at 0.15, which is considered a medium effect size for a multiple regression; the significance level was set at 0.05; and the power level was set at 0.80 and determined that 115 participants were needed to perform the multiple regression analysis. The number of required participants was, therefore, set at the higher value of 115. The second power analysis was for a Pearson product-moment correlation. In this analysis, the effect size was set at 0.30, which is considered a medium effect size for a correlation; the significance level was set at 0.05; and the power level was set at 0.80, as per conventional standards. This analysis determined that 84 participants were

needed to perform the correlation between inattentive ADHD symptoms and Neuroticism and Conscientiousness.

### **Demographic Analysis**

Demographically, the sample consisted of 131 male individuals, 73 female individuals, and one participant who did not specify gender ( $n = 205$ ), with a mean age of 34 years and an age range of 18 to 79 years. Participants identified as 77.6% European American, followed by 9.3% "Other," 3.8% Hispanic, 3.9% African American, 2.0% Asian American, and 4.9% with ethnicity unspecified in the database.

### **Hypothesis 1**

It was hypothesized that scores on the NEO Personality Inventory-Revised (NEO-PI-R), specifically Neuroticism, Extraversion, and Conscientiousness, would predict sluggish cognitive tempo (SCT) symptom severity, after accounting for depression and anxiety. Neuroticism, Extraversion, and Conscientiousness were operationalized as  $t$  scores as measured by the NEO-PI-R, SCT symptoms were operationalized as the SCT percentile as measured by the Barkley Adult ADHD Rating Scale-IV (BAARS-IV), depression was measured by the total score of the Beck Depression Inventory-II (BDI-II), and anxiety as the total score of the Penn State Worry Questionnaire (PSWQ).

A correlation analysis was carried out prior to the hierarchal multiple regression and determined the relationship between SCT and Neuroticism ( $r = .171$ ;  $p = .034$ ), Extraversion ( $r = -.104$ ;  $p = .009$ ), Conscientiousness ( $r = -.210$ ;  $p = .002$ ), depression ( $r = .303$ ;  $p < .001$ ), and anxiety ( $r = .240$ ;  $p = .001$ ). The results of the correlational analysis were found to be statistically significant on all variables and can be found in Table 2.

**Table 2**

*Means, Standard Deviations, and Intercorrelations for SCT, Neuroticism, Extraversion, Conscientiousness, Depression, and Anxiety*

Variable	<i>M</i>	<i>SD</i>	1	2	3	4	5
SCT	90.47	9.84	.171*	-.104*	-.210*	.303*	.240*
Predictor variables							
1. Neuroticism	58.82	12.55	-----	-.073	.001	.312*	.432*
			-				
2. Extraversion	48.65	12.01	-.073	-----	-.055	-.186*	-.090
				-			
3. Conscientiousness	35.44	13.79	.001	-.055	-----	-.069	.055
					-		
4. Depression	17.08	11.22	.312*	-.186*	-.069	-----	.316*
						-	
5. Anxiety	54.09	15.46	.432*	-.090	.055	.316*	-----

*Note:* SCT = sluggish cognitive tempo.

\* $p < .01$ .

The correlation findings suggested that all predictor variables were significantly related to SCT, indicating a regression was plausible. A regression analysis was then conducted accounting for depression, as measured by the BDI-II, and anxiety, as measured by the PSWQ, at the first level, and then with the addition of the NEO-PI-R *t* scores for Neuroticism, Extraversion, Conscientiousness, and depression and anxiety at the second level.

Tests of assumptions for multiple linear regression were met. The Durbin-Watson statistic, which tests for ongoing correlations between errors in regression models, was 1.973. The Durbin-Watson statistic varies between 0 and 4, with a value of 2 indicating that the residuals were at acceptable levels, that is, greater than 1 and less than 3 (Field, 2013).

The collinearity diagnostics revealed no evidence of multicollinearity for each of the predictor variables. Variance inflation factor was within normal limits, suggesting no multicollinearity as well. Further analyses of assumptions were conducted in accordance with Field (2013). A plot of standardized residuals (ZRESID) against standardized predicted values (ZPRED) revealed that the assumptions of linearity and homoscedasticity were met. To test the normality of the residuals, a histogram and normal probability plot of the residuals were examined. The histogram revealed skewedness, meaning that the assumption of normality was violated. Likewise, the normal probability plot examining observed cumulative percentages to expected cumulative percentages was also skewed. The probability-probability (P-P) scatter plot showed skewedness around the line. According to Field (2013), violating normality is

likely when Likert scales are used (BAARS-IV), but this violation was accounted for by the study's large sample size ( $n = 204$ ), and parametric analyses were carried out.

For Model 1, SCT was the criterion variable, and depression and anxiety were the predictor variables. The multiple correlation was  $R = .303$  with a coefficient of determination of  $R^2 = .092$  and minimal shrinkage shown with an adjusted coefficient of determination ( $AdjR^2 = .083$ ). Approximately 9.2% of the variance observed in SCT was attributed to depression and anxiety. The  $F$  change was highly significant at the  $< .001$  level,  $F(2, 201) = 10.134$ ,  $p = < .001$ . The outcome revealed that depression and anxiety led to a significant prediction ( $R = .303$ ;  $R^2 = .092$ ), suggesting that depression and anxiety made significant contributions to SCT severity.

In Model 2, SCT was also the criterion variable, and the predictor variables included Neuroticism, Extraversion, Conscientiousness, depression, and anxiety. In Model 2, the  $F$  change was also significant,  $F(3, 198) = 4.017$ ,  $p = .008$ . This outcome revealed that approximately 14.4% of the variance observed in SCT was attributed to the Big Five personality factors, depression, and anxiety. The outcomes for both models can be found in Table 3.

**Table 3**

*Model 1 and Model 2 Hierarchical Regression Summary*

Model	$R$	$R^2$	Adjusted $R^2$	Std. error of est.	$R^2$ Change	$F$ Change	$df1$	$df2$	Sig. $F$ Change
1	.303* <sup>a</sup>	.092*	.083	9.424	.092	10.134	2	201	< .001
2	.379* <sup>b</sup>	.144*	.122	9.219	.052	4.017	3	198	.008

*Note.* Dependent variable is sluggish cognitive tempo (SCT).

<sup>a</sup> Predictor variables of depression and anxiety to the dependent variable (SCT).

<sup>b</sup> Predictor variables of depression, anxiety, Neuroticism, Extraversion, and Conscientiousness to the dependent variable (SCT).

\* $p < .01$ .

Further analyses of the predictor variables from Model 2 revealed that Conscientiousness made a significant contribution when predicting SCT ( $p = .002$ ). Neuroticism was not significantly predictive ( $p = .926$ ), nor was Extraversion ( $p = .077$ ). All beta coefficient analyses can be found in Table 4. In sum, Model 1 was significant, indicating that depression and anxiety made significant contributions to the prediction of SCT ( $p < .001$ ). Regarding Model 2, it was

**Table 4**

*Coefficients of Depression, Anxiety, Neuroticism, Extraversion, and Conscientiousness Predictor Variables to SCT from Model 1 and Model 2*

Model	Unstandardized coefficients	Standardized coefficients	Beta	<i>t</i>	Collinearity statistics		
	B	Std. error			Sig.	Tolerance	VIF
1 (constant)	82.192	2.421		33.944	.000		
Depression	.199	.062	.227	3.213	.002*	.904	1.1064
Anxiety	.090	.045	.142	2.002	.047*	.904	1.106
2 (constant)	92.477	4.774		19.373	.000		
Depression	.167	.063	.190	2.651	.009*	.838	1.194
Anxiety	.099	.048	.155	2.069	.040*	.770	1.299
Neuroticism	-.005	.058	-.007	-.092	.926	.778	1.286
Extraversion	-.098	.055	-.119	-1.775	.077	.954	1.048
Conscientiousness	-.145	.047	-.203	-3.072	.002*	.987	1.014

*Note.* Dependent variable is sluggish cognitive tempo (SCT). VIF = variance inflation factor.

\* $p < .01$ .

hypothesized that NEO-PI-R *t* scores for Neuroticism, Extraversion, and Conscientiousness would predict SCT. Initially, Extraversion and Conscientiousness were found to be significantly and inversely associated with SCT ( $r = -.166, p = .009$ ;  $r = -.198, p = .002$ , respectively), and Neuroticism was positively correlated ( $r = .128, p = .034$ ). Regarding the predictive model, only Conscientiousness made a significant contribution when predicting SCT ( $p = .002$ ). The results of this study revealed that the comorbidities of depression and anxiety and the Conscientiousness Big Five factor significantly contributed to the severity of SCT. One should note that although Model 2 was statistically significant, the combination of Neuroticism, Extraversion, Conscientiousness, depression, and anxiety accounted for only about 14.4% of the variance. Results from the overall regression analysis can be found in Table 5.

**Table 5***Overall Regression Analysis*

Model	Sum of squares	<i>Df</i>	Mean square	<i>F</i>	Sig.
1 Regression	1800.096	2	900.048	10.134	< .001 <sup>*a</sup>
Residual	17851.946	201	88.816		
Total	19652.042	203			
2 Regression	2842	5	564.859	6.646	< .001 <sup>*b</sup>
Residual	16827	198	84.989		
Total	19652	203			

*Note.* Dependent variable is sluggish cognitive tempo (SCT).

<sup>a</sup> Predictor variables of depression and anxiety to the dependent variable (SCT).

<sup>b</sup> Predictor variables of depression, anxiety, Neuroticism, Extraversion, and Conscientiousness to the dependent variable (SCT).

\* $p < .01$ .

### Hypothesis 2

It was hypothesized that ADHD, inattentive presentation symptoms would be positively associated with Neuroticism and negatively correlated with Conscientiousness. Inattentive symptoms were operationalized as a total inattentive symptom score as measured by the BAARS-IV and the personality factors by NEO-PI-R *t* scores. A Pearson product-moment correlation was carried out to examine the relationships. Results indicated a significant, inverse relationship between ADHD, inattentive presentation, and Conscientiousness,  $r(205) = -.362$ ,  $p < .001$ . The *r* squared value suggested that about 13.1% of the variance of inattentive symptoms could be explained by Conscientiousness. Therefore, inattentive symptoms of ADHD are related to traits of Conscientiousness. No significant relationship was found between ADHD, inattentive presentation, and Neuroticism,  $r(205) = .058$ ,  $p = .204$ . Correlations, means, and standard deviations can be found in Table 6.

**Table 6**

*Means, Standard Deviations, and Correlations for ADHD, Inattentive Presentation, Neuroticism, and Conscientiousness*

Variable	<i>M</i>	<i>SD</i>	ADHD	Neuroticism	Conscientiousness
ADHD	25.31	5.525	-----	.058	-.362*
Neuroticism	58.57	12.60	.058	-----	.015
Conscientiousness	35.66	13.74	-.362*	.015	-----

*Note.* ADHD = attention-deficit/hyperactivity disorder.

\* $p < .01$

### Hypothesis 3

It was hypothesized that SCT scores would differ significantly in adults with ADHD, combined presentation, as compared to adults with ADHD, inattentive presentation. An independent samples *t* test was carried out to determine whether a difference existed between the two groups. The Levene's test was found not to be significant; thus, equal variances between groups can be assumed ( $p = .502$ ). Although the independent samples *t* test approached significance,  $t(153) = 1.91, p = .058$ , it was not statistically significant. Therefore, no significant difference was found between patients with ADHD, inattentive presentation ( $n = 55; M = 25.04, SD = 5.58$ ) and patients with ADHD, combined presentation ( $n = 98; M = 23.20, SD = 5.74$ ) in regard to SCT symptoms.

In sum, Hypothesis 1 assumed that Big Five personality factors of Neuroticism, Extraversion, and Conscientiousness would predict SCT severity when anxiety and depression were accounted for. Based on the hierarchical regression, depression, anxiety, and Conscientiousness significantly contributed to the prediction of SCT. Initially, Extraversion was found to be significantly and inversely associated with SCT and Neuroticism was positively correlated, but Neuroticism and Extraversion did not significantly contribute to the predictive model. Hypothesis 2 also examined Big Five personality traits. It was hypothesized that Neuroticism would be positively correlated with inattentive ADHD symptoms and Conscientiousness would be negatively correlated. Results indicated that Conscientiousness had a significant, negative relationship with inattentive symptoms. No significant relationship was found between Neuroticism and inattentiveness, though it was hypothesized that a positive relationship would occur.

Hypothesis 3 examined whether a difference in SCT symptoms existed between individuals with inattentive or combined ADHD presentations. It was hypothesized that the groups would differ significantly, but no difference was found between the two groups.

## CHAPTER 5: DISCUSSION

The present study examined the relationship between sluggish cognitive tempo (SCT), attention-deficit/hyperactivity disorder (ADHD), and personality pathology, after accounting for depression and anxiety in an adult, outpatient sample. SCT is a cluster of symptoms that includes daydreaming, mental confusion, slowed thinking, and hypoactivity, and said symptoms are believed to overlap with ADHD. McBurnett et al. (2001) suggested that SCT and ADHD, inattentive presentation, are two separate and distinguishable disorders. Nonetheless, ADHD, inattentive presentation, and SCT symptoms have been found to be highly correlated, and individuals with inattentive symptoms have been found to have higher levels of SCT symptoms when compared to individuals with other ADHD subtypes (Willcutt et al., 2012). SCT and ADHD are both also positively correlated with internalizing comorbid conditions, such as depression and anxiety, and this relationship exists for SCT even after accounting for inattentive symptoms (Barkley, 2019; Becker & Langberg, 2013).

Hypothesis 1 was partially supported, revealing that depression, anxiety, and Conscientiousness significantly predicted SCT severity. It was also hypothesized that Neuroticism and Extraversion would be predictive of SCT, but those variables did not contribute to the predictive model. The second hypothesis, that ADHD, inattentive presentation, would be positively associated with Neuroticism and negatively related to Conscientiousness, was also partially supported, as Neuroticism did not have a positive relationship with inattentive symptoms, but Conscientiousness had a significant, negative relationship with inattentive symptoms. Lastly, it was hypothesized that SCT severity

would differ between participants diagnosed with ADHD inattentive and combined presentations. Hypothesis 3 was not supported.

Personality differences can provide valuable information that is beneficial for diagnostic and treatment recommendations for all clinical disorders, including adult ADHD and SCT. For example, previous research found a relationship between ADHD, inattentive presentation, and Neuroticism, Conscientiousness, anxiety, and depression (Grogan et al., 2018; Kessler et al., 2006; Knouse et al., 2013; Nigg et al., 2002; Parker et al., 2004). The same relationships were reported for SCT when depression, anxiety, and inattentive symptoms were accounted for, with the additional finding of an inverse relationship with Extraversion (as cited in Becker, Schmitt et al., 2018). Many of the previous findings regarding SCT were limited because the studies were carried out in children and nonclinical samples (Barkley, 2019; Becker, Burns et al., 2018; Capdevila-Brophy et al., 2014; Skirbekk et al., 2011).

Although these previous studies controlled for the presence of comorbid anxiety, depression, and inattentive symptoms of ADHD, a literature review failed to find a single study examining the influence of personality pathology on SCT in an adult, clinical sample. This limitation is significant given the rising prevalence and awareness of SCT, the complexity of the presentation, and the overlap of comorbid mental health symptoms (Barkley 2019; Becker et al., 2013; Oguchi & Takahashi, 2019; Yoshimasu et al., 2018). Therefore, the goal of this study was to determine whether personality pathology (i.e., Neuroticism, Extraversion, and Conscientiousness) was predictive of SCT, after controlling for the influence of depression and anxiety, which are both known to be highly prevalent in this population (Barkley, 2019; Becker & Langberg, 2013).

## **Interpretations and Implications**

### **SCT, Inattentive ADHD, and Personality Pathology**

#### *Conscientiousness*

The current study partially supported the first hypothesis. Low Conscientiousness, as measured by the NEO Personality Inventory-Revised (NEO-PI-R), was predictive of higher SCT severity, operationalized as the Barkley Adult ADHD Rating Scale-IV (BAARS-IV) self-report rating scale. Similarly, Conscientiousness also had an inverse relationship with ADHD, inattentive presentation, providing partial support for Hypothesis 2. When conceptualizing SCT and ADHD, examining personality traits provides further information regarding the presentation, assessment, and treatment. Costa and McCrae (1992) defined Conscientiousness as one's ability to plan, organize, and carry out tasks. An individual with a high *t* score on the Conscientiousness factor would be described as punctual or reliable. The factor is comprised of six facets to further describe the overall domain: competence, order, dutifulness, achievement striving, self-discipline, and deliberation. Being described as "low" on this factor would mean that an individual may be perceived as lackadaisical, disorganized, or unreliable. The results of the present study indicate that low Conscientiousness had a significant influence on the severity of SCT symptoms: The greater one's SCT symptoms, the less conscientious one is.

The SCT finding was consistent with a previous study carried out by Becker, Schmitt et al. (2018), who found a significant, inverse relationship between SCT symptoms and Conscientiousness in a college-aged sample (18-29 years) using a short form of the NEO-PI. Considering symptoms of SCT (i.e., mental fogginess,

daydreaming, inconsistent alertness, confusion, motor retardation, fatigue, decreased energy, and absentmindedness), the significant inverse relationship with conscientiousness should not be surprising (Barkley, 2019; Becker et al., 2016; Becker & Barkley, 2018; Becker, Burns, Leopold et al., 2018; Garner et al., 2017). It would be challenging for an individual experiencing SCT to be well-prepared, organized, able to fulfill daily obligations, fully invested in one's education or career, able to follow through on tasks, or able to make cautious decisions.

The literature also reflects that adults and children endorsing symptoms of SCT were more likely than individuals endorsing symptoms of ADHD, depression, and anxiety to socially isolate, a finding that may indirectly be attributed to low Conscientiousness (Barkley 2012; Barkley, 2013; Willcutt et al., 2013). This may be because self-perception of competence is a facet of the Conscientiousness factor, and having low competence is associated with lower self-esteem, in turn possibly impacting the quality and quantity of social interactions (Costa & McCrae, 1992; O'Brien, 2016)). Thus, individuals who present for treatment with these symptoms may need to be evaluated further for SCT. Furthermore, these findings underscore the importance of appropriate assessment when beginning treatment of adults with ADHD, because low Conscientiousness may predict the presence of SCT or ADHD and, in turn, may exacerbate many of the functional difficulties individuals with either symptoms experience.

### ***Extraversion***

Hypothesis 1 was not fully supported, as Extraversion was not significantly predictive of SCT in the present study, a result not consistent with the previous literature

(Becker, Schmitt et al., 2018; John et al., 1994). Extraversion is characterized by the facets of warmth, gregariousness, assertiveness, activity, excitement-seeking, and positive emotion. It was hypothesized that participants' Extraversion would have a significant, inverse relationship with SCT because of the link between social withdrawal and avoidance with symptoms of SCT (Barkley 2012; Barkley, 2013; Willcutt et al., 2013). Additionally, SCT symptoms of fatigue, low energy, and social isolation provided corroboration for the hypothesized results. Costa and McCrae (1992) defined Extraversion as "sociable, preferring large groups and gatherings, assertive, active, talkative, and energetic" (p. 15).

One could conjecture that using an adult sample may provide an explanation for the discrepancy between the present and previous findings, as previous findings were carried out with children, who were exposed and had less of a choice to opt out of participation in many more social environments than adults (e.g., school, daycare, sport teams, scouting; Barkley, 2019; Becker, Burns et al., 2018; Capdevila-Brophy et al., 2014; John et al., 1994; Skirbekk et al., 2011). One could also hypothesize that children, as opposed to adults, are more outgoing and are persuaded by their caregivers to make friends and form social groups.

Looking further at the sample characteristics, more adults were diagnosed with ADHD, combined presentation, as opposed to the inattentive presentation (i.e., 55 inattentive and 98 combined) to the 30 participants who were diagnosed with an unspecified ADHD presentation. The larger number of participants with a combined presentation may have contributed to the insignificant predictability of Extraversion

because SCT is more prevalent in individuals with inattentive symptoms (Barkley, 2012; Kessler et al., 2010).

### *Neuroticism*

Hypothesis 1 was not fully supported, as Neuroticism did not significantly predict SCT severity. This finding was interesting because individuals with SCT have a greater risk of developing internalizing disorders, such as anxiety and depression, which are both facets of Neuroticism (Barkley, 2019; Becker & Langberg, 2013; Costa & McCrae, 1992). The Neuroticism factor of the NEO-PI-R is used to assess one's tendency to experience negative affect, as well as one's predisposition to psychological distress. The six facets of Neuroticism are anxiety, depression, angry hostility, self-consciousness, impulsiveness, and vulnerability (Costa & McCrae, 1992).

The anxiety facet is operationalized by the following characteristics: anxiety, fear, worry, tense, nervous, low confidence, and low optimism (Costa & McCrae, 1992). Considering the depression facet, Costa and McCrae (1992) provided the following description: worry, nonargumentative, low confidence, low self-confidence, pessimistic, mood, and anxious. One could hypothesize that the elevations of the other four facets (i.e., angry hostility, self-consciousness, impulsiveness, and vulnerability) were lacking, and therefore, the Neuroticism domain as a whole was not elevated. This hypothesis would make sense in a sample of adults who reported symptoms of SCT because the facets of angry hostility and impulsiveness seem to oppose the SCT symptoms of hypoactivity and low energy (Barkley, 2014). In fact, research has shown that children with SCT are less likely to demonstrate disruptive, aggressive, impulsive, or hyperactive behaviors in the classroom when compared to children with ADHD (Barkley, 2019). One

should note that Costa and McCrae (1992) suggested that personality factors should not be interpreted as diagnosable measures of psychopathology because the factors are considered on a continuous scale (i.e., very low, low, average, high, and very high), and scores falling at any part of this scale are informative of an individual's traits.

### **SCT, Inattentive ADHD, and Comorbid Psychopathology**

Hypothesis 1 was partially supported, as results demonstrated that depression and anxiety made significant contributions to the prediction of SCT, corroborating many of the findings in the literature that depression and anxiety are correlated strongly with SCT (Barkley, 2019; Becker et al., 2014; Becker & Langberg, 2013; Servera et al., 2018; Skirbekk et al., 2011). A significant relationship was also found between depression, anxiety, and inattentive symptoms of ADHD, consistent with results from Serine et al. (2015) that indicated a relationship between cognitive distortions and neuroticism, anxiety, and depression in adults diagnosed with ADHD. Importantly, the relationship between cognitive distortions and ADHD was no longer significant after accounting for the aforementioned comorbidities, indicating that the comorbidities, not ADHD itself, accounted for cognitive distortions in adults with ADHD.

In the present study, depression and anxiety accounted for approximately 14.4% of the variance of SCT, and a number of variables that were not considered could account for the other 85% of the variance, for example, *DSM-5* personality disorders, cognitive distortions, and medication status, none of which were assessed in this study. One could also speculate that the majority of the variance in SCT, unaccounted for in this study, could be attributed to these variables. Conversely, these findings may provide support for SCT as a stand-alone disorder, the symptoms of which are not accountable to

comorbidities or other clinical phenomena. Previous literature has demonstrated strong validity for SCT as a disorder distinct from ADHD, inattentive presentation (Barkley 2012; Barkley, 2013; Barkley, 2014; Barkley, 2019; Bauermeister et al., 2012; Becker et al., 2016; Becker & Barkley, 2018; Garner et al., 2017; Wood et al., 2017).

### **Assessment Recommendations for SCT**

The present findings underscore the importance of appropriate, comprehensive evaluation for adults seeking assessment for both SCT and ADHD. Clinicians are encouraged to be aware of the overlapping and co-occurring nature of symptoms of SCT, ADHD, depression, and anxiety. Consequently, this requires assessment of all of these clinical phenomena when working with this population. For example, assessment recommendations include inquiring further about symptom presentation and onset, such as with the addition of the ADHD, mood, and anxiety disorder sections of the Structured Clinical Interview for *DSM-5* Disorders during clinical interviewing (SCID-5; First et al., 2016).

SCT is not incorporated in the SCID-5, but the Adult Concentration Inventory (ACI; Becker, Burns, Garner et al., 2018) is a psychometrically sound, self-report measure developed for research and clinical use to assess the core symptoms of SCT identified via meta-analyses (i.e., daydreaming, staring, mental foggy/confusion, and slowed behavior/thinking). The scale consists of 16 items that are statistically distinguishable from ADHD, inattentive presentation. Individuals are asked to rate the items on a 4-point Likert scale based on symptoms experienced in the previous 6 months. Validation of the measure also demonstrated strong convergent and discriminant validity from depression and anxiety symptoms assessed by the Depression Anxiety Stress Scale

– 21 (DASS-21; Antony et al., 1998; Lovibond & Lovibond, 1995). Using a measure with strong discriminant validity is critical when assessing SCT because of the notable overlap between SCT, inattentive, depression, and anxiety symptoms (Barkley, 2019; Becker et al., 2014; Becker & Langberg, 2013; Servera et al., 2018; Skirbekk et al., 2011; Willcutt et al., 2012).

A greater emphasis should also be placed on social functioning, as symptoms of internalization and social withdrawal are prevalent in individuals with SCT and may mimic the avoidance and isolation common for those with anxiety or depression. The validation of the ACI revealed a significant relationship between SCT, self-esteem, and loneliness, as measured by the Rosenberg Self-Esteem Scale (RSE; Rosenberg, 1965) and University of California Los Angeles Loneliness Scale – 3 (Russell, 1996). The ACI is also unique in that it includes eight additional items assessing daily impairments in various domains caused by SCT symptoms (i.e., work, education, relationships with friends, intimate relationships, parenting, organization of daily life, daily self-care, and sleep quality). The impairment items of the ACI have not yet been statistically validated.

Physical ailments and medical history should also be thoroughly reviewed, as specific medical conditions have symptomology that can present similarly as symptoms of SCT. For example, symptoms of hypothyroidism that are similar to SCT include fatigue, lethargy, impaired memory, and depression (Garber et al., 2012; Healthwise Staff, 2020). Becker et al. (2017) examined the relationship between hypothyroidism and SCT in 570 children between the ages of 6-12 years. After accounting for age, gender, race, ADHD, and internalizing externalizing psychological conditions, a small but significant, inverse association was found between SCT and thyroid-stimulating hormone

(TSH) levels, meaning that reduced TSH predicted higher levels of SCT ( $R = .16$ ,  $R^2 = .32$ ), with a small effect size,  $F = 6.79$ ,  $p < .01$ . Consequently, one should note that some of the variance in SCT symptoms may be attributable to medical conditions, such as hypothyroidism. In sum, conducting a comprehensive assessment in a mental health setting is critical to determine a wide range of medical and psychiatric domains, including thyroid function and to rule out any related and overlapping conditions that may present as SCT. Other conditions to be considered and assessed through in-depth history taking include sleep disorders and chronic fatigue syndrome given the high prevalence of sleep disturbances and fatigue in an SCT population. Specific sleep disorders to account for include insomnia, narcolepsy, and obstructive sleep apnea, all of which can hinder adequate sleep at night and induce drowsiness during the day. Chronic fatigue syndrome is a condition characterized by fatigue lasting at least 6 months with rheumatological, infectious, and neuropsychiatric symptoms (Afari & Buchwald, 2003). Chronic fatigue can look like SCT, but the differential between the two conditions is the onset, as SCT is believed to have an onset during adolescence. The onset of chronic fatigue is typically paired with flu-like symptoms and is predominantly an adult condition (Afari & Buchwald, 2003; Barkley, 2012; Barkley, 2013; Barkley, 2014). During clinical interviewing, asking clarifying questions about the onset of fatigue or the nature of sleep difficulties would aid in the assessment of SCT.

### **Treatment Recommendations for SCT**

Cognitive-behavioral therapy (CBT) is uniquely qualified to address deficits caused by SCT. CBT is a structured approach that can be tailored and individualized and can be used to identify the manner in which symptoms, such as mental fogging,

inconsistent alertness, confusion, fatigue, and absentmindedness, interfere with executive-functioning skills and quality of life. Participation in CBT can aid in the identification of interventions that emphasize the implementation of effective coping strategies and management of these barriers. CBT has the added benefit of being an evidence-supported treatment for ADHD, depression, anxiety, and personality pathology, which are highly prevalent disorders in this population (Barkley 2012; Barkley, 2013; Barkley, 2019; Beck, 2011; Becker & Langberg, 2013; Ramsay & Rostain, 2015a, 2015b).

Ramsay and Rostain (2015b) developed treatment strategies based on the principles of CBT, adapted to the needs of adults with ADHD. It is hoped by the current authors that these interventions will be effective in treating symptoms of SCT as well. The authors identify behavioral strategies intended to enhance patients' abilities to manage daily matters and life stressors. Examples of suggested strategies include, but are not limited to, keeping a daily to-do list, using a daily planner, prioritizing time-sensitive tasks, and breaking large tasks into smaller pieces. The mentioned interventions can be used to compensate for deficits caused by SCT, including decreased energy and fatigue, slowed thinking, absentmindedness, confusion, and inconsistent alertness. For example, breaking large tasks into smaller pieces could help relieve stress and frustrations for an individual experiencing decreased energy and absentmindedness.

A problem-solving approach to CBT, developed by Nezu et al. (2004), could also be effective with an SCT population. The problem-solving model was developed with the understanding that patients have several obstacles preventing them from autonomously achieving their goals. The model is aimed at guiding patients in overcoming their

behavioral, cognitive, affective, and physiological challenges. This approach has been described as more cognitive than behavioral because of its focus on defining problems, generating alternatives, making decisions, and evaluating outcomes. Like CBT, the problem-solving treatment model is also recommended for the treatment of depression and anxiety, which have been found to be frequently comorbid with ADHD and SCT (Barkley, 2019; Becker & Langberg, 2013).

Currently, Vyvanse (lisdexamfetamine) is the only psychostimulant supported as a psychopharmacological treatment for SCT (Adler et al., 2021). The significant role of comorbid depression and anxiety may be indicative of the need for an antidepressant or anxiolytic medications paired with psychotherapy.

### **SCT in ADHD, Inattentive and Combined Presentations**

No difference in SCT was found between patients with combined and inattentive presentations; however, the result of the *t* test approached clinical significance. As mentioned previously, more adults were diagnosed with the combined presentation than with the inattentive. One should also consider that an individual diagnosed with combined symptoms of ADHD also experiences inattentive symptoms, which have a stronger relationship with SCT (Barkley 2012; Barkley, 2013; Willcutt et al., 2013).

Taken all together, the results of this study hopefully bring awareness to SCT and provide clinicians with information to guide assessment and treatment planning. Most importantly, depression, anxiety, and Conscientiousness were the strongest predictors of SCT. The less conscientious one is, the more severe one's SCT may be. Also, an inverse relationship was found between Conscientiousness and inattentive symptoms of ADHD, and this overlap should be considered during case formulation and assessment. The

overlap between SCT, depression, and anxiety warrants the need for diagnostic measures to rule out comorbidities and plan for effective treatment.

### **Limitations**

Limitations of the present study should be considered when reviewing the aforementioned results. A notable limitation arises from the idiosyncratic characteristics of the university-based treatment sample. The sample was composed of primarily European American, higher socioeconomic status, high-functioning, college-educated male individuals with ADHD. Additionally, most of the participants either were insured by a college-based health plan that covered the cost of the evaluation or had financial resources to self-pay. This discrepancy in demographics created limitations when generalizing these findings to minority populations and women. It may have also influenced findings because having greater economic and cognitive resources may have made coping with symptoms and life stressors easier.

Other limitations worth noting included medications and ADHD presentations. Some participants had been prescribed psychostimulants or other psychiatric medications at the time of the evaluation. Thus, participants taking medications might have presented with fewer or less severe symptoms than those not prescribed medications. Another sample characteristic that represents a limitation in this study was the number of participants diagnosed with ADHD, combined presentation. The number of individuals with a combined presentation diagnosis was much larger than the number of individuals with an inattentive presentation diagnosis, possibly having affected findings because past literature supported a significant overlap between SCT and inattentive presentation

(Barkley 2012; Barkley, 2013; Willcutt et al., 2013). Also of note is that no participant in the sample had a diagnosis of ADHD, hyperactive/impulsive presentation.

Additional limitations of the present study are the use of the NEO-PI-R and self-report measures. The NEO-PI-R was not designed to diagnose psychiatric or personality disorders, and the conclusions of this study should be interpreted with caution when generalizing to ADHD, SCT, and other comorbid clinical syndromes (Costa & McCrae, 1992). The use of self-report measures is also a noteworthy limitation because past research suggested that individuals with adult ADHD tend to underreport symptoms because of a lack of self-awareness (Kooij et al., 2008; Manor et al., 2012). Further, despite the psychometric qualities of the self-report measures used (i.e., BAARS-IV, NEO-PI-R, Beck Depression Inventory-II [BDI-II], and Penn State Worry Questionnaire [PSWQ]), the use of one measure per variable limits the accuracy of the results and was not accounted for with observer reports (Kooij et al., 2008).

A final limitation was not using the facets of the Big Five personality factors from the NEO-PI-R. Specifically, seeing analyses of the anxiety and depression facets of Neuroticism would have been helpful in determining why the factor itself did not significantly contribute to SCT or inattentive ADHD symptoms. Including the Agreeableness factor in the study also might have been helpful, as past studies have found relationships between Agreeableness and ADHD (Nig et al., 2002; Parker et al., 2004). According to Costa and McCrae (1992), each of the personality factors can be influenced by one another, and the authors specifically point out that a patient's *t* score on the Agreeableness domain can alter the interpretation of elevations on the Neuroticism factor (e.g., the anger hostility facet of Neuroticism).

Despite the limitations mentioned, the present study had multiple strengths. The present archival data used were from a large, clinical sample, thereby increasing the study's statistical power. The use of a clinical sample was unique to this study, as SCT and personality traits had not yet been analyzed in a clinical population (Becker, Schmitt et al., 2018). Additionally, measures used in the ADHD clinic's comprehensive ADHD assessment were psychometrically sound, and participants were evaluated thoroughly to ensure diagnostic accuracy.

### **Future Directions**

The current study's results differed from those of previous literature that found that Neuroticism and Extraversion Big Five personality factors made significant contributions to SCT (Becker, Schmitt et al., 2018; Martel et al., 2011). Considering the limitations of the present study and the increasing awareness and prevalence of SCT, future research may wish to replicate the current study with the addition of facet analyses. Future research should also consider expanding this current study by examining a more diverse population. Specifically, this study could be replicated in a community mental health center or private practice where a more generalizable sample could be used. Additionally, replicating this study to account for medication usage to determine whether psychostimulants, antidepressants, or anxiolytics have a greater effect on decreasing SCT symptom severity would add a better understanding of effective treatments.

### **Summary and Conclusions**

The present study examined the relationship between SCT, ADHD, Neuroticism, Extraversion, Conscientiousness, depression, and anxiety. The results will be used to add to the understanding, assessment, and treatment of SCT. The lack of inclusion of SCT in

the *DSM-5* has become a critical problem, as a subset of individuals who do not meet criteria for ADHD report symptoms consistent with SCT. One could speculate that gaps in the literature within the past 20 years may be the reason SCT was not carried over from the *DSM-IV-TR* to the *DSM-5*. The results of this study will add to the existing literature of SCT and potentially provide guidance for future *DSM* revisions.

**REFERENCES**

- Adler, L.A., Leon, T. L., Sardoff, T. M., Krone, B., Faraone, S. V., Silverstein, M. J., & Newcorn, J. H. (2021). A placebo-controlled trial of lisdexamfetamine in the treatment of comorbid sluggish cognitive tempo and adult ADHD. *The Journal of Clinical Psychiatry, 82*(4).
- Afari, N., & Buchwald, D. (2003). Chronic fatigue syndrome: A review. *The American Journal of Psychiatry, 160*(2), 221-236.
- Allen, T. A., Carey, B. E., McBride, C., Bagby, R. M., DeYoung, C. G., & Quilty, L. C. (2018). Big Five aspects of personality interact to predict depression. *Journal of Personality, 86*(4), 714–725. <https://doi.org/10.1111/jopy.12352>
- Allik, J., Realo, A., & McCrae, R. R. (2013). Universality of the five-factor model of personality. In T. A. Widiger & P. T. Costa, Jr. (Eds.), *Personality disorders and the five-factor model of personality* (pp. 61–74). American Psychological Association. <https://doi.org/10.1037/13939-005>
- American Psychiatric Association (1952). *Diagnostic and statistical manual of mental disorders*. Washington, DC, American Psychiatric Association.
- American Psychiatric Association (1968). *Diagnostic and statistical manual of mental disorders* (2nd ed.). Washington, DC: American Psychiatric Association.
- American Psychiatric Association. (1980). *Diagnostic and statistical manual of mental disorders* (3rd ed.). Washington, DC: American Psychiatric Association.
- American Psychiatric Association. (1987). *Diagnostic and statistical manual of mental disorders* (3rd ed. text rev.). Washington, DC: American Psychiatric Association.

- American Psychiatric Association. (1994). *Diagnostic and statistical manual of mental disorders* (4th ed.). Washington, DC: American Psychiatric Association.
- American Psychiatric Association. (2000). *Diagnostic and statistical manual of mental disorders* (4th ed., text rev.). Washington, DC: American Psychiatric Association.
- American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental health disorders* (5th ed.). Arlington, VA: American Psychiatric Publishing.
- Antony, M. M., Bieling, P. J., Cox, B. J., Enns, M. W., & Swinson, R. P. (1998). Psychometric properties of the 42-item and 21-item versions of the Depression Anxiety Stress Scales in clinical groups and community sample. *Psychological Assessment, 10*(2), 176-181.
- Barkley, R. A. (2011). *Barkley Adult ADHD Rating Scale IV (BAARS-IV)*. Guilford Press.
- Barkley, R. A. (2012). Distinguishing sluggish cognitive tempo from attention-deficit/hyperactivity disorder in adults. *Journal of Abnormal Psychology, 121*(4), 978–990.
- Barkley, R. A. (2013). Distinguishing sluggish cognitive tempo from ADHD in children and adolescents: Executive functioning, impairment, and comorbidity. *Journal of Clinical Child & Adolescent Psychology, 42*(2), 161– 173.
- Barkley, R. A. (2014). Sluggish cognitive tempo (concentration deficit disorder?): Current status, future directions, and a plea to change the name. *Journal of Abnormal Child Psychology, 42*(1), 117-125.
- Barkley, R. A. (2018). *Barkley Sluggish Cognitive Tempo Scale--Children and Adolescents (BSCTS-CA)*. Guilford Publications.

- Barkley, R. A. (2019, January 6). *Dr. Russell Barkley: The Second Attention Disorder Sluggish Cognitive Tempo vs ADHD* [Video]. YouTube.  
<https://www.youtube.com/watch?v=gGRqzh9QFn4&t=3583s>
- Bauermeister, J. J., Barkley, R. A., Bauermeister, J. A., Martinez, J. V., & McBurnett, K. (2012). Validity of the sluggish cognitive tempo, inattention, and hyperactivity symptom dimensions: Neuropsychological and psychosocial correlates. *Journal of Abnormal Child Psychology*, *40*(5), 683-697.
- Beck, A. T., Steer, R. A., Ball, R., & Ranieri, W. F. (1996). Comparison of Beck Depression Inventories- I and -II in psychiatric outpatients. *Journal of Personality Assessment*, *67*(3), 588-597.
- Beck, A. T., Steer, R. A., & Brown, G. (1996). *Beck Depression Inventory manual* (2nd ed.). The Psychological Corporation.
- Beck, J. S. (2011). *Cognitive behavior therapy: Basics and beyond* (2nd ed.). Guilford Press.
- Becker, S., Marshall, S., & McBurnett, K. (2013). Sluggish cognitive tempo in abnormal child psychology: An historical overview and introduction to the special section. *Journal of Abnormal Child Psychology*, *42*(1), 1–6.
- Becker, S. P., & Barkley, R. A. (2018). Sluggish cognitive tempo. *Oxford textbook of attention deficit hyperactivity disorder*. Oxford University Press.
- Becker, S. P., Burns, G. L., Garner, A. A., Jarrett, M. A., Luebke, A. M., Epstein, J. N., & Willcutt, E. G. (2018). Sluggish cognitive tempo in adults: Psychometric validation of the Adult Concentration Inventory. *Psychological Assessment*, *30*(3), 296–310. <https://doi.org/10.1037/pas0000476>

Becker, S. P., Burns, G. L., Leopold, D. R., Olson, R. K., & Willcutt, E. G. (2018).

Differential impact of trait sluggish cognitive tempo and ADHD inattention in early childhood on adolescent functioning. *Journal of Child Psychology and Psychiatry*, *59*(10), 1094-1104.

Becker, S. P., & Langberg, J. M. (2013). Sluggish cognitive tempo among young adolescents with ADHD: Relations to mental health, academic, and social functioning. *Journal of Attention Disorders*, *17*(8), 681-689.

Becker, S. P., Leopold, D. R., Burns, G. L., Jarrett, M. A., Langberg, J. M., Marshall, S. A., McBurnett, K., Waschbusch, D. A., & Willcutt, E. G. (2016). The internal, external, and diagnostic validity of sluggish cognitive tempo: A meta-analysis and critical review. *Journal of the American Academy of Child and Adolescent Psychiatry*, *55*(3), 163–178.

Becker, S. P., Luebbe, A. M., Fite, P. J., Stoppelbein, L., & Greening, L. (2014). Sluggish cognitive tempo in psychiatrically hospitalized children: Factor structure and relations to internalizing symptoms, social problems, and observed behavioral dysregulation. *Journal of Abnormal Child Psychology*, *42*(1), 49-62.

Becker, S. P., Luebbe, A. M., Greening, L., Fite, P. J., & Stoppelbein, L. (2017). A preliminary investigation of the relation between thyroid functioning and sluggish cognitive tempo in children. *Journal of Attention Disorders*, *21*(3), 240-246.

Becker, S. P., Schmitt, A. P., Jarrett, M. A., Luebbe, A. M., Garner, A. A., Epstein, J. N., & Burns, G. L. (2018). Sluggish cognitive tempo and personality: Links to BIS/BAS sensitivity and the Five Factor model. *Journal of Research in Personality*, *75*, 103-112.

- Bennett, T. W. (2015). *The relationship between ADHD and trait facets of the five-factor model* [Unpublished doctoral dissertation]. Philadelphia College of Osteopathic Medicine,
- Camprodon-Rosanas, E., Ribas-Fitó, N., Batlle-Vila, S., Persavento, C., Alvarez-Pedrerol, M., Sunyer, J., & Forns, J. (2017). Sluggish cognitive tempo: Sociodemographic, behavioral, and clinical characteristics in a population of catalan school children. *Journal of Attention Disorders, 21*(8), 632-641.
- Canu, W. H., & Carlson, G. L. (2003). Differences in heterosocial behavior and outcomes of ADHD-symptomatic subtypes in a college sample. *Journal of Attention Disorders, 6*(3), 123-133.
- Capdevila-Brophy, C., Artigas-Pallarés, J., Navarro-Pastor, J. B., García-Nonell, K., Rigau-Ratera, E., & Obiols, J. E. (2014). ADHD predominantly inattentive subtype with high sluggish cognitive tempo: A new clinical entity? *Journal of Attention Disorders, 18*(7), 607–616.
- Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2<sup>nd</sup> ed.). Academic Press.
- Cohen, J. (1992). A power primer. *Psychological Bulletin, 112*(1), 155.
- Combs, M. A., Canu, W. H., Broman Fulks, J. J., & Nieman, D. C. (2014). Impact of sluggish cognitive tempo and attention-deficit/hyperactivity disorder symptoms on adults' quality of life. *Applied Research in Quality Life, 9*(4), 981-995.
- Costa, P. T. (1996). Work and personality: Use of the NEO-PI-R in industrial/organizational psychology. *Applied Psychology: An International Review, 45*(3), 225–241.

- 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* (Vol. 2, pp. 179-198). SAGE Publications.
- Costa, P. T., Jr., & McCrae, R. R. (1995). Domains and facets: Hierarchical personality assessment using the Revised NEO Personality Inventory. *Journal of Personality Assessment*, *64*(1), 21-50.
- Dan, O., & Raz, S. (2015). The relationships among ADHD, self-esteem, and test anxiety in young adults. *Journal of Attention Disorders*, *19*(3), 231-239.
- Deberdt, W., Thome, J., Lebec, J., Kraemer, S., Fregenal, I., Ramos-Quiroga, J., & Arif, M. (2015). Prevalence of ADHD in nonpsychotic adult psychiatric care (ADPSYC): A multinational cross-sectional study in Europe. *BMC Psychiatry*, *15*(1), 1-13.
- Fayyad, J., De Graaf, R., Kessler, R., Alonso, J., Angermeyer, M., Demyttenaere, K., De Girolamo, G., Haro, J. M., Karam, E. G., Lara, C., Lepine, J. P., Posada-Villa, J., Zaslavsky, A. M., & Jin, R. (2007). Cross-national prevalence and correlates of adult attention-deficit hyperactivity disorder. *The British Journal of Psychiatry*, *190*(5), 402-409.
- Fayyad, J., Sampson, N. A., Hwang, I., Adamowski, T., Aguilar-Gaxiola, S., Al-Hamzawi, A., Andrade, L. G., Borges, G., De Girolamo, G., Florescu, S., Gureje,

- O., Haro, J. M., Hu, C., Karam, E. G., Lee, S., Navarro-Mateu, F., O'Neil, S., Pennell, B., Piazza, M., Posada-Villa, J., & Kessler, R. C. (2017). The descriptive epidemiology of *DSM-IV* adult ADHD in the World Health Organization world mental health surveys. *ADHD Attention Deficit and Hyperactivity Disorders*, 9(1), 47-65.
- Fein, E. C., & Klein, H. J. (2011). Personality predictors of behavioral self-regulation: Linking behavioral self-regulation to Five-Factor model factors, facets, and a compound trait. *International Journal of Selection & Assessment*, 19(2), 132-144.
- Field, A. (2013). *Discovering statistics using IBM SPSS statistics: North American edition*. Sage.
- First, M. B., Williams, J. B. W., Karg, R. S., & Spitzer, R. L. (2016). *User's guide for the SCID-5-CV structured clinical interview for DSM-5 disorders: Clinical version*. American Psychiatric Publishing.
- Fischer, A. G., Bau, C. H. D., Grevet, E. H., Salgado, C. A. I., Victor, M. M., Kalil, K. L. S., Sousa, N. O., Garcia, C. R. & Belmonte-de-Abreu, P. (2007). The role of comorbid major depressive disorder in the clinical presentation of adult ADHD. *Journal of Psychiatric Research*, 41(12), 991-996.
- Flannery, A. J., Becker, S. P., & Luebke, A. M. (2016). Does emotion dysregulation mediate the association between sluggish cognitive tempo and college students' social impairment? *Journal of Attention Disorders*, 20(9), 802-812.
- Friedrichs, B., Igl, W., Larsson, H., & Larsson, J. O. (2012). Coexisting psychiatric problems and stressful life events in adults with symptoms of ADHD—a large

Swedish population-based study of twins. *Journal of Attention Disorders*, 16(1), 13-22.

Garber, J. R., Cobin, R. H., Gharib, H., Hennessey, J. V., Klein, I., Mechanick, J. I., Pessah-Pollack, R., Singer, P. A., & Woeber, K. A. (2012). Clinical practice guidelines for hypothyroidism in Adults: Cosponsored by the American Association of CLINICAL endocrinologists and the American Thyroid Association. *Thyroid*, 22(12), 1200–1235. <https://doi.org/10.1089/thy.2012.0205>

Garner, A. A., Peugh, J., Becker, S. P., Kingery, K. M., Tamm, L., Vaughn, A. J., Ciesielski, H., Simon, J. O., Loren, R. E. A. & Epstein, J. N. (2017). Does sluggish cognitive tempo fit within a bi-factor model of ADHD? *Journal of Attention Disorders*, 21(8), 642-654.

Geffen, J., & Forster, K. (2017). Treatment of adult ADHD: A clinical perspective. *British Association for Psychopharmacology*, 8(1), 25-32.

Gray, J. A. (1982). Précis of the neuropsychology of anxiety: An enquiry into the functions of the septo-hippocampal system. *Behavioral and Brain Sciences*, 5(3), 469-484.

Grogan, K., Gormley, C. I., Rooney, B., Whelan, R., Kiiski, H., Naughton, M., & Bramham, J. (2018). Differential diagnosis and comorbidity of ADHD and anxiety in adults. *British Journal of Clinical Psychology*, 57(1), 99–115.

Halleland, H. B., Sørensen, L., Posserud, M. B., Haavik, J., & Lundervold, A. J. (2019). Occupational status is compromised in adults with ADHD and psychometrically defined executive function deficits. *Journal of Attention Disorders*, 23(1), 76-86.

- Healthwise Staff. (2020, December 2). *Hypothyroidism*. Charlotte Hungerford Hospital, | Torrington, CT. <http://charlottehungerford.org/health-wellness/health-resources/health-library/detail?id=hw145667&lang=en-us>.
- Hesselmark, E., Eriksson, J., Westerlund, J., & Bejerot, S. (2015). Autism spectrum disorders and self-reports: Testing validity and reliability using the NEO-PI-R. *Journal of Autism & Developmental Disorders, 45*(5), 1156–1166.
- Hoelzle, J. B., Ritchie, K. A., Marshall, P. S., Vogt, E. M., & Marra, D. E. (2019). Erroneous conclusions: The impact of failing to identify invalid symptom presentation when conducting adult attention-deficit/hyperactivity disorder (ADHD) research. *Psychological Assessment, 31*(9), 1174.
- Jarrett, M. A., Wolff, J. C., Davis, T. E., Cowart, M. J., & Ollendick, T. H. (2016). Characteristics of children with ADHD and comorbid anxiety. *Journal of Attention Disorders, 20*(7), 636-644.
- Kaplan, S. C., Levinson, C. A., Rodebaugh, T. L., Menatti, A., & Weeks, J. W. (2015). Social anxiety and the Big Five personality traits: The interactive relationship of trust and openness. *Cognitive Behaviour Therapy, 44*(3), 212-222.
- Karsten, J., Penninx, B. W., Riese, H., Ormel, J., Nolen, W. A., & Hartman, C. A. (2012). The state effect of depressive and anxiety disorders on Big Five personality traits. *Journal of Psychiatric Research, 46*(5), 644-650.
- Katzman, M. A., Bilkey, T., Chokka, P. R., Fallu, A., & Klassen, L. J. (2016). Re: Is adult attention-deficit hyperactivity disorder being overdiagnosed? *The Canadian Journal of Psychiatry, 61*(1), 60–61. <https://doi.org/10.1177/0706743715620143>

- Kessler, R. C., Adler, L., Barkley, R., Biederman, J., Conners, C. K., Demler, O., Faraone, S. V., Greenhill, L. L., Howes, M. J., Secnik, K., Spencer, T., Ustun, B., Walters, E. E., & Zaslavsky, A. M. (2006). The prevalence and correlates of adult ADHD in the United States: Results from the National Comorbidity Survey Replication. *American Journal of Psychiatry, 163*(4), 716-723.
- Kessler, R. C., Green, J. G., Adler, L. A., Barkley, R. A., Chatterji, S., Faraone, S. V., Finkelman, M., Greenhill, L. L., Gruber, M. J., Jewell, M., Russo, L. J., Sampson, N. A., & Van Brunt, D. L. (2010). Structure and diagnosis of adult attention-deficit/hyperactivity disorder: Analysis of expanded symptom criteria from the aAdult ADHD Clinical Diagnostic Scale. *Archives of General Psychiatry, 67*(11), 1168-1178.
- 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.
- Kooij, 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 Attentional Disorders, 11*(4), 445-458.
- Koorevaar, A. M. L., Hegeman, J. M., Lamers, F., Dhondt, A. D. F., Van der Mast, R. C., Stek, M. L., & Comijs, H. C. (2017). Big Five personality characteristics are associated with depression subtypes and symptom dimensions of depression in older adults. *International Journal of Geriatric Psychiatry, 32*(12), e132-e140.

- Lahey, B., Pelham, W., Schaughency, E., Atkins, M., Murphy, A., Hynd, G., Russo, M., Hartdagen, S., & Lorys-Vernon, A. (1988). Dimension and types of attention deficit disorder. *Journal of the American Academy of Child & Adolescent Psychiatry, 27*(3), 330-335.
- Lange, K. W., Reichl, S., Lange, K. M., Tucha, L., & Tucha, O. (2010). The history of attention deficit hyperactivity disorder. *Attention Deficit and Hyperactivity Disorders, 2*(4), 241–255.
- 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.
- Lovibond, P.F., & Lovibond, S. H. (1995). The structure of negative emotional states: Comparison of the depression anxiety stress scales (DASS) with the Beck depression and anxiety inventories. *Behaviour Research and Therapy, 33*(3), 335-343.
- MacLaren, V. V., & Best, L. A. (2009). Female students' disordered eating and the Big Five personality facets. *Eating Behaviors, 10*(3), 192-195.
- Manor, I., Vurembrandt, N., Rozen, S., Gevah, D., Weizman, A., & Zalsman, G. (2012). Low self-awareness of ADHD in adults using a self-report screening questionnaire. *The Journal of the European Psychiatric Association, 27*(5), 314-320.
- Martel, M. M., Roberts, B., Gremillion, M., Von Eye, A., & Nigg, J. T. (2011). External validation of bifactor model of ADHD: Explaining heterogeneity in psychiatric

- comorbidity, cognitive control, and personality trait profiles within *DSM-IV* ADHD. *Journal of Abnormal Child Psychology*, 39(8), 1111-1123.
- McBurnett, K., Pfiffner, L., & Frick, P. (2001). Symptom properties as a function of ADHD type: An argument for continued study of sluggish cognitive tempo. *Journal of Abnormal Child Psychology*, 29(3), 207-213.
- McCrae, R. R., & Costa, P. T., Jr. (2008). The five-factor theory of personality. In O. P. John, R. W. Robins, & L. A. Pervin (Eds.), *Handbook of personality: Theory and research* (pp. 159–181). Guilford Press.
- McCrae, R. R., Kurtz, J. E., Yamagata, S., & Terracciano, A. (2011). Internal consistency, retest reliability, and their implications for personality scale validity. *Personality and Social Psychology Review*, 15(1), 28–50.
- McIntosh, D., Kutcher, S., Binder, C., Levitt, A., Fallu, A., & Rosenbluth, M. (2009). Adult ADHD and comorbid depression: A consensus-derived diagnostic algorithm for ADHD. *Neuropsychiatric Disease and Treatment*, 5, 137.
- 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. [https://doi.org/10.1016/0005-7967\(90\)90135-6](https://doi.org/10.1016/0005-7967(90)90135-6)
- Molina, S., & Borkovec, T. D. (1994). The Penn State Worry Questionnaire: Psychometric properties and associated characteristics. In G. Davey & F. Tallis (Eds.), *Worrying: Perspectives on theory, assessment and treatment* (pp. 265–283). Wiley.

- Montejano, L., Sasané, R., Hodgkins, P., Russo, L., & Huse, D. (2011). Adult ADHD: Prevalence of diagnosis in a U.S. population with employer health insurance. *Current Medical Research and Opinion*, 27(2), 5–11.
- Moore, E., Sunjic, S., Kaye, S., Archer, V., & Indig, D. (2016). Adult ADHD among NSW prisoners: Prevalence and psychiatric comorbidity. *Journal of Attention Disorders*, 20(11), 958–967.
- Newcorn, J. H., Halperin, J. M., Jensen, P. S., Abikoff, H. B., Arnold, L. E., Cantwell, D. P., Conners, K. C., Elliot, G. R., Epstein, J. N., Greenhill, L. L., Hechtman, L., Hinshaw, S. P., Hoza, B., Kraemer, H. C., Pelham, W. E., Severe, J. B., Swanson, J. M., Wells, K. C., & Vitiello, B. (2001). Symptom profiles in children with ADHD: Effects of comorbidity and gender. *Journal of the American Academy of Child and Adolescent Psychiatry*, 40(2), 137-146.
- Nezu, A. M., Nezu, C. M., & Lombardo, E. (2004). *Cognitive-behavioral case formulation to treatment design: A problem-solving approach*. Springer Publishing
- Nigg, J. T., & Hinshaw, S. P. (1998). Parent personality traits and psychopathology associated with antisocial behaviors in childhood. *Journal of Child Psychology & Psychiatry & Allied Disciplines*, 39(2), 145-159.
- Nigg, J. T., John, O. P., Blaskey, L. G., Huang-Pollock, C. L., Willcutt, E. G., Hinshaw, S. P., & 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)* [Doctoral dissertation, Philadelphia College of Osteopathic Medicine]. (2016). PCOM Psychology Dissertations.  
[https://digitalcommons.pcom.edu/psychology\\_dissertations/366](https://digitalcommons.pcom.edu/psychology_dissertations/366)
- Oguchi, M., & Takahashi, F. (2019). Behavioral inhibition/approach systems constitute risk/protective pathways from ADHD symptoms to depression and anxiety in undergraduate students. *Personality and Individual Differences, 144*, 31–35.  
<https://doi.org/10.1016/j.paid.2019.02.033>
- Parker, J. D. A., Majeski, S. A., & Collin, V. T. (2004). ADHD symptoms and personality: Relationships with the five-factor model. *Personality and Individual Difference, 36*(4), 977-987.
- Piñeiro-Dieguez, B., Balanzá-Martínez, V., García-García, P., Soler-López, B., & CAT Study Group. (2016). Psychiatric comorbidity at the time of diagnosis in adults with ADHD: The CAT study. *Journal of Attention Disorders, 20*(12), 1066-1075.
- Pliszka, S. R. (2019). ADHD and anxiety: Clinical implications. *Journal of Attention Disorders, 23*(3), 203–205. <https://doi.org/10.1177/1087054718817365>
- Polanczyk, G., De Lima, M. S., Horta, B. L., Biederman, J., & Rohde, L. A. (2007). The worldwide prevalence of ADHD: A systematic review and metaregression analysis. *American Journal of Psychiatry, 164*(6), 942-948.
- Prevatt, F., Dehili, V., Taylor, N., & Marshall, D. (2015). Anxiety in college students with ADHD: Relationship to cognitive functioning. *Journal of Attention Disorders, 19*(3), 222-230.
- Ramsay, J. R., & Rostain, A. L. (2015a). *Cognitive-behavioral therapy for adult ADHD:*

- An integrative psychosocial and medical approach (second edition)*. Routledge.
- Ramsay, J. R., & Rostain, A. L. (2015b). *The adult ADHD tool kit: Using CBT to facilitate coping inside and out*. Routledge.
- Ranseen, J. D., Campbell, D. A., & Baer, R. A. (1998). NEO-PI-R profiles of adults with attention deficit disorder. *Assessment, 5*(1), 19–24.
- Reimherr, F. W., Marchant, B. K., Gift, T. E., & Steans, T. A. (2017). ADHD and anxiety: Clinical significance and treatment implications. *Current Psychiatry Reports, 19*(12), 109.
- Rosenberg, M. (1965). *Society and the adolescent self-image*. Princeton University Press.
- Russell, D. W. (1996). UCLA Loneliness Scale (version 3): Reliability, validity, and factor structure. *Journal of Personality Assessment, 66*(1), 20-40.
- Sayal, K., Prasad, V., Daley, D., Ford, T., & Coghill, D. (2018). ADHD in children and young people: Prevalence, care pathways, and service provision. *The Lancet Psychiatry, 5*(2), 175-186.
- Schatz, D. B., & Rostain, A. L. (2006). ADHD with comorbid anxiety: A review of the current literature. *Journal of Attention Disorders, 10*(2), 141–149.
- Serine, A. D., Rosenfield, B., DiTomasso, R. A., Collins, J. M., Rostain, A. L., & Ramsay, J. R. (2020). The Relationship Between Cognitive Distortions and Adult Attention-Deficit/Hyperactivity Disorder After Accounting for Comorbidities and Personality Traits. *Cognitive Therapy and Research, 44*, 967-976.

- Servera, M., Sáez, B., Burns, G. L., & Becker, S. P. (2018). Clinical differentiation of sluggish cognitive tempo and attention-deficit/hyperactivity disorder in children. *Journal of Abnormal Psychology, 127*(8), 818.
- Shi, M., Liu, L., Wang, Z. Y., & Wang, L. (2015). The mediating role of resilience in the relationship between Big Five personality and anxiety among Chinese medical students: A cross-sectional study. *PloS One, 10*(3).
- Skirbekk, B., Hansen, B. H., Oerbeck, B., & Kristensen, H. (2011). The relationship between sluggish cognitive tempo, subtypes of attention-deficit/hyperactivity disorder, and anxiety disorders. *Journal of Abnormal Child Psychology, 39*(4), 513-525.
- Stanton, K., & Watson, D. (2016). Adult ADHD: Associations with personality and other psychopathology. *Journal of Psychopathology and Behavioral Assessment, 38*(2), 195-208.
- Strohmeier, C. W., 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.
- Tabachnick, B. G., & Fidell, L. S. (2007). *Using multivariate statistics* (5th ed.). Allyn & Bacon/Pearson Education.
- Van Dijk, F. E., Mostert, J., Glennon, J., Onnink, M., Dammers, J., Vasquez, A. A., Kan, C., Verkes, R. J., Hoogman, M., Franke, B., & Buitelaar, J. K. (2017). Five factor model personality traits relate to adult attention-deficit/hyperactivity disorder but not to their distinct neurocognitive profiles. *Psychiatry Research, 258*, 255-261.

- Widiger, T. A., & Costa, P. T., Jr. (2013). *Personality disorders and the five-factor model of personality*. American Psychological Association.
- Wilens, T. E., Biederman, J., Faraone, S. V., Martelon, M., Westerberg, D., & Spencer, T. J. (2009). Presenting ADHD symptoms, subtypes, and comorbid disorders in clinically referred adults with ADHD. *The Journal of Clinical Psychiatry, 70*(11), 1557–1562.
- Willcutt, E., Chhabildas, N., Kinnear, M., DeFries, J., Olson, R., Leopold, D., Keenan, J. M., & Pennington, B. (2013). The internal and external validity of sluggish cognitive tempo and its relation with *DSM-IV* ADHD. *Journal of Abnormal Child Psychology, 42*(1), 21–35.
- Willcutt, E., Nigg, J., Pennington, B., Solanto, M., Rohde, L., Tannock, R., Loo, S. K., Carlson, C. L., McBurnett, K., & Lahey, B. (2012). Validity of *DSM-IV* attention deficit/hyperactivity disorder symptom dimensions and subtypes. *Journal of Abnormal Psychology, 121*(4), 991–1010.
- Wood, W. L., Lewandowski, L. J., Lovett, B. J., & Antshel, K. M. (2017). Executive dysfunction and functional impairment associated with sluggish cognitive tempo in emerging adulthood. *Journal of Attention Disorders, 21*(8), 691-700.
- Yang, H. N., Tai, Y. M., Yang, L. K., & Gau, S. S. F. (2013). Prediction of childhood ADHD symptoms to quality of life in young adults: Adult ADHD and anxiety/depression as mediators. *Research in Developmental Disabilities, 34*(10), 3168-3181.
- Yoshimasu, K., Barbares, W. J., Colligan, R. C., Voigt, R. G., Killian, J. M., Weaver, A. L., & Katusic, S. K. (2018). Adults with persistent ADHD: Gender and

psychiatric comorbidities—A population-based longitudinal study. *Journal of Attention Disorders*, 22(6), 535-546.