

2015

# The Relationship Between ADHD and Trait Facets of the Five-Factor Model

Todd William Bennett

*Philadelphia College of Osteopathic Medicine, toddbe@pcom.edu*

Follow this and additional works at: [http://digitalcommons.pcom.edu/psychology\\_dissertations](http://digitalcommons.pcom.edu/psychology_dissertations)

 Part of the [Experimental Analysis of Behavior Commons](#), [Mental Disorders Commons](#), [Quantitative Psychology Commons](#), and the [Social Psychology and Interaction Commons](#)

---

## Recommended Citation

Bennett, Todd William, "The Relationship Between ADHD and Trait Facets of the Five-Factor Model" (2015). *PCOM Psychology Dissertations*. Paper 333.

This Dissertation is brought to you for free and open access by the Student Dissertations, Theses and Papers at DigitalCommons@PCOM. It has been accepted for inclusion in PCOM Psychology Dissertations by an authorized administrator of DigitalCommons@PCOM. For more information, please contact [library@pcom.edu](mailto:library@pcom.edu).

Philadelphia College of Osteopathic Medicine

Department of Psychology

THE RELATIONSHIP BETWEEN ADHD AND TRAIT FACETS OF THE FIVE-  
FACTOR MODEL

By Todd William Bennett

Submitted in Partial Fulfillment of the Requirements for the Degree of

Doctor of Psychology

May 2015

**PHILADELPHIA COLLEGE OF OSTEOPATHIC MEDICINE  
DEPARTMENT OF PSYCHOLOGY**

**Dissertation Approval**

This is to certify that the thesis presented to us by Todd Bennett  
on the 27 day of April, 2015, 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:**

**Brad Rosenfield, PsyD, Chairperson**

**Robert A DiTomasso, PhD, ABPP**

**J Russel Ramsay, PhD**

**Robert A DiTomasso, PhD, ABPP, Chair, Department of Psychology**

## Acknowledgements

I would like to thank Dr. Rosenfield for his commitment, patience, and knowledge to this project. I would also like to thank other members of my committee, Dr. Russell Ramsay and Dr. DiTomasso for their time and feedback.

I would also like to thank Lofton Harris for his feedback and time finding the data.

I would like to thank my parents for their emphasis on education and for encouraging me to go into this field.

But my greatest thanks go to my wife and son, for they remind me of my most important roles in life, as a husband and a father. They instill in me the things that matter most, provide me with the strength, support, and confidence to go further....

## Abstract

Facets of the Five-Factor Model (FFM) were examined in order to understand its interaction with Attention Deficit Hyperactivity Disorder (ADHD)-symptoms. By utilizing archival data, in a correlational design, adults between the ages of 18-66 were tested for the presence of ADHD, which was then compared with data gathered from the NEO-PI-R. Comorbid psychiatric conditions often associated with ADHD were accounted for in the design. Results partially supported the hypotheses, specifically, that altruism was inversely related to Impulsivity, as predicted. However, other findings largely did not support a relationship between other specific NEO-PI-R facets and ADHD. Other significant relationships that were not predicted were also established and discussed. The impact of these findings includes the utility of facets in predicting ADHD symptoms and the potential influence of compensation in an adult ADHD population. Limitations to this study were also indicated.

*Keywords:* ADHD, personality, Five-Factor Model, NEO-PI-R, Altruism, Impulsivity

## Table of Contents

List of Figures.....	vi
List of Tables.....	vii
Introduction.....	1
History.....	4
Adult Prevalence .....	9
Comorbidity and Psychiatric Illness .....	10
Health Related Behaviors .....	19
Additional Issues.....	20
ADHD and Personality.....	21
ADHD and the Five-Factor Model.....	28
Why Examine Facets.....	34
Hypotheses .....	43
Method .....	44
Design .....	44
Participants.....	44
Measures.....	45
Procedure.....	46
Results .....	47
Data Cleaning.....	47
Statistical Analysis.....	52
Discussion.....	60
Limitations.....	63

Future Research.....64

References.....65

**List of Figures**

Figure 1. The Distribution of Scores on the CAARS Impulsivity Subscale.....	49
Figure 2. The Distribution of Scores on the NEO-PI-R Self-Discipline Facet.....	49

## List of Tables

Table 1 Facet selection and rationale .....	40
Table 2. Facets and Rationale for Exclusion.....	41
Table 3. Bivariate Correlations for Hypothesis 1: Inattention Predicted from Dutifulness, Self-Discipline, Achievement/Striving, and Order, Controlling for Neuroticism.....	53
Table 4. Details of the Regression Equation of Inattention on Neuroticism. ....	54
Table 5. Bivariate Correlations for Hypothesis 2: Hyperactivity Predicted from Activity and Excitement Seeking, Controlling Statistically for Neuroticism.....	55
Table 6. Details of the Regression Equation of Hyperactivity on Neuroticism. ....	56
Table 7. Bivariate Correlations for Hypothesis 3: Impulsivity Predicted from Excitement Seeking, Altruism, and Compliance, Controlling Statistically for Neuroticism. ....	57
Table 8. Results of Hierarchical Regression Equation to Predict Impulsivity From Excitement Seeking, Controlling Statistically for Neuroticism. ....	58
Table 9. Summary of the Model to Predict Impulsivity From Excitement Seeking, Controlling Statistically for Neuroticism. ....	59

## **Chapter 1: Introduction**

Attention-deficit/hyperactivity disorder (ADHD) is typically categorized as a disorder characterized as a persistent pattern of inattention and/or hyperactivity-impulsivity. This disorder is composed of three sub-types: Predominately, inattentive/hyperactive/impulsive, and combined (American Psychiatric Association [APA], 2013). Traditionally, the focus has been on the impact of this disorder on children; however, over the past two decades there is increasing evidence that this disorder continues to affect adults because symptoms of ADHD can commonly persist from childhood into adulthood (Kessler et al., 2006).

Approximately 5.3% of children worldwide meet diagnostic criteria for ADHD (Polanczyk, Lima, Horta, Biederman, & Rohde 2007), and approximately 4.4% of the population continues to meet criteria into adulthood (Kessler et al., 2006). Multiple investigations found higher rates of ADHD in adults diagnosed as children, compared with those who were not diagnosed with this disorder during childhood (Fischer, Barkley, Smallish, & Flercher, 2005; Klein, Mannuzza, Olazagasti, Roizen, Hutchison, Lashua, & Castellanos, 2012), indicating that this diagnosis does not limit itself to children.

The pervasiveness of this disorder goes well beyond inattentiveness, impulsivity, and hyperactivity. It is also associated with a host of other psychiatric disorders and psychosocial dysfunction. For example, increased rates of depression, dysthymia, anxiety, substance abuse and dependence were found in adult ADHD populations (Barkley & Murphy, 2007; Michielsen, Comijs, Semeijn, Beekman, Deeg, & Kooij, 2012; Garcia et al., 2012). In addition, compared with those not diagnosed with ADHD, significantly poorer educational, occupational, economic, and social outcomes were

reported in adults who were originally diagnosed as children (Mannuzza, Klein, Bessler, Malloy, Lapadula, 1993). ADHD permeates multiple areas of functioning, but the relationship between ADHD and personality is also noteworthy.

ADHD is reported to be strongly associated with cluster B personality disorders (dramatic, emotional, or erratic) (APA, 2000; May & Bos, 2000; Reimherr, Marchant, Olsen, Wender, & Robison, 2013; Gudjonsson, Sigurdsson, Young, Newton, & Peersen, 2009), obsessive compulsive personality disorder (Modestin, Matutat, & Würmle, 2001) and a variety of personality traits (Nigg, et al., 2002) such as being impatient, self-defeating, and antisocial (Robin, Tzelepis, & Bedway, 2008).

Conceptually, distinguishing ADHD from personality may be difficult. ADHD is viewed as a psychiatric disorder of childhood, characterized by inattention and/or hyperactivity and/or impulsivity. However, in adulthood, similar symptoms may be viewed as a persistent, maladaptive personality style that includes difficulty following through with life demands, disorganization, impulsivity, and a chronic pursuit of stimulation (Miller, Miller, Newcorn, & Halperin, 2008).

Prior research has examined the relationship between personality traits and ADHD. Many of these studies used The Big Five or the Five Factor Model (FFM), which is used to represent the five major dimensions of adult personality (McCrae & Costa, 1999). It is the most widely accepted taxonomy of personality traits (Nigg, et al. 2002). This model indicates that personality can be summarized most accurately by looking at five relatively broad personality factors: neuroticism, extraversion, openness to new experiences, agreeableness, and conscientiousness. Composing each factor are six

facets that provide meaningful personality trait differences within broader domains (Rector, Bagby, Huta, & Ayearst, 2012).

Some studies have identified distinct personality profiles related to ADHD. For instance, Ranssen, Campbell, and Baer (1998) found higher scores in the neuroticism domain and significantly lower scores in the conscientiousness domain than those without ADHD. Similarly, Nigg et al., (2002) also found comparatively low scores in conscientiousness in adults with ADHD. These findings support possible connections between personality factors and ADHD symptoms.

Furthermore, according to the Five Factor Model, each of the five personality factors is composed of six facets; however, there are no known studies that examine how specific symptoms of ADHD may relate to facets of the five-factor model. Linking personality facets with ADHD may be helpful in deepening the understanding of this disorder in adults.

Consequently, the present study will examine the relationship between facets of the FFM and ADHD symptoms. When broad factors of the FFM are broken down into more specific facets, unique aspects of personality and their relationship to ADHD can be identified. More specifically, this study aims to understand how symptoms of ADHD, being inattentive, hyperactive, and impulsive (APA, 2000) relate to specific personality factors and facets. The results of this study may further an understanding of how adult ADHD relates to aspects of personality. Such knowledge may also illuminate heretofore unrecognized symptom clusters in a way that can guide treatment planning and intervention, specifically to target symptoms that cause distress and impairment in both ADHD and personality disorders.

According to the Diagnostic and Statistical Manual for Mental Health Disorders, 5<sup>th</sup> Edition (DSM-5, APA, 2013), ADHD is categorized as a persistent pattern of inattention and/or hyperactivity-impulsivity that interferes with functioning or development (APA, 2013). Although the construct of ADHD is debatable in children and adults, current conceptualization describes three types: predominately inattentive, predominately hyperactive-impulsive, and combined presentation.

ADHD is a well-researched disorder with a rich history. There are over 6000 published studies that have been conducted on the disorder. Many of these studies have been conducted on children, but there is increasing literature on adults with ADHD over the past two decades (Barkley, 2006; Kessler et al., 2006).

### **History**

Although the diagnosis of ADHD as defined in the DSM-IV and DSM-IV-TR (APA, 1994; 2000) is relatively new, excessive hyperactivity, inattention and impulsivity in children have been described in literature since the 18<sup>th</sup> century. Many of the historical descriptions are consistent with diagnostic criteria for ADHD.

According to Lang, Reichl, and Lange (2010) the first known published example came from Sir Alexander Crichton in 1798, a Scottish physician who published a work, *On Attention and its Diseases*. Within this work, several indicators of the modern description of ADHD were given. He indicated that there was incapacity to attend to any one object consistently (inattention). He went on to describe restlessness and impulsiveness in his patients that became apparent very early in life.

In 1844 the German physician Heinrich Hoffman created some illustrated children's stories including Fidgety Phil (Zappelphilipp). In the story, Hoffman describes

a family conflict at the dinner table caused by the fidgety behavior of the son, Phil, who is observed leaning back on his chair until falling backwards, taking tablecloth and food with him. In the beginning of the sketch, Phil's father is noted as anticipating some misbehavior at dinner, suggesting that this is not a single event; it is rather a long lasting pattern. This is believed to be an early interpretation of ADHD (Lang, Reichl, & Lange, 2010).

The work of Sir George Frederic Still is considered to be the scientific starting point in the recognition of ADHD. Still was a British pediatrician who wrote several medical textbooks. His most widely known finding was a chronic joint disease, which remains known today as Still's disease. Relevant to ADHD, Still also described a "lack of moral control may be shown in many ways" (Still, 1902, p. 1009). Such lack of control could be manifested in an abnormal incapacity to sustain attention, which of course is a hallmark symptom. Additional symptoms indicated passionateness, lawlessness, dishonesty, destructiveness, shamelessness, and immodesty. According to Still, immediate self-gratification without regard to others was critical to what he termed "moral defect without general impairment of intellect" (Still, 1902, 1079) Although this conceptualization and symptom profile does not accurately reflect more contemporary notions of ADHD, these symptoms do suggest inattention, hyperactivity, impulsivity and other comorbid conditions often associated with ADHD, in addition to some of the personality characteristics that often co-occur.

Dr. Still also indicated, in many of his cases, "a quite abnormal incapacity for sustained attention. Both parents and school teachers have specially noted this feature in some of my cases as something unusual" (Still, 1902, p. 1166). This highlights current

features of ADHD as well. Difficulty sustaining attention, as previously discussed, is a major factor within the diagnostic criteria. Still also suggested that symptoms exist in multiple environments; that is, a pervasiveness, which remains to this day a requirement for a diagnosis.

Physicians Franz Kramer and Hans Pollnow, in 1932, continued to refine what would later be termed ADHD, with their description of “Hyperkinetic disease,” in which there is urgent and remarkable motor activity with a lack of purpose (p. 7). They described aimless activity that may be due to distractibility by new stimuli. They, (subjects) are unable to concentrate on difficult tasks but were able to sustain attention on areas of their interest for hours (Kramer & Pollnow, 1932).

It was not until 1968 that the definition of hyperactivity was incorporated into the official diagnostic nomenclature, labeled then as Hyperkinetic Reaction of Childhood. It was described by a disorder that is characterized by overactivity, restlessness, distractibility, and short attention span (APA, 1968).

That these symptoms could be accounted for by minimal brain damage was an ongoing theory proposed in the 1930s and is still a diagnostic consideration today. Ross and Ross (1976) cited research in the 1930s and 1940s, which supported a causal relationship between brain damage and hyperactive behavior. Rosenfield and Bradley (1948) gave an account of typical behavior of children who experienced asphyxiant illness in infancy. They suggested the following:

1. Unpredictable variability in mood
2. Hypermotility
3. Impulsiveness
4. Short attention span
5. Fluctuant ability to recall material previously learned
6. Conspicuous difficulty with arithmetic in school (p. 74)

The concept of “a continuum of cerebral damage ranging from severe dysfunction, such as cerebral damage ranging from severe abnormalities, such as cerebral palsy and mental deficiency, to minimal damage” was discussed by Knobloch and Pasamanick (1959, p. 1384). This suggests that even when brain damage cannot be detected, it would be assumed to exist. Thus, hyperactivity was viewed as a symptom of brain damage (Ross & Ross 1976).

The concept that every child who presented with such abnormal behavior had sustained minimal brain damage was increasingly challenged in the 1960's. Laufer, Denhoff, and Solomon (1957) regarded as a problem, the fact that there were children who presented with hyperkinetic impulse disorder who did not have any history of trauma or infection that could account for "brain damage." Their studies suggested a functional disturbance rather than damage to the brain. In 1963, the Oxford International Study Group of Child Neurology indicated that brain damage should not be implied from problematic behavior alone. They advocated a shift in terminology by replacing the term *minimal brain damage* by *minimal brain dysfunction* (Bax & MacKeith, 1963).

Douglas (1972) is credited with arguing that hyperactivity was no longer essential for an attention related issue. He argued that deficits in attention were more significant features of attention than of hyperactivity. His findings were influential at the time. He stimulated further research, which helped to reconceptualize the disorder. In the 1970s and 80s, the importance of attentional problems was recognized in the DSM-III (APA, 1980) by giving the disorder the name Attention Deficit Disorder (ADD) with or without hyperactivity. This was also the first time in which a specific number of symptoms was stipulated, a guideline for age of onset, and exclusion for other symptoms

In the DSM-IV (APA, 1994), the concept of ADD was reorganized. It was found that inattentive children without hyperactivity were more daydreamy, more hypoactive, were disabled in academic achievement, and were less aggressive and less rejected by peers than their hyperactive counterparts. Perhaps most importantly for the purposes of this investigation, the DSM-IV first recognized that this was not a disorder exclusive to children. Three subtypes were outlined as the basis of symptomatology: predominately inattentive, predominately hyperactive-impulsive, and a combined type. In the DSM-IV-TR (American Psychiatric Association, 2000), the definition of ADHD had not changed from the previous version. Critics continued to call for validation of ADHD in adults (e.g., Fisher & Barkley, 2007).

Finally and most recently, the DSM-5 explicitly recognizes ADHD symptoms in adults by allowing for 5 symptoms (if age 17 and older), instead of the 6 needed for children in order to reach the diagnostic threshold for each type. In addition, although the criteria have not changed, the descriptions for the criteria better characterize how certain symptoms may apply to adults (e.g. in addition to avoiding school work the DSM-5 describes the avoidance of completing forms or lengthy paperwork). The DSM-5 appears to validate further the need to examine this disorder beyond childhood and into areas in which this disorder contributes to dysfunction in the lives of adults.

### **Adult Prevalence**

Prevalence in a population can be determined in a variety of ways. One means of determining the presence of ADHD is using longitudinal studies. Adult outcome studies of large numbers of clinic-referred children are few in number (Barkley, Murphy, & Fisher, 2008). There are few studies that have at least 50 participants and have retained at least 50% or more of the original sample. These studies included the Barkley, Fisher, Smallish, and Fletcher (2004), (the Milwaukee study), Rasmussen and Gilberg (2001); (the Swedish study), and Mannuzza et al. study in 1993 (the Montreal study). Results from these studies were mixed, due to variation of the inclusion criteria. Explicit criteria for level of dysfunction, pervasiveness, and age of onset were not applied. Many of the studies began even before systematic DSM criteria existed.

The Milwaukee study conducted by Barkley et al., (2002) was the most recent study that examined clinic-referred participants over the course of time. This study examined 147 individuals over a 4-year period for symptoms of hyperactivity, using both self-report measures and parent report. What was perhaps most notable from this study was the disparity between reporters. Only 3 to 5% of hyperactive participants qualified for a DSM-III diagnosis of hyperactivity in young adulthood, according to self-report. However, according to parental reports, 42% met criteria. This obviously suggests that the source of the information is critical when assessing prevalence. They examined the veracity of parent and self-report symptoms by examining other sources (e.g. employers, academic transcripts, and work records.). Across eight different measures that assessed educational, occupational, and social functioning, those with ADHD tended to underreport their symptoms.

In addition, Kessler et al. (2006), administered the National Comorbidity Survey Replication (NCS-R) to 9,282 adults in order to, in part, determine prevalence rates of ADHD in adults. Blinded clinical follow-up was carried out on 154 respondents, oversampling those with positive screen results. Multiple imputations were used to estimate prevalence. This study found the ADHD rate among adults to be 4.4% of the US population. This study, in addition to several others, also found significant relationships between ADHD and other disorders, which warrants further discussion.

Other more recent studies have used other methods in order to ascertain a prevalence of adult ADHD. For example, Montejano et al. (2011), utilized health insurance claims data in order to determine ADHD rates among insured adults. Diagnosis, determined by a psychiatrist, reported on the health insurance claim using an ICD-9 diagnostic code. Claims data were again reviewed at the conclusion of the 5-year study period. Between 2002 and 2007, 342,284 patients had more than one claim that indicated an ICD-9 code of some type of ADHD. Of these patients, 79,368 continued to meet criteria until the conclusion of the study period. One group of patients showed a remarkable increase in prevalence rates. During the course of this period diagnosis increased from 3.54 per 1000 individuals to 12.34 per 1000 in young adults 18-24 years of age.

### **Comorbidity and Psychiatric Illness**

Understanding comorbidity is critical to comprehend the overall clinical picture of individuals with ADHD. Approximately 70-80% of ADHD adults present with at least one other psychiatric condition (Garcia et al., 2012; Fisher et al., 2007). The type of comorbid psychiatric illness that an individual has is strongly influenced by ADHD type.

In general, those with the inattentive type are more apt to experience internalizing disorders, which include anxiety and depression. Those with hyperactive/impulsive type are more likely to be diagnosed with externalizing conditions, such as conduct disorder, oppositional defiant disorder and substance use disorders.

The following is a discussion of comorbid conditions in adult ADHD (Friedrichs, Larsson, & Larsson, 2012). Internalizing and externalizing psychiatric issues are more narrowly described according to their diagnosis (e.g. depression as an internalizing disorder).

#### Internalizing Disorders

ADHD and internalizing disorders are highly comorbid. The following paragraphs describe depression, anxiety, and Bipolar Disorder, and their relationship to ADHD.

#### *Depression*

Major Depressive Disorder (MDD) is characterized by depressed mood and/or loss of pleasure or interest in previously enjoyed activities most of the day, nearly every day during the same two-week period (APA, 2000; 2013). MDD is the most commonly comorbid condition associated with ADHD as a whole and is associated with poorer outcome than either disorder alone (Spencer, Wilens, Biederman, Wozniak, & Harding-Crawford, 2000).

This point is highlighted in the National Comorbidity Survey Replication, which used a lay administered diagnostic interview to assess for a variety of DSM-IV disorders. The interview was divided into two parts, consisting of self-report and a diagnostic

interview (N=3199) on adults. Depressive symptoms (MDD or Dysthymia; APA 2000) were reported in 31.4% of adults with ADHD (Kessler et al., 2006).

In a sample of 320 adult outpatient ADHD participants, Fisher et al. (2007) found that 25.31% presented with Major Depressive Disorder (MDD). There were no notable differences between subtypes. Interestingly, participants with ADHD, who were diagnosed with MDD, also had higher frequencies of generalized anxiety and social phobia (APA, 2000), with a lower frequency of substance abuse, compared with ADHD only groups. Demand for psychotherapy and medication among those with MDD and ADHD was higher, compared with those who were free of MDD. Also of note, was the fact that participants with or without MDD did not differ regarding ADHD severity, which suggests that between group differences are due to MDD itself, and not ADHD severity.

Secnik, Swensen, and Lage (2005) further demonstrated the comorbid relationship between ADHD and depression. By utilizing a large claim database that captures inpatient, outpatient, and prescription drug services, they were able to identify, in part, comorbidities associated with ADHD. They compared 2254 adult individuals with ADHD with 2252 individuals without ADHD. They found, that 35.9% of individuals diagnosed with ADHD were also prescribed an antidepressant, suggesting a strong relationship between ADHD and depression.

### *Anxiety*

Anxiety is also a highly comorbid condition of adult ADHD, with up to 47.1% meeting criteria for some type of anxiety disorder, the three most common being social phobia, specific phobia, and PTSD (APA, 2000; Kessler et al., 2006). This statistic

includes those who may also be diagnosed with comorbid depression; these are more likely to exhibit anxiety symptoms (Fisher et. al., 2007). More recently, Ameringen and Levebthal (2010) examined this issue from the standpoint of comorbid ADHD with those who were diagnosed with an anxiety disorder alone. One hundred twenty- nine consecutive admissions to an anxiety disorder clinic were assessed. They found that of individuals who had a primary complaint of anxiety, 27.9% also met criteria for ADHD, suggesting that even with ADHD as a secondary diagnosis, the relationship between anxiety disorders and ADHD is significant.

Moreover, a recent study by Friedrichs et al. (2012) examined 17,899 Swedish twins in order to investigate coexisting psychiatric problems in adults with ADHD. They found, in part, that ADHD was strongly associated with generalized anxiety disorder. They found significant differences among subtypes. Specifically, the hyperactive-impulsive type was found to be at lower risk for anxiety and depression than the inattentive type. This suggests that internalizing disorders are more closely linked to the inattentive type of ADHD.

### *Bipolar Disorder*

In the previously mentioned Friedrichs et al. (2012) study, the most notable feature of their study was the high risk of ADHD for bipolar disorder. However, it should be noted that several symptoms for ADHD and Bipolar overlap, which could complicate diagnosis. For example, being more talkative, distractibility, increase activity, flight of ideas, and excessive involvement in pleasurable activities without regard for consequences are symptoms of mania that overlap with those found in ADHD. Although more research is needed, compared with Bipolar alone, those with Bipolar and

comorbid ADHD have lower functional scores, lower education, fewer partnerships, more suicide attempts, and more legal problems than those with either disorder, alone (Nierenber et al., 2005; Sentissi et al., 2008).

#### Externalizing Disorders

ADHD and externalizing, often coined as behavioral disorders, are highly comorbid. The relationship between ADHD and these disorders is described in the following section.

#### *Conduct Disorder/Oppositional Defiant Disorder*

Oppositional Defiant Disorder (ODD) is a disorder typically categorized in childhood; it includes a negativistic or hostile pattern of behavior, which may include frequent arguments, blaming others for their mistakes, and actively refusing others' requests (APA, 2013); Conduct Disorder (CD), however, is viewed as more severe and is characterized mainly as a persistent pattern of violating the rights of others and may include aggression towards people or animals, destruction of property, theft, and serious violation of rules (APA, 2013).

These disorders are typically diagnosed in childhood and there is some question about whether or not ODD or Conduct Disorder is a meaningful or appropriate diagnosis in adults. Harpold et al., (2007), set out to characterize ODD and the clinical correlates in adults by using psychiatrically referred ADHD adults with and those without a childhood diagnosis of ODD and/or CD. Two hundred and seven participants were stratified into 3 groups, based upon comorbidity with ODD and/or CD. They found that 57% (n = 118) did not have a lifetime diagnosis of ODD or CD; 24% (n = 49) had ODD with no history of CD, and 19% (n = 40) had a history of both ODD and CD.

Adult participants with a lifetime history of ODD symptoms had a history of lower levels of academic achievement in arithmetic and had higher rates of repeated school grades, regardless of a CD diagnosis. In addition, higher rates of comorbid bipolar disorder, anxiety, and substance use disorders consistent with patterns of children with ODD were observed. ODD and CD, but not ODD alone, were associated with lower cognitive ability. But ADHD and ODD were more likely than ADHD alone to have repeated a grade. Functioning in the group was also more highly impaired, compared with ADHD alone. This study suggests that ODD is highly comorbid with ADHD in adults and that those with either ODD or CD are more impaired than ADHD alone. This study suggests that ODD is highly comorbid with a diagnosis of ADHD in adults, and that it is risk factor for greater distress and impairment. However, more research is needed in understanding the course of ODD alone in adults.

It is evident, based on these studies that ODD is a highly comorbid disorder with ADHD and that those with both disorders have greater challenges in terms of dysfunction. The addition of ODD/CD occurs in approximately 43% of ADHD cases based on this data; with that comes the possibility of academic and other struggles that may indirectly exacerbate other comorbid conditions such as depression or anxiety.

Gadow et al., (2007) also investigated the validity of ODD as a behavioral syndrome in adults. They utilized outpatient clinic referrals (N=490) and community controls (N=900), using a DSM-IV rating scale along with a brief psychosocial questionnaire. Participants were separated into four groups; ODD only, ADHD only, ODD and ADHD, and no ADHD diagnosis. Findings indicated that adults, who reported ODD symptoms, either alone or in combination with ADHD, were clearly more severe in

terms of self-reported symptoms of other psychiatric disorders than adults who did not meet symptom criteria for ODD. Participants with ODD reported, overall, more severe ratings of aggression and antisocial behavior than ADHD only. ADHD only also presented with more severe anxiety and depression than ODD only. However, overall, those with ADHD in addition to ODD reported as being most severe in terms of behavioral and emotional symptoms. Further studies need to be completed in order to determine if ODD is a distinct disorder in adults. However, the notion of how ODD and other externalizing disorders are currently categorized should also be a consideration in this review. Specifically, adults with ODD may be more likely to be diagnosed with a personality disorder (Gadow et al., 2007), which is discussed in greater detail in a later section.

Witkiewitz and others' (2013) aim was to explore multiple models of shared variation among externalizing disorders, which include ADHD, ODD, and CD. This would provide a less categorical and a more spectrum-based view on externalizing disorders. Similar to the work of Krueger and others (2005) and Markon and Krueger (2005), covariations were assessed between conduct problems, substance use, and adult antisocial behavior, as well as a diagnosis of ADHD and ODD. Data were gathered from Fast Track, which is a multi-site, longitudinal program that investigates the development of childhood conduct problems. Teachers screened 9594 kindergarteners across three cohorts from 55 schools, initially for classroom conduct problems. Those children in the top 40% of problematic behavior were solicited for the next stage of screening for home behavior problems, by parents (N=3,274). Children were selected for inclusion into the high-risk sample based on this score. The outcome was that 891 would encompass the

high-risk sample. Follow-up studies were conducted annually through 2 years post high school (approximately age 20).

This study provided additional support for a dimensional conceptualization of externalizing disorders. Specifically, findings showed a two-factor model of externalizing psychopathology characterized by hyperactivity/impulsivity, oppositionality, and conduct disorder/antisocial behavior that is correlated with antisocial personality and substance use disorders. Antisocial personality characteristics could be included as a symptom indicator both of hyperactive/oppositional behavior and of substance abuse. However, covariation between ADHD, ODD, and CD were distinguishable from covariation with substance abuse, whether or not antisocial behavior was included. This is not the currently accepted view (APA, 2013); however, this budding research should be a consideration when conceptualizing any externalizing disorder.

Reumherr and others' (2013) aim, in part, was to examine the prevalence of ODD symptoms in ADHD adults. Sixty-five participants who met criteria for ADHD (according to the Wender Utah and Conners Adult ADHD Scale) were assessed. In addition, ODD was assessed by self-report and investigator scales of the SR-WRAADDS. Of the ADHD participants who were evaluated for ODD, 42% met criteria for adult ODD. ODD was associated with high level of symptoms on rating of childhood ADHD, especially in the hyperactive/impulsive items. In adulthood, they were more likely to be rated as impulsive rather than inattentive.

*Conduct Disorder*

Although research on adult CD in individuals with ADHD is extremely limited, data examining adult ADHD and an earlier childhood diagnosis of CD are in abundance. Dowson (2008) investigated, in part, if CD in childhood is also associated with a subsequent characteristic profile of adult ADHD. They found that a former CD diagnosis generated a profile of ADHD that had increased impulsivity, which included a rapid response to stimuli, reduced ability to delay gratification, maladaptive affect regulation, acting without thinking, poor planning, novelty seeking, and a maladaptive under-concern about the consequences of behavior. The CD group also showed associations between all three personality disorder clusters, especially cluster B. The associations between CD with ADHD related impulsivity might reflect an overlap in features. This clinical overlap may also represent a shared etiology.

Despite there being, perhaps, a shared cause of symptomology with CD, the presence of ADHD alone does not appear to increase the chances of delinquency. In a study conducted by Mordre, Groholt, Kjelsberg, Sandstad, and Myhre (2011), 541 child psychiatric in-patients in Norway were followed for periods of time between 19 to 41 years after hospitalization by record linkage with the National Register of Criminality. A diagnosis of conduct disorder in childhood was highly predictive of adult delinquency; however, there was no direct association between ADHD and future delinquent behavior. This suggests that only when a comorbid diagnosis of CD is made that the likelihood of delinquency increases.

It is clear, based on the research, that ADHD has a relationship with a variety of disorders that can exacerbate impairment and complicate treatment. Given this relationship, it is important to consider the potential implications of these relationships in

the current study by measuring only ADHD and not its associated problems. It is also important to note that other behaviors and disorders may not be direct symptoms of ADHD but are often associated with the disorder.

### **Health Related Behaviors**

Individuals with ADHD tend to experience more automobile accident crashes, experience more bodily injury and more at-fault determinations, than do non-ADHD counterparts, with those with ADHD and ODD and/or CD at greatest risk. Interestingly this is not related to lack of knowledge of driving procedures but is rather a result of symptomology (Barkley et al., 1996). Other evidence of this is shown in a study conducted by Weafer, Camarillo, Fillmore, Milich, and Marczinski (2008), in which they conducted two experiments that evaluated driving performance in adults with ADHD in terms of the type of driving decrements typically associated with alcohol consumption. Experiment one compared the simulated driving performance of 15 adults with ADHD with 23 adult control participants, who performed the task both sober and intoxicated. Results showed that sober adults with ADHD exhibited decrements in driving performance, compared to sober controls, and that the profile of impairment for the sober ADHD group did, in fact, resemble that of intoxicated drivers at the blood alcohol level for legally impaired driving in the United States.

In the second experiment, eight adults with ADHD and six controls performed the driving simulation task under three different doses of alcohol. Results showed that although both groups were impaired, individuals with ADHD exhibited generally poorer driving performance than did the controls across all conditions (deviation of lane position, steer rate, driving speed variation, self-perceived ratings, perceived intoxication

ratings, and perceived ability to drive). They also found that those with ADHD tend to overestimate their driving ability and underestimate the degree of intoxication, when compared with non-ADHD controls. Not surprisingly, the ADHD groups in both experiments also exhibited greater levels of impulsivity.

### **Additional Issues**

Several studies have reported the comorbidity of tobacco use and ADHD. Individuals with ADHD are more likely to become regular smokers (Pomerleau, Lima, Horta, Biederman, & Rohde, 1995), and they tend to start smoking earlier and smoke more heavily (Kollins, McClernon, & Fuemmeler, 2005; Lambert & Hartsough, 2000).

In addition, a secondary data analysis of a large national epidemiological study of adolescents indicated that cigarette smoking is associated with self-reported symptoms of ADHD, because the severity of smoking is also directly proportional to the severity of ADHD symptoms endorsed. Nicotine has been shown to improve attention in laboratory studies, including smokers and non-smokers with and without ADHD, leading some authors to suggest that nicotine dependence may develop as an attempt to self-medicate in order to compensate for symptoms of ADHD (Lambert & Hartsough, 2000).

Multiple studies demonstrate a significant relationship between ADHD and substance abuse and dependence. This relationship encompasses a variety of substances, which include alcohol (Biederman, Wilens, & Mick, 1998; Molina & Pelham, 2003) and illicit substances (Molina & Pelham, 2003; Carroll & Rounsaville, 1993). Wilens et al. (2011) examined this relationship of 268 individuals with ADHD, compared with 229 individuals without ADHD over a 10-year period. Participants were assessed utilizing a structured clinical interview by Board-certified psychiatrists. Findings suggested that

participants with ADHD were 1.47 times more likely to develop a substance use disorder, compared with controls. Although those with CD were at even higher risk of developing a substance use disorder, even when controlling for those with CD, ADHD continued to be a significant risk factor. Moreover, ADHD was associated with earlier onset and a higher risk of substance abuse disorders.

More recently, Ameringer and Leventhal (2013) examined participants in the National Epidemiologic Survey on Alcohol and Related Conditions (NESARC) which assessed the prevalence of substance use, psychiatric disorders, and other characteristics of the U.S. adult population. At wave 1 (2001-2002), 43,093 individuals completed an in-person interview, and 34,653 of these individuals completed Wave 2 (2004-2005) survey. They found that both inattentive and hyperactive types of ADHD were associated with increased risk of substance dependence. In fact the relationship was linear; each additional ADHD symptom was generally associated with a proportional increase in odds of substance dependence. Looking more closely, however, hyperactivity showed a more robust and consistent relationship with various illicit substance dependence, compared with the inattentive type. The authors went on to state that this might be due to hyperactive developmental processes. They suggest that hyperactive symptoms may contribute to a more impulsive personality trait in which individuals are less likely to consider the negative medical and legal consequences of substance use. It is these and other personality traits that warrant further investigation.

### **ADHD and Personality**

Personality disorders represent a chronic and maladaptive behavioral pattern that is associated with significant stress and disability (APA, 2000; 2013). The overlap in

ADHD and personality disorders is notable. Given the aforementioned similarity in some symptom criteria, prevalence rates of ADHD typically extending into adult years and the comorbid dysfunctions associated with them, and the maladaptive pattern that appears to endure, it is not surprising to see ADHD co-occur with various personality disorders. The range and findings are, however mixed; from 7 to 44% of adults with ADHD also met diagnostic criteria for a personality disorder (Biedermann et al., 1993; Shekim et al., 1990; Torgersen, Gjervab & Rasmussen, 2006; Miller, Nigg, and Faraone, 2007).

In a study of 363 adults, Miller, Nigg, and Faraone (2007), examined Axis I and II (APA, 2000) comorbidity in adults with ADHD. Due to overlap of personality disorder symptoms, they examined personality in terms of DSM-IV-TR clusters (APA, 2000). They found that ADHD was associated with both Cluster B, and perhaps more surprisingly, with Cluster C personality disorders. Cluster C may be considered surprising due to the fact that the symptomology is inconsistent with ADHD. For example, an individual with Obsessive-Compulsive Personality Disorder is described as someone who is preoccupied with details, excessively devoted to work and productivity, and rigidity (APA, 2000).

Cluster B disorders have long been associated with ADHD due to being characterized by an inability to control behavior, regulate affect, and cognition. It was further suggested that ADHD may predispose one to Cluster B personality disorders in adulthood. Alternatively, Cluster B personality disorders share similar personality diathesis and therefore tend to co-occur (Miller, Nigg and Farone, 2007).

Both ADHD and Cluster B disorders, particularly ASPD, have overlapping inability to regulate behavior poorly. Cluster C, specifically OCPD, could reflect a high

overlap in fear and anxiety in inattentive symptoms. Cluster C symptoms may also be an attempt to overcompensate ADHD symptoms; for example, a rigid adherence to rules and schedules, seen in OCPD, may be an attempt to compensate for a history of forgetting or missing important obligations. It may be that an etiological subgroup of ADHD exists (anxious-fearful subtype), but this still warrants further investigation. The following is a more detailed description of the specific personality disorders observed to co-occur with ADHD.

#### *Antisocial Personality Disorder*

There is a plethora of literature that supports an association between ADHD and Antisocial Personality Disorder (APD). Similar to Bipolar Disorder, it is argued, at least in part, that there is an overlap of symptoms (impulsivity or failure to plan ahead) (APA, 2000). Those with ADHD and those with APD often show antisocial behavior, unstructured lifestyle, and a chronic pursuit of stimulation (Eisenbarth, et al., 2008).

Criminal behavior is often the result of a developmental progression from childhood behavioral problems, to adolescent delinquency, to eventual adult antisocial behavior, which can lead to incarceration (Babinski, Harsough, & Lambert, 1999). Children with ADHD often have high levels of conduct disorder and associated problems, as discussed previously, which is a prerequisite for a diagnosis of antisocial personality disorder. Those socially aggressive children who continue antisocial activities into adulthood are at elevated risk for meeting diagnostic criteria for this personality disorder (Barkley, Fisher, Smallish, & Fletcher, 2004).

The relationship between ADHD in children and subsequent adult criminal behavior has long been established (Satter-field, Hoppe, & Schell, 1982; Weiss, Minde,

Werry, Douglas, & Nemeth, 1971). However, many earlier studies were heavily criticized for “diagnostic heterogeneity”, suggesting that the diagnostic criteria for ADHD are too inclusive (Lynam, 1996, p. 209). Other criticisms suggest that what is actually being measured in these results is comorbid conduct disorder rather than ADHD.

In order to distinguish more accurately, Barbinski et al.,(1999) examined children (N=305) through adulthood. They found that symptoms of hyperactivity-impulsivity alone are predictive of higher self-reported crime in males. Notably symptoms of inattention are unrelated to adult criminal behavior. This suggests that some subtypes of ADHD are at higher risk for developing Antisocial Personality Disorder. Specifically, those with hyperactivity-impulsivity are at higher risk for antisocial outcomes, even without concomitant conduct problems.

These findings were echoed in other research. In a longitudinal study that followed ADHD children into young adulthood (N=147), it was found that a greater proportion of hyperactive children, by adulthood, had committed a variety of antisocial activities. These activities included theft of property, theft of money, assault with fists, fire setting, carrying concealed weapons, and running away from home. Interestingly, 54% of the once hyperactive children had been arrested at least once. Frequency of these activities was also largely predicted by ADHD severity (Barkley, et al., 2004).

The relationship between childhood and adult ADHD and personality was also examined in a male prison population in Iceland. Although incarceration does not directly suggest that an individual has a diagnosis of Antisocial Personality Disorder (e.g. a drug possession crime does not always infer an indifference towards the well-being of others), the relationship is nonetheless notable. Gudjonsson et al., (2009) examined 46

prisoners, using the Wender-Utah rating scale and the DSM-IV checklist for ADHD symptoms. They also utilized the Eysenck Personality Questionnaire (EPQ) to measure personality dimensions. They found that over half (52.5%) were found to have met criteria for ADHD in childhood and of those, 62.5% were either fully symptomatic or in partial remission of their symptoms. They also found that neuroticism, as measured by the EPQ, was the best predictor of ADHD symptoms. These results reinforce previous findings that ADHD extends from childhood to adulthood; it also demonstrated that ADHD is prevalent in prison populations, and that emotional neuroticism may exacerbate existing propensities for poor behavioral inhibition.

Gudjonsson, Wells, and Young (2012) conducted a study in which they investigated the type of personality disorders and clinical syndromes that best related to ADHD symptoms among a prison population. The authors screened for childhood and adult ADHD symptoms and administered the Millon Clinical Multiaxial Inventory (MCMI)-III (Millon, 1997) to 196 prisoners. They found that the most common personality disorder found was an antisocial disorder (43.8% scored 85 or above) followed by depressive, and negativistic personality disorders.

Psychopathy was also measured in non-incarcerated ADHD adults as compared with healthy participants. Utilizing the Psychopathic Personality Inventory (PP-I; Lilienfeld, S & Widows, 2005) as well as 18 Likert-scaled questions for each ADHD criterion, 30 ADHD and 41 control participants were assessed. Findings suggested that ADHD participants, compared with non-ADHD participants, had higher scores on blame externalization, rebellious nonconformity, carefree nonplanfulness, stress immunity, and coldheartedness (Eisnbarth et. al., 2008).

Semiz et al. (2008), found stunningly similar results to Gudjonsson et al., (2009) in their study of 105 male military recruits who were being assessed for antisocial behavior. They were referred because of exhibiting antisocial behavior (e.g. stealing, fighting, and/or harming others). They found that 65% of participants met criteria for both Antisocial Personality Disorder and ADHD, with combined type being the most common. They also found that severity of ADHD symptoms and the number of symptoms reported, related to whether or not criteria for APD were met.

There are also similarities in neurobiological functioning between ADHD and APD. For example, serotonergic susceptibility genes associated with human aggression include the monoamino-oxidase A (MAOA) and the serotonin transporter proper gene (5HTTLPR). It has been shown that the risk for ADHD and APD was generally high in carriers of 5-HTTLPR, independent of psychosocial factors (Beaver, Nedelec, Rowland, & Schwartz, 2012).

#### *Borderline Personality Disorder*

Borderline Personality Disorder (BPD) is a severe mental disorder, which is marked by interpersonal instability, impulsivity, and emotional dysregulation (American Psychiatric Association, 2000). Given the impulsive element of BPD, it is not surprising that BPD is highly comorbid with ADHD. Ferrer et al. (2010) examined how BPD and ADHD comorbidity may impact functioning. They examined 181 participants who were diagnosed with BPD. Of those 181, 69 (38.1%) were diagnosed with comorbid ADHD. Those with BPD and ADHD had higher rates of substance abuse (59.4% v. 38.4%), antisocial personality disorder (7.2% v. 0.9%), and obsessive-compulsive personality disorder (21.7% v. 6.3%). The BPD group, without ADHD, experienced higher rates of

mood disorders (62.5% v. 37.7%), panic disorder (54.5% v. 23.1%), and avoidant personality disorder. According to the Global Symptomatic Index Scale of the SCL-90R, more severe symptomology was reported in the BPD group alone. It is clear that ADHD and BPD are frequently comorbid; however, it would appear, based on this study, that having these comorbid conditions presents a different clinical picture. The BPD-ADHD participants showed a more homogenous, impulsive profile, whereas those without ADHD tended to experience greater mood difficulty.

Similar to Ferrer et al. (2010), Dijk, Lappenschaar, Kan, Verkes, and Buitelaar (2011) also examined BPD and ADHD comorbidity and symptom severity, using a latent class analysis of 103 female outpatients. Participants were recruited from an ADHD program or a BPD program. Four distinct profiles emerged: Only ADHD symptoms; BPD symptoms and only ADHD symptoms of hyperactivity; BPD symptoms and symptoms of inattention and hyperactivity, and BPD symptoms, and symptoms of inattention, hyperactivity, and impulsivity. Notably all the BPD participants had some symptoms of ADHD. Also of note was the fact that hyperactivity appeared to be a symptom in every patient. The authors attributed this to the ambiguous nature of the diagnostic criteria, which measures overall restlessness and can be confounded by stress and anxiety. Nonetheless, this research illustrates the overlap between ADHD and BPD.

*Obsessive Compulsive Personality Disorder*

Few studies have been published that examine the relationship between ADHD and Obsessive Compulsive Personality Disorder (OCPD). Cumyn, French, and Hechtman (2009) examined ADHD comorbidity, as a whole, by assessing adult participants (N=447) for Axis I and Axis II disorders. Results indicated that those with

ADHD combined type were most likely to experience a variety of other disorders, which included OCPD (27.68%). In addition, combined type overall was most likely to experience some kind of Axis II disorder (61.61%). Findings also show that ADHD, of any subtype, had higher rates of Antisocial Personality Disorder and OCPD, compared with adults without ADHD.

This research continues to support the importance of careful assessment when determining if a diagnosis of ADHD is appropriate. A personality disorder can undoubtedly alter the course of treatment (Paris, 2015). In addition, an individual's personality style should also be a consideration and how, at minimum, it interacts with the disorder. The most common and well-established way to measure personality dimensions is by utilizing instruments based on the Five-Factor Model (Costa & McCrae, 1992).

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

Personality psychologists generally agree that many significant individual differences can be accounted for by the Five-Factor Model (FFM), even cross-culturally (McCrae et al., 2004). The five-factor trait theory has served as a taxonomy for personality models for the past 50 years (Norman, 1963). Espoused more recently by Costa and McCrae (1992), the FFM continues to serve as a way of describing five relatively broad, stable dimensions. The way to describe a personality trait can vary. There may be multiple adjectives used to describe one trait. For example, nervous may be described as jittery, worried, fearful, or apprehensive. Beyond semantic similarity, psychologists realized that some classes of traits were related. For example, there is a clear difference between being sad and being lonely. However, people who are lonely

are frequently sad. In order to manage these constructs, factor analysis was used in order to determine the statistical relationship between traits. Thus the FFM was born. The FFM is a model of the structure of traits as well as a basis for organizing research findings (Widiger & Costa, 2013). Briefly, these five trait dimensions include Neuroticism, or a general tendency to feel psychological distress; Extraversion, which includes a person's ability to feel sociable; Openness to Experience, which indicates an individual's general interest in new things and ideas; Agreeableness, which is the tendency to be sympathetic to others and to be altruistic, and Conscientiousness, which describes an ability to be organized and plan.

The NEO-PI-R assesses 30 trait components, or facets, six for each of the factors in the FFM; these represent variations in normal personality functioning. It provides reliable and valid measures of personality traits as described in the FFM (NEO-PI-R; Costa and McCrae, 1992). Some studies have examined how NEO profiles compare to adults with ADHD. To date, six published studies have examined the FFM in non-clinical and clinical adult populations with ADHD (Braaten & Rosen, 1997; Jacob et al., 2007; McKinney, Canu, & Schneider, 2012; Nigg et al., 2002; Parker, Majeski, & Collin, 2004; Ranseen, Cambell, & Baer, 1998).

Ranseen et al., (1998) assessed 25 adults who met DSM-III-R criteria for ADHD, with the NEO-PI-R over a 15-month period. In addition to the NEO-PI-R, a checklist of ADHD symptoms according to DSM-III-R criteria, the Wender Utah rating scale, WAIS, and WRAT-R were measurements utilized to determine an ADHD diagnosis as well as to screen for other comorbid conditions. A control group included 23 nonpsychotic outpatients.

Exclusion criteria, notably, included those who had been diagnosed with other Axis I or II psychiatric illnesses, other than Adjustment Disorder. Findings suggested that adults with ADHD displayed very low Conscientiousness scale scores and elevated scores on the Neuroticism scale, compared with the controls. Of note was the elevated Neuroticism factor. The authors attributed this elevation to the fact that adults with ADHD tend to have higher levels of global psychopathology, compared with non-ADHD populations (Ranseen et al., 1998).

Nigg et al. (2002) set out to provide a more thorough examination of adult personality and ADHD symptoms. They examined adult undergraduates (N=1620) by using a variety of self-report and spousal measures for both personality and ADHD. They also asked participants to recall retrospectively associated ADHD problems from childhood. This study not only relied on multiple reporters but also examined ADHD by subtype in order to ascertain a more specific relationship between FFM factors and ADHD.

Overall, ADHD symptom scores were related to low Conscientiousness, low Agreeableness, and high Neuroticism. Supporting the generalizability of these results, reports from spouses regarding the Five-Factors showed a pattern similar to the self-reports. Attention problems were most clearly associated with low Conscientiousness for both self-report and spousal reports. A smaller, secondary association was reported with Neuroticism regarding overall ADHD symptoms in both the self-report and spousal report. Impulsivity correlated negatively with Agreeableness on both the self-report and spousal report, respectively. It should be noted that in this study there did not appear to control for other comorbid conditions. Taking this into consideration, it is possible that

these participants were also suffering from some other diagnoses such as anxiety or depression, which could cause an elevation in Neuroticism. Nonetheless, as previously stated, such a complicated profile may accurately reflect the true nature of high comorbidity found in this population.

Jacob et al., (2007) also examined co-morbidity of ADHD and personality traits. Their findings of 372 participants demonstrated a strong link between ADHD and various Axis I and II disorders. Personality factors, Extraversion, Openness to experience, and Conscientiousness were significantly lower, compared with the control group. This particular study further supports previous findings regarding lower Conscientiousness scores with adults who have ADHD, but presents contradictory evidence with regard to extraversion. Reasons for this may be due to the fact that ADHD subtypes were distinguished from one another. Given the range of presentations observed and depending on subtype, mixed results may be seen. This evidence is highlighted in the subsequent study.

Parker et al., (2004) examined 587 adults utilizing the NEO-FFI and the Conners Adult ADHD Rating Scale (CAARS; Conners, Erhardt, & Sparow, 1996). Participants were grouped into three non-overlapping groups (inattentive, hyperactive/impulsive, and non-ADHD controls) on the basis of their respective ADHD diagnostic subtype. They found that extraversion was a significant predictor of hyperactive/impulsive ADHD symptoms. The elevated Extraversion scale is believed to occur in order to compensate for lower internal arousal. However, extraversion was not related to inattentive type. In fact, there was no difference between the control group and inattentive type with regard to extraversion scores. Neuroticism was found to be a significant predictor of both

ADHD types. However, the most notable finding was the relationship with conscientiousness and inattention, with more than half of the explained variance in attention scores accounted for by low conscientiousness scores. The inattention group scores were more than two standard deviations below the mean for non-ADHD controls. Although not as strong, conscientiousness was also a significant predictor for hyperactive/impulsivity scores. Low agreeableness was found to be the most powerful predictor for hyperactivity/impulsivity scores; however, both ADHD groups scored significantly lower on Agreeableness than non-ADHD controls. These results may be, in part, accounted for by the aforementioned comorbidity of ADHD and oppositional defiant disorder.

This study is of note because it demonstrates a difference in presentations due to ADHD subtype. By simply grouping participants by ADHD vs. non-ADHD, a significant amount of data can be lost. Although consistent with previous research, with respect to the relationship between low Conscientiousness scale scores and inattentiveness, it also highlights how elevated Extraversion and decreased Agreeableness scale scores were unique to hyperactive/impulsive type. Also of note, is the fact that it did not appear that comorbid conditions were solely related to Neuroticism.

McKinney et al. (2012) examined the relationship between ADHD traits and personality. More specifically, the aim was to demonstrate how distinct features of ADHD, inattentive and impulsive type, are differentially related to normal and disordered personality traits in young adults. These authors utilized the CAARS to assess ADHD symptomology. The MCMI-III and the NEO-PI-R were utilized to measure personality constructs in 130 individuals. Regression analysis revealed that impulsivity was

negatively associated with agreeableness and was a positive predictor of MDD, alcohol dependence, and antisocial tendencies. In addition, impulsivity was also related to neuroticism, self-defeating behavior, anxiety, and bipolar traits. Inattentiveness was found to be a rather limited predictor of inattention and low Conscientiousness scale scores, supporting previous research.

In a recent study on the topic, Knouse (2013) utilized structural equation modeling to examine adult ADHD symptoms with FFM traits on 117 adults. All participants had a pre-existing ADHD diagnosis, as per an outside provider, and were being treated with medications, but continued to meet full criteria for the disorder. Similar to McKinney et al. (2012), they found that Impulsivity predicted lower Agreeableness. Consistent with previous research (Parker et al., 2004; Nigg et al., 2002; Ranseen et al., 1998), inattention predicted higher Neuroticism and lower than average Conscientiousness scores, whereas hyperactivity positively predicted Extraversion. A major limitation in this study, and the other studies, is that they were not able to examine facet-level scores in order to refine their findings further. This suggests a closer look at the facet level to determine if this will be the case.

Last, an Alternative Five Factor Model (AFFM) was proposed by Valero et al. (2012) to add to this growing research. The AFFM model emerged from a series of factor analyses of scales that had been used in psychobiological research. The basic traits of the AFFM are measured by the Zuckerman-Kuhlman Personality Questionnaire, which contains five scales: Neuroticism-Anxiety, Activity, Sociability, Impulsive Sensation Seeking, and Aggression-Hostility. They examined 217 adults with ADHD, and a control of 434 individuals. The ADHD sample showed, in comparison with the control,

higher scores of Neuroticism-Anxiety, Impulsive-Sensation Seeking, and Aggression-Hostility. Notably no elevations were seen on Activity. However, when facets were introduced into the analysis, the results changed somewhat: high scores on Neuroticism-Anxiety, Impulsivity, and General Activity were elevated, whereas low scores were observed on Work Activity. This was not seen from broad, factor level analyses but became apparent only when more specific facets were introduced. Aggression-Hostility was not associated when all personality facets were simultaneously considered. It should be noted that this study did not control for any comorbid conditions. This study demonstrated the fact that when facets are introduced into an analysis, the findings could change significantly.

### **Why Examine Facets?**

It is clear that a great deal of useful information can be extracted by examining the broad traits of the five-factor model. However, FFM facets that comprise these factors have received considerably less attention. There is growing evidence that facet scales offer incremental validity over the five factors in predicting a variety of criteria (Paunonen & Ashton, 2001; Reynolds & Clark, 2001). Facets for the NEO PI-R were selected on the basis of reviews of the literature and on a series of item analyses (Costa & McCrae, 1995). The goal was to include traits that reflected variables that psychologists have considered important in describing behavior.

There are clear advantages to examining both facets and factors. Few studies demonstrate this better than the work of Paunonen and Ashton (2001), which compared the five factors of personality with the facets of personality that constitute those factors on their ability to predict 40 behavior criteria. Results showed that selected personality

facet scales can predict as well or better than all the big five factors combined. Perhaps even more interestingly, a substantial part of the criteria variance predicted by the facet scales was variance not predicted by the factor scales. For example, the Conscientiousness facet scale may have facets that are nonrandom and specific to the trait but also have components of variance that do not overlap with one another, and it is possible that this variance may change according to disorder, situation *or even time*. In a work setting, for instance perhaps, Conscientiousness predicts the quality of a manager, but not all the facets of Conscientiousness may predict the quality of a manager equally (Widiger & Costa, 2013). This illustrates the fact that a more detailed assessment of the facets is justified.

Fein and Klein (2011) also examined relationships between facet-level characteristics within the FFM and outcomes across three phases of behavioral self-regulation. Lack of behavioral self-regulation is not synonymous with ADHD; however, this study provides important data with regard to an executive function that is at the core of ADHD symptomology for many individuals: self-regulation. The author's selected facets from the FFM reflecting clear behavioral or cognitive patterns that contributed to behavioral self-regulation. Specifically, they were interested in examining compound traits emerging with a single focal criterion. In the case of self-regulation, the goal was to see if compound traits or a collection of FFM facets were linked to a specific behavior.

To do this they used a rational method of relating trait descriptions to behavioral self-regulation outcomes. For example, self-regulation can relate to organization (Costa & McCrae, 1992). There was a clear relationship between self-regulation and the factor of Conscientiousness. They selected, in part, several facets of the Conscientiousness

factor, which provides the most extensive connection to self-regulation. They then created a composite of traits by averaging the items from the seven-targeted facet-level traits within the FFM (assertiveness, activity, achievement striving, deliberation, self-discipline, dutifulness, and ideas), defining this as self-regulation. They then compared this composite to various dependent measures of achievement.

Not surprisingly, they found that Conscientiousness was the most reliable in predicting behavioral self-regulation. Specifically, achievement striving correlated with all five self-regulatory outcomes that were of interest in this study (academic goal level, decision task goal level, academic feedback seeking, academic metacognition, and decision task metacognition). For the purposes of this investigation, this study demonstrates that a constellation of facets, differing from the original five factors, can predict a specific behavioral outcome. This is not unlike the present study, in which a rational method is used to select facets based on behavioral outcome to predict behavior.

Facets of the Conscientiousness factor were also used in the prediction of job performance; this was done in order to better understand the incremental validity of facets as a predictor of job performance. Essential to this study is that the researchers examined the interrelationships among facets and whether or not they themselves are sufficient to be predictive. For example, if 4 or 5 facets of Conscientiousness are highly correlated with one another, little can be gained by distinguishing between them. Moreover, an elevated Conscientiousness score would equate to elevated facet scores, if this were true. Their findings supported the idea that facets have only low to moderate correlations between one another, supporting the idea that facets are in fact separate from one another. Facets themselves were not predictive of overall performance for customer

service workers but did show incremental validity with the performance of sales managers, skilled, and semi-skilled workers. Future research was suggested in order to better understand the reasons why traits are predictive in some cases but not in others (Dudley et al. 2006).

Bipp, Steinmayr, and Spinath (2008) also found mixed results when they examined achievement, motivation and personality by examining relationships between goal orientations (e.g. learning, performance-approach, performance-avoidance, and work avoidance) with personality facets measured by the NEO. Their sample comprised 160 undergraduates. They utilized the NEO-PI-R to measure personality traits and the SELLMO-ST (Skalen zur Erfassung der Lernund Leistungsmotivation; Spinath, 2002) to measure learning and achievement orientation. They determined that Achievement Striving did not relate to Performance-Approach, Compliance, or Performance Avoidance as predicted, overall, although, 35 out of the 41 postulated correlations were supported. Here, facets were useful predictors in some cases but not in others. This study highlights two areas of interest: facets themselves, distinct and separate from FFM Factors, can be predictive in a way that their parent factor cannot. Also, at least in this study on predicting Achieving Striving, factors alone, could not generate as comprehensive a picture as did the facets by providing a more comprehensive picture than simply an elevated factor score.

These findings were further echoed by a more recent study (Rector et al., 2012) in which researchers also experienced mixed results when utilizing facets from the NEO-PI-R in the identification of mood and anxiety disorders in treatment-seeking clinical populations. Results of 610 outpatient adults demonstrated that unique personality facet

profiles for some disorders emerged (e.g. Major Depressive Disorder); however, these results were not found in all the disorders explored in their study. For example, Panic Disorder with or without Agoraphobia had no unique associations. They further hypothesized that a theoretical framework that potentially deviates outside of a formal personality measure may best account for stable trait constructs. In other words, they suggested that, in this case, the NEO-PI-R may not be an appropriate measure to develop an appropriate construct for Panic Disorder. It should be noted that ADHD was not a part of this study.

As with Fein and Klein (2011), a method that relates trait descriptions to a behavior was used, in this case, ADHD symptoms with personality facets. For the factor of Conscientiousness, several facets will relate to the corresponding ADHD symptoms of inattentiveness.

In summation, ADHD is a prevalent (Kessler et al., 2006), highly comorbid (Barkley & Murphy, 2007), disorder that carries with it psychosocial dysfunction (Mannuzza et al., 1993), and other associated problems (Michielsen et al., 2012). In addition, the relationship to ADHD and personality is only beginning to be understood. What can be extracted from previous research overall was that ADHD symptoms inversely relate to Conscientiousness and Agreeableness and positively relate to Neuroticism and Extraversion. Going further, Inattention predicted higher Neuroticism and low Conscientiousness scores; impulsivity predicted low Agreeableness, and hyperactivity positively predicted Extraversion (Braaten & Rosen, 1997; Jacob et al., 2007; McKinney, Canu, & Schneider, 2012; Nigg et al., 2002; Parker, Majeski, & Collin, 2004; Ranssen, Cambell, & Baer, 1998; Knouse, 2013). At the facet level, greater detail

can be extracted regarding the interaction of ADHD with personality. The hypotheses are informed by using the factors as an overarching guide, in addition to following an approach in which facets are selected based on behavioral descriptions, as outlined by Fein and Klein (2011).

The following tables outline each facet that was selected, its definition, and the rationale for choosing or excluding that particular facet. A logic is also provided (table 2) for the reason why certain facets from the respective factor were not used. It is important to note that the NEO-PI-R has been used for evaluating personality for over 50 years (Norman, 1963); however the idea of examining how facets relate to the complex disorder of ADHD is completely novel.

Table 1 *Facet selection and rationale*

Facet	Facet definition	Rationale for selection
Dutifulness	Adhere strictly to their principles; low scores may be unpredictable (Widiger & Costa, 2013)	Often fails to give close attention to details or makes careless mistakes in schoolwork, work, or other activities, often does not follow through on duties in the workplace (APA, 2013)
Self-Discipline	The ability to begin tasks and carry them out to completion, despite	often avoids, dislikes, or is reluctant to engage in tasks that require sustained

	distractions (Widiger & Costa, 2013)	mental effort (APA, 2013)
Achievement/striving	High aspiration levels, diligent, purposeful (Widiger & Costa, 2013)	often fails to give close attention to details or makes careless mistakes (APA, 2013)
Order	Neat, tidy, well organized (Widiger & Costa, 2013)	often has difficulty organizing tasks and activities (APA, 2013)
Activity	Vigorous movement, high energy, need to keep busy (Widiger & Costa, 2013)	often “on the go” or acts as if “driven by a motor (APA, 2013)
Excitement Seeking	Crave excitement and stimulation (Widiger & Costa, 2013)	Often unable to engage in leisure activities (APA, 2013)
Altruism	Active concern for the well-being of others (Widiger & Costa, 2013)	Often interrupts and intrudes on others (APA, 2013)

Compliance	Tend to inhibit aggression, tend to be meek and mild (Widiger & Costa, 2013)	Has difficulty waiting his or her turn (APA, 2013)
------------	--	---

Table 2 *Facets and rationale for exclusion*

Facet	Facet definition	Rationale for exclusion
Competence	Sense that one is capable (Widiger & Costa, 2013)	This facet did not have a clear behavioral rationale for selection
Deliberation	Cautious, deliberate (Widiger & Costa, 2013)	This facet appeared to have overlap with Dutifulness specifically with reference to being deliberate.
Warmth	Issues that are most relevant to interpersonal intimacy (Widiger & Costa, 2013)	This facet did not appear relevant to the study at hand
Gregariousness	High scorers enjoy the company of others (Widiger & Costa, 2013)	ADHD is not related to propensity towards social interaction
Assertiveness	Dominant, forceful (Widiger & Costa, 2013)	There is no established relationship between ADHD and being forceful

Positive emotions	Tendency to experience emotions such as joy and happiness (Widiger & Costa, 2013)	ADHD is not directly related to emotional states
Trust	High scorers believes others are honest and well intentioned (Widiger & Costa, 2013)	This facet did not appear to have a behavioral relationship to ADHD
Straightforwardness	Individuals are sincere and ingenuous (Widiger & Costa, 2013)	ADHD has no known relationship to being sincere and honest
Modesty	Humble, self-effacing (Widiger & Costa, 2013)	Based on this behavioral description, no clear relationship exists
Tender-Mindedness	Sympathy, moved by others (Widiger & Costa, 2013)	ADHD does not relate to feeling sympathetic towards others.

## **Chapter 2: Hypotheses**

Hypothesis I: Symptoms of inattentiveness will be inversely related to the following facets of the Conscientiousness factor: Dutifulness, Self-Discipline, Achievement Striving, and Order, while controlling for Neuroticism.

Hypothesis II: Symptoms of hyperactivity will be positively associated with the following facets of the Extraversion Factor: Activity and Excitement Seeking, while controlling for Neuroticism.

Hypothesis III: Symptoms of impulsivity will be positively related to Excitement Seeking of the Extraversion factor, and inversely related to Agreeableness facets of Altruism and Compliance, while controlling for Neuroticism.

## **Chapter 3: Method**

### **Design and Justification**

This study will utilize a correlational, non-experimental design. A hierarchical multiple regression analysis will be used to determine the relationship between the independent variables of personality facets to the dependent variables to the dependent variables of ADHD type. The effect of depression and anxiety (neuroticism) will be statistically controlled. The design of this study permits the experimenter to better understand the nature of ADHD, while controlling for comorbid conditions, and to determine if there is a statistical relationship, both in direction (whether they are positively or negatively correlated) and magnitude, between personality facets and ADHD type.

### **Participants**

Participants are typically self- or other-referred adults presenting for treatment for ADHD at university-based outpatient specialty clinic in Philadelphia, PA, specializing in the assessment and treatment of Adults with ADHD.

### **Inclusion and Exclusion Criteria**

Inclusion criteria consists of archival data of clinic patients presenting to the facility exhibiting ADHD symptoms with or without other symptomatic and personality disorder comorbidities. Also included are individuals that do not meet full diagnosis for ADHD but present with complaints that would be responsive to interventions for ADHD, e.g., procrastination, problems with time management, disorganization, etc. Excluded are those with bipolar disorder, active severe substance use, PTSD, active psychotic symptoms, or severity beyond the scope of the clinics services, (e.g., suicidality,

homicidality). Those excluded are referred to more appropriate settings. Treatment at the clinic is not contingent upon participation in this or any other study. This study used archival data from a sample who, individually, had previously participated to consent in research.

### **Measures**

In the present study, obtaining narrow aspects of personality is required to better understand how these aspects impact ADHD.

#### *Revised NEO Personality Inventory (NEO-PI-R)*

The NEO-PI-R was designed according to the Five Factor Model (FFM; (McCrae & Costa, 2010)). It is a three-level instrument, comprising 240 self-report items in addition to a validity question, 30 facets, and 5 domains, commonly called factors. The test is presumed to take between 30-40 minutes to complete. The Five Factors include the following: Neuroticism, Extraversion, Openness to Experience, Agreeableness, and Conscientiousness. Facet level scales include Anxiety, Angry hostility, Depression, Self-Consciousness, Impulsiveness, Vulnerability, (Neuroticism); Warmth, Gregariousness, Assertiveness, Activity, Excitement seeking, Positive Emotions (Extraversion); Fantasy, Aesthetics, Feelings, Actions, Ideas, Values (Openness to Experience); Trist, Straightforwardness, Altruism, Compliance, Modesty, Tender-Mindedness (Agreeableness); Competence, Order, Dutifulness, Achievement Striving, Self-Discipline, and Deliberation (Conscientiousness). Facet score ranges between 1-30. Prior evidence indicates internal consistency coefficients range from .87 to .92 for the factor scales and from .58 to .82 for the facet-level scales (Costa & McCrae, 2010).

#### *Conners Adult ADHD Rating Scales- Self Report: Long Version (CAARS-S:LV)*

The CAARS (Conners Erhardt, & Sparrow, 1999) measures the presence and severity of ADHD symptoms in adults. It consists of 66 items rated from 0 (not at all, never) to 3 (very much, very frequently). There are eight subscales each comprised of 5 items (A: inattention/memory; B: hyperactivity; C: impulsivity; and D: self-concept) as well as a 12 item overall CAARS index. It takes approximately 10-15 minutes to complete. Coefficient alphas ranged from .74 to .95, and test-retest reliability from .85 to .92.

### **Procedure**

All patients at the clinic complete an extensive psychological diagnostic evaluation as part of the standard intake procedure. After the data was retained in a patient's chart at the program, a clinician at the center reviewed the chart and relevant records, gathered data from the patient's scores on the ADHD subscale scores from the CAARS and NEO-PI-R scores. A unique coded identification system was created for each set of data. After all identifying information of the patient was removed through the coding process, the data was transferred to an electronic database and was given to the responsible investigator.

## Chapter 4: Results

Data were gathered from 155 cases, including 59 females (38.1%) and 96 males (61.9%). Participants' ages ranged from 18 to 66,  $M = 34.54$  years ( $SD = 13.27$ ).

Variables included in tests of the study hypotheses included ADHD subscale scores from the CAARS (Conners et al., 1999) and personality factor and facet scores from the NEO-PI-R (McCrae & Costa, 2010). From the CAARS, three subscales were examined measuring three different features of ADHD: (a) Inattention/Memory, (b) Hyperactivity, and (c) Impulsivity. From the NEO-PI-R, one factor score, Neuroticism, was examined, as were eight facet scores: (a) Activity, (b) Excitement Seeking, (c) Altruism, (d) Compliance, (e) Order, (f) Dutifulness, (g) Achievement Striving, and (h) Self-Discipline. All analyses were completed using IBM SPSS (Version 22.0) except as otherwise noted.

### Data Screening and Cleaning

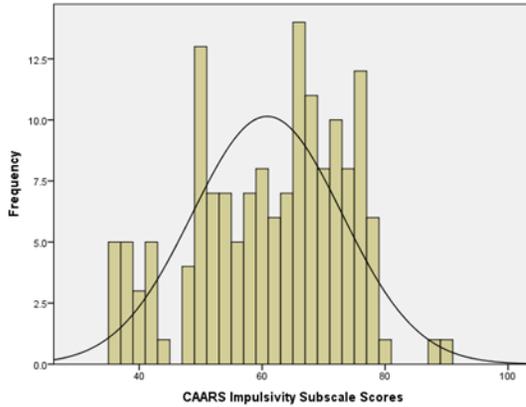
Scores on all variables were first screened for univariate outliers by standardizing all variables and searching for  $z$ -scores exceeding  $+3.0$  (Meyers, Gamst, and Guarino, 2013). One case (113) showed a  $z$ -score of  $-3.08$  on the Altruism facet, one case (124) showed a  $z$ -score of  $-3.23$  on the Dutifulness facet, and three cases (53, 61, and 145) showed  $z$ -scores of  $3.11$  on the facet of Self-Discipline. Although these cases' scores on other variables were retained, their scores on these variables were treated as missing.

To identify multivariate outliers, Mahalanobis distances were calculated for each case using the three CAARS subscales, the Neuroticism factor score, and eight facet scores from the NEO-PI-R. The Mahalanobis distance statistic measures the degree to which a given case's pattern of values on the selected variables differs from patterns seen

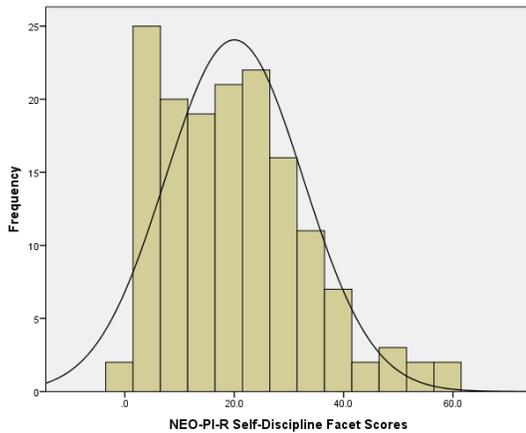
across the entire sample of cases (Meyers, et al., 2013). Mahalanobis distances were evaluated for significance using the chi-square distribution, with degrees of freedom equal to the number of variables evaluated ( $df = 12$ ) and a stringent alpha level ( $\alpha = .001$ ). No cases met or exceeded the critical value of  $\chi^2 = 32.91$  and it was concluded that there were no multivariate outliers.

SPSS does not include the capability of evaluating multivariate normalcy, but the univariate normalcy assumption was evaluated visually, by inspecting histograms for all variables in the analysis, and statistically, using the Shapiro-Wilk test for normalcy (using a stringent  $\alpha = .001$ ) and by screening variables for measures of skewness and kurtosis greater than + 1.0. The CAARS Impulsivity subscale and the NEO-PI-R Self-Discipline facet scale were both identified as significantly nonnormal by the Shapiro-Wilk test: for the CAARS Impulsivity subscale,  $SW(155) = 0.962, p < .001$ ; for the NEO-PI-R Self-Discipline facet scale,  $SW(152) = 0.951, p < .001$ . The nature of these deviations from normalcy can be seen in the frequency histograms provided as Figures 1 and 2. While both variables were candidates for a data transform to bring their distributions closer to the normal curve (e.g., a logarithmic or reciprocal transform), three considerations weighed against the use of a transform. First, visual comparisons of the frequency histograms to the normal curve did not suggest that either distribution deviated dramatically from normal. Second, measures of skewness and kurtosis were not especially extreme: for the Impulsivity subscale, skewness =  $-.342$  and kurtosis =  $-.663$ ; for the Self-Discipline personality trait variable, skewness =  $.757$  and kurtosis =  $.399$ . Third, transforming scores complicates the subsequent interpretation of scores on the transformed variables. With all of these facts in mind, it was determined that all variable

distributions would be treated as approximations to the normal curve and no data transforms would be applied.



*Figure 1.* The distribution of scores on the CAARS Impulsivity subscale was significantly nonnormal, showing indications of negative skew and platykurtosis.



*Figure 2.* The distribution of scores on the NEO-PI-R Self-Discipline facet scale was significantly nonnormal, showing indications of positive skew and leptokurtosis

Linearity of relationships between variables was evaluated by examining scatterplots of the bivariate relationships between variables in the analysis and comparing the strength of the linear and nonlinear (quadratic) relationships in each scatterplot. With  $k = 12$  variables in the analysis, the number of pairs of variables ( $k^2 - k / 2 = 66$ ) would

be exceedingly large. Therefore a sample of 12 pairs was selected to represent the complete set. The bivariate relationships in this sample were generally of weak to moderate strength and in no case was a relationship strongly nonlinear.

### **Analysis of the Factor Structure of the NEO-PI-R**

As several of the facets and one of the personality factors measured by the NEO-PI-R were central to this study, a principal components analysis was used to ensure that the NEO-PI-R data sample that was available for use in this study displayed the same structure that is intended by the designers of the instrument. Personality factors and their associated facets are as follows: *Neuroticism* Factor—Anxiety, Hostility, Depression, Self-Consciousness, Impulsiveness, Vulnerability to Stress; *Extroversion* Factor—Warmth, Gregariousness, Assertiveness, Activity, Excitement Seeking, Positive Emotion; *Openness to Experience* Factor—Fantasy, Aesthetics, Feelings, Actions, Ideas, Values; *Agreeableness* Factor—Trust, Straightforwardness, Altruism, Compliance, Modesty, Tendermindedness; *Conscientiousness* Factor—Competence, Order, Dutifulness, Achievement Striving, Self-Discipline, Deliberation. Data were available from 155 cases consisting of scores on all of the facets of the NEO-PI-R as well as factor scores, but the facet scores were the focus of this analysis. There were very small amounts of missing data and missing values were deleted in listwise fashion. The principal components analysis was used to determine if facet scores were correlated in a manner that was consistent with the intended factor structure of the NEO-PI-R.

Principal components analysis essentially looks for clusters of highly correlated variables, each cluster representing an underlying factor. In order for the analysis to be valid, the correlation matrix must therefore include both weak and strong correlations

(Diekhoff, 1992). While this characteristic can be evaluated subjectively through a visual examination of the correlation matrix, there are more objective tools available for the purpose. Bartlett's test of sphericity tests the null hypothesis that none of the variables are significantly correlated. Additionally, Meyers, Gamst, and Guarino (2006) call for the use of the Kaiser-Meyer-Olkin (*KMO*) measure of sampling adequacy and recommend minimum *KMO* value of 0.70. In the present analysis, Bartlett's test of sphericity was significant,  $\chi^2(435) = 2525.224, p < .001$ , and *KMO* = .802, both results suggesting that the correlations were sufficiently variable to be appropriately examined using principal components analysis.

The principal components analysis extracted six factors with eigenvalues of 1.0 or larger which explained 64.99% of the variance in the original facet scores. In contrast to this result, only five personality factors comprise the NEO-PI-R. A five-factor solution was performed next, followed by a varimax rotation to achieve a simpler factor structure. This solution explained less variance (55.39%) than the six-factor solution, but produced factor loadings that reflected a structure very similar to that of the NEO-PI-R. Although there was some "noise" in the structure matrix, i.e., with some facets loading on more than one factor, all five NEO-PI-R personality factors were clearly present. All five personality factors were represented with ( $\geq \pm .35$ ) loadings from all six of the facets that are supposed to represent those factors. Six of the eight facets that were the focus of this study (Activity, Compliance, Order, Dutifulness, Achievement Striving, and Self-Discipline) loaded "cleanly" on their appropriate factors, i.e., the facets showed loadings only on their factors and very weak loadings ( $< .35$ ) on other factors. Altruism loaded strongly (.418) on its appropriate factor (Agreeableness) but loaded even more strongly

on an inappropriate factor, Extraversion (.617). Excitement Seeking loaded most strongly (.562) on its appropriate factor, Extraversion, but showed a second loading (-.412) on an inappropriate factor, Agreeableness. It can be concluded that the factor structure of the available sample of NEO-PI-R data provides a close approximation to the instrument's intended factor structure. A more thorough evaluation, however, would benefit from the use of a confirmatory factor analytic procedure that is unavailable in SPSS Version 22.0.

### **Sample Size and Power Analysis**

G\*Power sample/power software (Version 3.1.9.2) (Faul, Erdfelder, Buchner, & Lang, 2009) was used to estimate the power available from 150 cases (based on the number of cases in the data file following listwise deletion of cases with missing data) in a hierarchical multiple regression analysis with one covariate and four predictor variables, assuming an effect of medium strength ( $f^2 = .15$  or  $R^2 = .13$ ) and  $\alpha = .05$ . A sample of 150 cases is sufficient to provide statistical power estimated at  $1 - \beta > .95$  and so the sample size available was deemed suitable for the purposes of the present analyses.

### **Tests of Research Hypotheses**

The three research hypotheses were evaluated by first examining bivariate correlations among the variables relevant to each hypothesis. If facet predictors were found to be significantly correlated to the criterion variable as hypothesized, the analysis proceeded to a second step, hierarchical multiple regression analysis. In these hierarchical multiple regression analyses Neuroticism was entered as a covariate in Block 1 and facet predictors that were previously established as being significantly correlated with the criterion variable were entered in Block 2. Facets that were not significantly correlated with the criterion variable were excluded from these analyses.

**Hypothesis 1: Symptoms of Inattentiveness will be inversely related to the following facets of the Conscientiousness factor—Dutifulness, Self-Discipline, Achievement/Striving, and Order, while controlling for Neuroticism.** The test of Hypothesis 1 began with an examination of the bivariate correlations among the variables relevant to the hypothesis. The dependent variable was Inattentiveness, as measured by the Attention/Memory scale of the CAARS, the covariate was Neuroticism from the NEO-PI-R, and the four facet independent variables from the NEO-PI-R were Dutifulness, Self-Discipline, Achievement/Striving, and Order. These correlations are shown in Table 1.

Table 3

*Bivariate Correlations for Hypothesis 1: Inattention Predicted from Dutifulness, Self-Discipline, Achievement/Striving, and Order, Controlling for Neuroticism*

NEO-PI-R Facets	Attention/ Memory	Neuroticism	Dutifulness	Self- Discipline	Achievement/ Striving	Order
Attention/Memory		.201**	.042	-.035	.124	-.039
Neuroticism			-.136*	-.195**	.063	.023
Dutifulness				.515**	.553**	.452**
Self-Discipline					.542**	.626**
Achievement/ Striving						.482**
Order						

*Note.* *N*'s range from 152 to 155 due to occasional missing data.

\*  $p < .05$  (1-tail)

\*\* $p < .01$  (1-tail)

Neuroticism, the covariate, was significantly correlated with Inattentiveness,  $r(153) = .201, p = .006$ , but none of the facet score independent variables were

significantly correlated with Inattentiveness. No further analyses were needed to test Hypothesis 1, it having been determined that none of the facet score predictors were significantly related to the Inattentiveness dependent variable. However, the relationship between Neuroticism and Inattentiveness was examined further using bivariate regression analysis. Table 4 provides the details of the resulting regression equation. With 155 cases in the analysis, Neuroticism accounted for 4.0% of the variance in Inattention,  $F(1,153) = 6.425$ ,  $p = .012$ .

Table 4

*Details of the Regression Equation of Inattention on Neuroticism.*

Model	Unstandardized Coefficients		Beta	<i>t</i>	Sig.
	B	Std. Error			
1 (Constant)	45.454	3.948			
Neuroticism	0.165	0.065	0.201	2.535	.012

Hypothesis 1 was not supported by the data. Although Neuroticism predicted a statistically significant 4.0% of the variance in Inattention, none of the personality facets that were the focus of Hypothesis 1 were significantly correlated with Inattentiveness.

**Hypothesis 2: Symptoms of Hyperactivity will be positively associated with the following facets of the Extraversion Factor—Activity and Excitement Seeking, while controlling for Neuroticism.**

The test of Hypothesis 2 began with an examination of the bivariate correlations between the variables relevant to the hypothesis. The dependent variable was Hyperactivity, as measured by the Hyperactivity/Restlessness scale of the CAARS, the covariate was Neuroticism from the NEO-PI-R, and the two facet score independent variables from the NEO-PI-R were Activity and Excitement-Seeking. These correlations are shown in Table 5.

Table 5

*Bivariate Correlations for Hypothesis 2: Hyperactivity Predicted from Activity and Excitement Seeking, Controlling Statistically for Neuroticism.*

NEO-PI-R Facets	Hyperactivity/ Restlessness	Neuroticism	Activity	Excitement Seeking
Hyperactivity/Restlessness		.403**	.110	.064
Neuroticism			-.035	-.151*
Activity				.346**
Excitement Seeking				

*Note.* *N*'s range from 152 to 155 due to occasional missing data.

\*  $p < .05$  (1-tail)

\*\* $p < .01$  (1-tail)

Neuroticism, the covariate, was significantly correlated with Inattentiveness,  $r(153) = .403, p < .001$ , but neither of the facet score independent variables were significantly correlated with Inattentiveness. No further analyses were needed to test Hypothesis 2, it having been determined that none of the facet score predictors were significantly related to the Hyperactivity dependent variable. However, the relationship between Neuroticism and Hyperactivity was examined further using bivariate regression

analysis. Table 6 provides the details of the resulting regression equation. With 155 cases in the analysis, Neuroticism accounted for 16.2% of the variance in Hyperactivity,  $F(1,153) = 29.606, p < .001$ .

Table 6

*Details of the Regression Equation of Hyperactivity on Neuroticism.*

Model	Unstandardized Coefficients		Beta	<i>t</i>	Sig.
	B	Std. Error			
1 (Constant)	34.114	4.173			
Neuroticism	0.375	0.069	0.403	5.441	.000

Hypothesis 2 was not supported by the data. Although Neuroticism predicted a statistically significant 16.2% of the variance in Hyperactivity, neither of the personality facet scales that were the focus in Hypothesis 2 were significantly correlated with Hyperactivity.

**Hypothesis 3: Symptoms of Impulsivity will be positively related to Excitement Seeking of the Extraversion factor and inversely related to Agreeableness facets of Altruism and Compliance, while controlling for Neuroticism.**

The test of Hypothesis 3 began with an examination of the bivariate correlations between the variables relevant to the hypothesis. The dependent variable was Impulsivity,

as measured by the Impulsivity/Emotional Lability scale of the CAARS, the covariate was Neuroticism from the NEO-PI-R, and the three facet score independent variables from the NEO-PI-R were Excitement Seeking, Altruism, and Compliance. These correlations are shown in Table 7. Impulsivity was significantly correlated with the covariate Neuroticism,  $r(153) = .627, p < .001$ , and two of the facet score variables: Excitement Seeking,  $r(153) = -.172, p = .016$ , and Altruism,  $r(152) = -.156, p = .027$ .

Table 7

*Bivariate Correlations for Hypothesis 3: Impulsivity Predicted from Excitement Seeking, Altruism, and Compliance, Controlling Statistically for Neuroticism.*

NEO-PI-R Facets	Impulsivity/ Emotional Lability	Neuroticism	Excitement Seeking	Altruism	Compliance
Impulsivity/Emotional Lability		.627**	-.172*	-.156*	.112
Neuroticism			-.151*	-.047	.002
Excitement Seeking				.124	-.307**
Altruism					.250**
Compliance					

*Note.* *N*'s range from 154 to 155 due to occasional missing data.

\*  $p < .05$  (1-tail)

\*\* $p < .01$  (1-tail)

The test of Hypothesis 3, that Impulsivity is significantly related to Excitement Seeking, Altruism, and Compliance after controlling statistically for Neuroticism, continued using hierarchical multiple regression analysis. The ADHD dependent variable in the analysis was Impulsivity and the covariate entered in Block 1 was the Neuroticism personality factor. Excitement Seeking and Altruism facet scores were entered as predictor variables in Block 2. The other facet score, Compliance, was not entered in

Block 2 because that variable was not found previously to be significantly correlated with Impulsivity. Using listwise deletion of missing data, the number of cases in the hierarchical multiple regression analysis was 154.

Results of the hierarchical multiple regression analysis are summarized in Table 6. The covariate Neuroticism explained 39.2% of the variance in Inattentiveness,  $F(1, 152) = 97.863, p < .001$ . The two personality facet independent variables, Excitement Seeking and Altruism, explained an additional 2.0% of the variance in Inattentiveness, but this increase was statistically nonsignificant  $F(1, 150) = 2.564, p = .080$ .

Table 8

*Results of Hierarchical Regression Equation to Predict Impulsivity From Excitement Seeking, Controlling Statistically for Neuroticism.*

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	F Change	df1	df2	Sig. F Change
1	.626	.392	.388	9.538	.392	97.863	1	152	.000
2	.642	.412	.400	9.441	.020	2.564	2	150	.080

*Notes.* The predictor variable in Model 1 was Neuroticism. In Model 2, predictors were Neuroticism, Altruism, and Excitement Seeking.

Table 9 provides details of the model and tests of the significance of the individual predictors. Although Neuroticism explained significant variance in Impulsivity, neither Excitement Seeking,  $\beta = -.065, t = -1.021, p = .309$ , nor Altruism,  $\beta = -.119, t = -1.886, p = .061$ , explained a significant unique variance beyond that already accounted for by the other variables.

Table 9

*Summary of the Model to Predict Impulsivity From Excitement Seeking, Controlling Statistically for Neuroticism.*

Model	Unstandardized Coefficients		Beta	<i>t</i>	Sig.
	B	Std. Error			
1 (Constant)	27.691	3.428			
Neuroticism	0.560	0.057	0.626	9.893	.000
2 (Constant)	38.621	6.142			
Neuroticism	0.546	0.057	0.610	9.632	.000
Excitement Seeking	-0.069	0.068	-0.065	-1.021	.309
Altruism	-0.128	0.068	-0.119	-1.886	.061

Hypothesis 3 was not supported. Compliance was not significantly correlated with Impulsivity, and although Excitement Seeking and Altruism were both significantly correlated with Impulsivity, results of the hierarchical multiple regression analysis found that these two facets did not provide significant additional explained variance in Impulsivity once the covariate Neuroticism was controlled statistically.

## Chapter 5: Discussion

The purpose of this study was to gain greater insight into the relationship between personality and ADHD by exploring facets of the NEO-PI-R and ADHD symptoms described by the CAARS. As previously indicated, the predictive utility of facets remains unclear, and, therefore, the current study sought a greater understanding of the predictive power of facets in adults with ADHD.

Facets of the NEO-PI-R (Activity and Excitement Seeking of the Extraversion factor, Agreeableness facets of Altruism and Compliance, Dutifulness, Self-Discipline, Achievement/Striving, and Order of the Conscientiousness factor) were used to predict ADHD symptoms as measured by the CAARS, specifically, Inattention/Memory, Hyperactivity, and Impulsivity. Facets were selected based on previous research showing a relationship between ADHD and the parent factor and through using a rational, logical method, outlined by Fein and Klein (2011), to select individual facets to explore. Although Excitement Seeking and Altruism were both significantly correlated with Impulsivity, results of the hierarchical multiple regression analysis found that these two facets did not provide significant additional explained variance in Impulsivity once the covariate Neuroticism was statistically controlled. Thus, based on the present findings, none of the hypotheses regarding individual facets were supported.

What was gleaned in this study, in part, was the power and influence of Neuroticism in this population. Neuroticism was controlled for statistically because, based on previous studies, a relationship between ADHD and neuroticism had been established and there is a clear relationship between neuroticism and other clinical syndromes. However the intent of this study was to understand ADHD and personality,

rather than the comorbid conditions that often occur with ADHD and correlate with Neuroticism. While some influence of Neuroticism was predicted, the degree in which it influenced these findings was underestimated. For example, in Hypothesis 3, Neuroticism explained 39.2% of the variance in Inattentiveness. Overall, Neuroticism consumed enough variance that even the statically significant facets of Excitement Seeking and Altruism were no longer significant when Neuroticism was statistically controlled. This study demonstrates the degree of influence that comorbid Neuroticism can exert on the symptomatology of individuals with ADHD. These results serve as a keen reminder that effective assessment and treatment assessing and treatment of ADHD is unlikely limited to inattention, hyperactivity, and impulsivity, alone.

Another interesting area for exploration is what was not supported in this study. For example, there is a well-established inverse relationship between ADHD and Conscientiousness. However, facets selected from this factor did not reveal a statistically significant relationship. This may be due to the fact that these select facets did not capture the full influence of the parent factor. It is also possible that individuals from this sample have developed compensatory strategies in an effort to help them cope with ADHD symptoms. For example, environmental engineering refers to the process of setting up one's space to make it more compatible with ADHD. Specifically, simply reducing distractions in work areas to make it more ADHD friendly and by engaging in training of the executive function by being consistent in the routine can improve performance. In addition, cognitive modification is another example of an effective compensatory strategy. Task interfering thoughts may involve a magnified view of the task or a

perceived inability to complete the task. Cognitive modification allows for alternative explanations, which can enhance motivation and functioning (Ramsay, 2010).

Similarly, Palmieri (2008) also found that certain behavioral strategies could develop in successful adults with ADHD. For instance, forgetfulness is addressed through frequent note taking, alarm clocks, routinizing tasks, and with the help of collaterals. The frequent tendency to procrastinate and engage in "brinksmanship" may be addressed through the development of abilities for "last minute pushes," (p. 65) increasing the salience of the importance of specific tasks, increasing self-talk, scheduling and explicitly constructing graded tasks (Ramsay & Rostain, 2003). Thus, it is very possible that some of the aforementioned compensatory strategies are adaptive, in that they help the individual to compensate for the cognitive deficits and behavioral dysfunction associated with ADHD.

Overall, these findings were highly curious and appeared to defy intuition, at least generally. In addition to the fact these results may reflect compensatory strategies in the population tested, the present results, may also support some additional hypotheses to help to understand the data. Such counterintuitive results may reflect that individuals with ADHD are notoriously poor self-reporters, at least in part, due to low self-awareness, the latter, common among individuals with ADHD (Barkley et al., 2002). In support of this hypothesis and as previously indicated, in the Milwaukee study conducted by Barkley et al. (2002) only 3 to 5% of participants qualified for a DSM-III diagnosis of ADHD in young adulthood, according to self-report. However, according to parental reports on the same individuals, 42% met ADHD diagnostic criteria. Manor et al. (2012)

also determined that adults with ADHD tended to underestimate ADHD related impairments.

Whereas permutations of facets from the NEO-PI-R, exclusive of parent factors, do not appear to be a reliable predictor of all aspects of ADHD, there are other considerations that should be taken into account when exploring the relationship between personality and ADHD type: one of which is that the particular constellation of facets chosen for investigation in this study is not predictive of ADHD symptoms. Despite previous research demonstrating a relationship between the NEO parent factors and ADHD (Braaten & Rosen, 1997; Jacob et al, 2007; McKinney, Canu, & Schneider, 2012; Nigg et al, 2002; Parker, Majeski, & Collin, 2004; Ranssen, Cambell, & Baer, 1998; Knouse, 2013); previous studies have also shown that some facets may operate independent of their parent factor (Bipp, Steinmayr, & Spinath, 2008).

This study extends the existing research on the FFM, which is considered by most to be the most empirically supported, well-established personality model. While the present study did not support the notion that individual facets were predictive of ADHD symptoms, it provided strong support for the impact of Neuroticism on this important clinical disorder.

### **Limitations**

There are several limitations in this study. One of which is the characteristic of the present sample, itself. Given the cost of a thorough intake evaluation and treatment, the majority of participants here are self-referred and private pay. Consequently, such a scenario might naturally attract individuals who tend to be either higher functioning and/or having more financial means. Screening for more severe and chronic pathology

also limits the understanding to those with select comorbid issues, although even in this sample, symptoms of ADHD and other clinical syndromes and personality disorders may be quite severe.

In addition, a control group was not utilized, which does not allow for a benchmark of comparison. Another limitation is the use of the self-report to gather data. Those with ADHD may not be the most accurate self-reporters and tend to underestimate personal symptoms due to a lack of self-awareness. Their awareness of dysfunction is subject to their own perception of experience. Finally, data was also collected in accordance to the ADHD types outlined in the DSM-IV-TR (APA, 2000), which has since been updated.

### **Future Research**

The idea that exploring facets of the FFM can illuminate a deeper understanding into an individual's functioning for a host of disorders is in the early stages of investigation and nuanced. It is important for future research to further explore facets, as they have the potential, in some instances, to expand on and refine our knowledge of how a personality relates to various important aspects of life. Whereas a relationship between certain facets and ADHD was only partially supported in this study, previous research supports the relationship between ADHD and the five factors of personality. Refining aspects of personality and their relationship to ADHD further promotes an understanding of the disorder and continued refinement of more targeted assessment and treatment. Interestingly, in the present study, the data might even suggest that these individuals may be more cognizant of some symptoms than others and recognize more symptoms over

others. Further research may be able to determine which symptoms are more apparent to those with ADHD.

In addition, obtaining an understanding of how the frequent comorbid disorders may interact with personality may further inform the nature of ADHD. In addition, it would be beneficial to examine ADHD longitudinally and how the disorder influences personality over time, and vice versa.

### References

- American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders* (5th ed.). Washington, DC: Author.
- American Psychiatric Association. (2000). *Diagnostic and statistical manual of mental disorders* (4th ed., text rev.). Washington, DC: Author
- American Psychiatric Association. (2000). *Diagnostic and statistical manual of mental disorders* (4th ed., text rev.). Washington, DC: Author
- American Psychiatric Association. (1994). *Diagnostic and statistical manual of mental disorders* (4th ed.). Washington, DC: Author
- American Psychiatric Association. (1987). *Diagnostic and statistical manual of mental disorders* (3<sup>rd</sup> ed., revised.). Washington, DC: Author
- American Psychiatric Association. (1980). *Diagnostic and statistical manual of mental disorders* (3<sup>rd</sup> ed.). Washington, DC: Author
- Ameringer, K. J., & Leventhal, A. M. (2013). Associations between attention deficit hyperactivity disorder symptom domains and DSM-IV lifetime substance dependence. *The American Journal On Addictions*, 22(1), 23-32.  
doi:10.1111/j.1521-0391.2013.00325
- Angold, A., Costello, E., & Erkanli, A. (1999). Comorbidity. *Journal Of Child Psychology And Psychiatry*, 40(1), 57-87. doi:10.1111/1469-7610.00424
- Antshel, K. M., & Barkley, R. (2011). Children with ADHD grown up. In S. Goldstein, J. A. Naglieri, M. DeVries (Eds.). *Learning and attention disorders in adolescence and adulthood: Assessment and treatment* (2nd ed.) (pp. 113-134). Hoboken, NJ US: John Wiley & Sons Inc.

- Babinski, L. M., & Hartsough, C. S. (1999). Childhood conduct problems, hyperactivity-impulsivity, and inattention as a predictors of adult. *Journal Of Child Psychology & Psychiatry & Allied Disciplines*, 40(3), 347.
- Barkley, R. A., & Murphy, K. R. (2007). Comorbid Psychiatric Disorders in Adults with ADHD. *ADHD Report*, 15(2), 1-7.
- Barkley, R. A. (1997). Attention-deficit/hyperactivity disorder, self-regulation, and time: Toward a more comprehensive theory. *Journal Of Developmental And Behavioral Pediatrics*, 18(4), 271-279. doi:10.1097/00004703-199708000-00009.
- Barkley, R. A. (1997). Behavioral inhibition, sustained attention, and executive functions: Constructing a unifying theory of ADHD. *Psychological Bulletin*, 121(1), 65-94. doi:10.1037/0033-2909.121.1.6
- Barkley, R. A. (2011). *Barkley Deficits in Executive Functioning Scale*. New York: Guilford Press.
- Barkley, R. A. (2011). *Barkley Adult ADHD Rating Scale*. New York: Guilford Press.
- Barkley, R., Fischer, M., Smallish, L., & Fletcher, K. (2004). Young adult follow-up of hyperactive children: antisocial activities and drug use. *Journal Of Child Psychology & Psychiatry*, 45(2), 195-211.
- 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.
- Bax, M. & MacKeith (1963). Minimal cerebral dysfunction. *Little Club Clinics in*

developmental medicine. Heineman, London.

- Beaver, K. M., Nedelec, J. L., Rowland, M. W., & Schwartz, J. A. (2012). Genetic risks and ADHD symptomatology: Exploring the effects of parental antisocial behaviors in an adoption-based study. *Child Psychiatry And Human Development, 43*(2), 293-305. doi:10.1007/s10578-011-0263
- Beck, A. T., Epstein, N., Brown, G., & Steer, R. A. (1988). An inventory for measuring clinical anxiety: Psychometric properties. *Journal of Consulting & Clinical Psychology, 56*, 893-897.
- Beck, A. T., Epstein, N., Brown, G., & Steer, R. A. (1996). Beck Depression Inventory, Second Edition. Pearson Assessments: San Antonio, TX.
- Beck, A. T., (1993). Beck Hopelessness Scale. Pearson assessments: San Antonio, TX.
- Berlin, I., Hu, M., Covey, L. S., & Winhusen, T. (2012). Attention-deficit/hyperactivity disorder (ADHD) symptoms, craving to smoke, and tobacco withdrawal symptoms in adult smokers with ADHD. *Drug And Alcohol Dependence, 124*(3), 268-273. doi:10.1016/j.drugalcdep.2012.01.019
- Biederman, J., Petty, C. R., Evans, M., Small, J., & Faraone, S. V. (2010). How persistent is ADHD? A controlled 10-year followup study of boys with ADHD. *Psychiatry Research, 177*, 299-304. doi:10.1016/j.psychres.2009.12.010
- Briley, D. A., & Tucker-Drob, E. M. (2012). Broad bandwidth or high fidelity? Evidence from the structure of genetic and environmental effects on the facets of the Five Factor Model. *Behavior Genetics, 42*(5), 743-763. doi:10.1007/s10519-012-9548-8
- Braaten, E. B., & Rosén, L. A. (1997). Emotional reactions in adults with symptoms of

- attention deficit hyperactivity disorder. *Personality and Individual Differences*, 22(3), 355-361. doi:10.1016/S0191-8869(96)00217-6
- Brod, M., Schmitt, E., Goodwin, M., Hodgkins, P., & Niebler, G. (2012). ADHD burden of illness in older adults: A life course perspective. *Quality Of Life Research: An International Journal Of Quality Of Life Aspects Of Treatment, Care & Rehabilitation*, 21(5), 795-799. doi:10.1007/s11136-011-9981-9
- Brown, T. (2001). *Brown Attention-Deficit Disorder Scales*. San Antonio: Pearson Assessments.
- Colledge, E. E., & Blair, R. R. (2001). The relationship in children between the inattention and impulsivity component of attention deficit and hyperactivity disorder and psychopathic tendencies. *Personality And Individual Differences*, 30(7), 1175-1187. doi:10.1016/S0191-8869(00)00101-X
- Conners, C., Erhardt, D., & Sparrow, E. (1998). *The conners adult ADHD rating scale (CAARS)*. Toronto: Multi-Health Systems Inc.
- Costa, P. T., Jr., & McCrae, R. R. (2010). *NEO PI-R professional manual*. Odessa, FL: Psychological Assessment Resources, Inc.
- Costa Jr., P. T., & McCrae, R. R. (1995). Domains and Facets: Hierarchical personality Assessment Using the Revised NEO Personality Inventory. *Journal Of Personality Assessment*, 64(1), 21.
- Cumyn, L., French, L., & Hechtman, L. (2009). Comorbidity in adults with attention-deficit hyperactivity disorder. *The Canadian Journal Of Psychiatry / La Revue Canadienne De Psychiatrie*, 54(10), 673-683.
- Davids, E., & Gastpar, M. (2005). Attention deficit hyperactivity disorder and borderline

- personality disorder. *Progress In Neuro-Psychopharmacology & Biological Psychiatry*, 29(6), 865-877. doi:10.1016/j.pnpbp.2005.04.033
- Diekhoff, G. M. (1992). *Statistics for the social and behavioral sciences : Univariate, bivariate, and multivariate*. New York : McGraw-Hill.
- Douglas, V. (1972). Stop, look and listen: the problem of sustained attention and impulse control hyperactive and normal children. *Canadian Journal of Behavioral Science*, 4, 259-282.
- Ebejer, J. L., Medland, S. E., van der Werf, J., Gondro, C., Henders, A. K., Lynskey, M., & ... Duffy, D. L. (2012). Attention deficit hyperactivity disorder in Australian adults: prevalence, persistence, conduct problems and disadvantage. *Plos ONE*, 7(10), doi:10.1371/journal.pone.0047404
- Eisenbarth, H. H., Alpers, G. W., Conzelmann, A. A., Jacob, C. P., Weyers, P. P., & Pauli, P. P. (2008). Psychopathic traits in adult ADHD patients. *Personality And Individual Differences*, 45(6), 468-472. doi:10.1016/ McKinne j.paid.2008.05.022
- 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. doi:10.1111/j.1468-2389.2011.00541.x
- Ferrer, M., Andi3n, 3., Matal3, J., Valero, S., Navarro, J., Ramos-Quiroga, J., & ... Casas, M. (2010). Comorbid attention-deficit/hyperactivity disorder in borderline patients defines an impulsive subtype of borderline personality disorder. *Journal Of Personality Disorders*, 24(6), 812-822. doi:10.1521/pedi.2010.24.6.812
- Fischer, A. G., Bau, C. D., Grevet, E. H., Salgado, C. I., Victor, M. M., Kalil, K. S., & ...

- 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. doi:10.1016/j.jpsychires.2006.09.008
- Fischer, M., Barkley, R. A., Smallish, L., & Fletcher, K. (2005). Executive Functioning in Hyperactive Children as Young Adults: Attention, Inhibition, Response Perseveration, and the Impact of Comorbidity. *Developmental Neuropsychology*, 27(1), 107-133. doi:10.1207/s15326942dn2701\_5
- Friedrichs, B., Igl, W., Larsson, H., & Larsson, J. (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. doi:10.1177/1087054710376909
- Fydrich, T., Dowdall, D., & Chambless, D. L. (1992). Reliability and validity of the Beck Anxiety Inventory. *Journal Of Anxiety Disorders*, 6(1), 55-61. doi:10.1016/0887-6185(92)90026-4
- Gadow, K. D., Sprafkin, J., Schneider, J., Nolan, E. E., Schwartz, J., & Weiss, M. D. (2007). ODD, ADHD, versus ODD + ADHD in clinic and community adults. *Journal Of Attention Disorders*, 11(3), 374-383. doi:10.1177/1087054706295609
- Garcia, C. R., Bau, C. D., Silva, K. L., Callegari-Jacques, S. M., Salgado, C. I., Fischer, A. G., & ... Grevet, E. H. (2012). The burdened life of adults with ADHD: Impairment beyond comorbidity. *European Psychiatry*, 27(5), 309-313. doi:10.1016/j.eurpsy.2010.08.002
- Gudjonsson, G. H., Sigurdsson, J., Young, S., Newton, A., & Peersen, M. (2009).

Attention deficit hyperactivity disorder (ADHD). How do ADHD symptoms relate to personality among prisoners?. *Personality And Individual Differences*, 47(1), 64-68. doi:10.1016/j.paid.2009.01.048

Halmøy, A., Fasmer, O., Gillberg, C., & Haavik, J. (2009). Occupational outcome in adult ADHD: Impact of symptom profile, comorbid psychiatric problems, and treatment: A cross-sectional study of 414 clinically diagnosed adult ADHD patients. *Journal Of Attention Disorders*, 13(2), 175-187. doi:10.1177/1087054708329777

Harpold, T., Biederman, J., Gignac, M., Hammerness, P., Surman, C., Potter, A., & Mick, E. (2007). Is oppositional defiant disorder a meaningful diagnosis in adults?: Results from a large sample of adults with ADHD. *Journal Of Nervous And Mental Disease*, 195(7), 601-605. doi:10.1097/NMD.0b013e318093f448

Jacob, C., Ramanos, J., Dempfle, A., Heine, M., Windemuth-Kieselback, C., Kruse, A., Reif, A., Walitza, S., Romanos, M., Strobel, A., Brocke, B., Schafer, H., Schmidtke, A., Boning J., & Lesch, K. (2007). Co-morbidity of adult attention-deficit/hyperactivity disorder with focus on personality traits and related disorders in a tertiary referral center. *European Archives of Psychiatry and Clinical Neuroscience*, 257, 309-317.

Johnson, J. A., Miller, M. L., Lynam, D. R., & South, S. C. (2012). Five-Factor Model facets differentially predict in-the-moment affect and cognitions. *Journal Of Research In Personality*, 46(6), 752-759. doi:10.1016/j.jrp.2012.09.002

Kessler, R. C., Adler, L., Barkley, R., Biederman, J., Conners, C., Demler, O., & ... Zaslavsky, A. M. (2006). The prevalence and correlates of adult ADHD in the

- United States: Results from the National Comorbidity Survey replication. *The American Journal Of Psychiatry*, 163(4), 716-723. doi:10.1176/appi.ajp.163.4.716
- Kessler, R. C., Adler, L. A., Gruber, M. J., Sarawate, C. A., Spencer, T., & Van Brunt, D. L. (2007). Validity of the World Health Organization Adult ADHD self-report scale (ASRS) screener in a representative sample of health plan members. *International Journal Of Methods In Psychiatric Research*, 16(2), 52-65. doi:10.1002/mpr.208
- Klassen, L. J., Katzman, M. A., & Chokka, P. (2010). Adult ADHD and its comorbidities, with a focus on bipolar disorder. *Journal Of Affective Disorders*, 124(1-2), 1-8. doi:10.1016/j.jad.2009.06.036
- Kollins, S. H., McClernon, F., & Fuemmeler, B. F. (2005). Association Between Smoking and Attention-Deficit/Hyperactivity Disorder Symptoms in a Population-Based Sample of Young Adults. *Archives Of General Psychiatry*, 62(10), 1142-1147. doi:10.1001/archpsyc.62.10.1142
- Kotov, R., Gamez, W., Schmidt, F., & Watson, D. (2010). Linking “big” personality traits to anxiety, depressive, and substance use disorders: A meta-analysis. *Psychological Bulletin*, 136, 768-821. doi:10.1037/a0020327
- Knobloch, H., Pasamanick, B. (1959). Syndrome of minimal cerebrak damage in infancy. *Journal of American Medical Association* 170, 1384-1387.
- Knouse, L. E., Traeger, L., O'Cleirigh, C., & Safren, S. A. (2013). Adult attention deficit hyperactivity disorder symptoms and five-factor model traits in a clinical sample: a structural equation modeling approach. *The Journal Of Nervous And Mental Disease*, 201(10), 848-854. doi:10.1097/NMD.0b013e3182a5bf33

- Kramer, F., Pollnow, H. (1932). Über eine hyperkinetische Erkrankung im Kindesalter. Aus der Psychiatrischen und Nerven-Klinik der Charité in Berlin (Direktor; Geh. Med.-Rat Prof. Dr. Bonhoeffer). *Mtschr Psychiat Nuerol* 82:21-40 [Reprint in Rothenberger A, Neumärker KJ (2005) *Wissenschaftsgeschichte der ADHS. Kramer-Pollnow im Spiegel der Zeite. Steinkopff, Darmstadt*]
- Krause-Utz, A., Sobanski, E., Alm, B., Valerius, G., Kleindienst, N., Bohus, M., & Schmahl, C. (2013). Impulsivity in relation to stress in patients with borderline personality disorder with and without co-occurring attention-deficit/hyperactivity disorder: An exploratory study. *Journal Of Nervous And Mental Disease*, 201(2), 116-123. doi:10.1097/NMD.0b013e31827f6462
- Lambert, N. M., & Hartsough, C. S. (2000). 'Prospective study of tobacco smoking and substance dependencies among samples of ADHD and non-ADHD participants': Reply. *Journal Of Learning Disabilities*, 33(4), 314-316.
- 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. doi:10.1007/s12402-010-0045-8
- Larsson, H., Anckarsater, H., Råstam, M., Chang, Z., & Lichtenstein, P. (2012). Childhood attention- deficit hyperactivity disorder as an extreme of a continuous trait: A quantitative genetic study of 8,500 twin pairs. *Journal Of Child Psychology And Psychiatry*, 53(1), 73-80. doi:10.1111/j.1469-7610.2011.02467.x
- Laufer, M., W., Denhoff., Solomon, G., (1957). Hyperkinetic impulse disorder in children's behavior problems. *Psychosomatic Medicine* 19: 38-49.
- Lilienfeld, S. O., & Widows, M. R. (2005). Psychopathic Personality Inventory—Revised

- (PPI-R) professional manual. Odessa, FL: Psychological Assessment Resources
- Lynam, D., (1996) The early identification of chronic offenders: Who is the fledging psychopath? *Psychological Bulletin*, 120, 209-234.
- Mannuzza, S., Klein, R. G., Bessler, A., & Malloy, P. (1993). Adult outcome of hyperactive boys: Educational achievement, occupational rank, and psychiatric status. *Archives Of General Psychiatry*, 50(7), 565-576.  
doi:10.1001/archpsyc.1993.01820190067007
- Manor, I. I., Vurembrandt, N. N., Rozen, S. S., Gevah, D. D., Weizman, A. A., & Zalsman, G. G. (2012). Low self-awareness of ADHD in adults using a self-report screening questionnaire. *European Psychiatry*, 27(5), 314-320.  
doi:10.1016/j.eurpsy.2010.08.013
- Matthies, S., van Elst, L., Feige, B., Fischer, D., Scheel, C., Krogmann, E., & ... Philipsen, A. (2011). Severity of childhood attention-deficit hyperactivity disorder—A risk factor for personality disorders in adult life?. *Journal Of Personality Disorders*, 25(1), 101-114. doi:10.1521/pedi.2011.25.1.101
- May, B., & Bos, J. (2000). Personality characteristics of ADHD adults assessed with the Millon Clinical Multiaxial Inventory—II: Evidence of four distinct subtypes. *Journal Of Personality Assessment*, 75(2), 237-248.  
doi:10.1207/S15327752JPA7502\_5
- McCrae, R. R., Costa, P. r., Martin, T. A., Oryol, V. E., Rukavishnikov, A. A., Senin, I. G., & ... Urbánek, T. (2004). Consensual validation of personality traits across cultures. *Journal Of Research In Personality*, 38(2), 179-201. doi:10.1016/S0092-6566(03)00056-4

- McKinney AA, Canu WH & Schneider HG (2012) Distinct ADHD Symptom Clusters Differentially Associated With Personality Traits. *Journal of Attention Disorders*.
- Michielsen, M., Comijs, H. C., Semeijn, E. J., Beekman, A. F., Deeg, D. H., & Sandra Kooij, J. J. (2012). The comorbidity of anxiety and depressive symptoms in older adults with attention-deficit/hyperactivity disorder: A longitudinal study. *Journal Of Affective Disorders*, doi:10.1016/j.jad.2012.11.063
- Miller, T. W., Nigg, J. T., & Faraone, S. V. (2007). Axis I and II comorbidity in adults with ADHD. *Journal Of Abnormal Psychology*, 116(3), 519-528.  
doi:10.1037/0021-843X.116.3.519
- Miller, C. J., Miller, S. R., Newcorn, J. H., & Halperin, J. M. (2008). Personality characteristics associated with persistent ADHD in late adolescence. *Journal Of Abnormal Child Psychology*, 36(2), 165-173. doi:10.1007/s10802-007-9167-
- Millon, T. (1997). MCMI-III: Manual. Minneapolis, Minn: NCS Pearson, Inc.
- Millstein, R. B., Wilens, T. E., Biederman, J., & Spencer, T. J. (1997). Presenting ADHD symptoms and subtypes in clinically referred adults with ADHD. *Journal Of Attention Disorders*, 2(3), 159-166. doi:10.1177/108705479700200302
- Millstein, R. B., Wilens, T. E., Biederman, J., & Spencer, T. J. (1997). Presenting ADHD symptoms and subtypes in clinically referred adults with ADHD. *Journal Of Attention Disorders*, 2(3), 159-166. doi:10.1177/108705479700200302
- Modestin, J., Matutat, B., & Würmle, O. (2001). Antecedents of opioid dependence and personality disorder: Attention-deficit/hyperactivity disorder and conduct disorder. *European Archives Of Psychiatry And Clinical Neuroscience*, 251(1), 42-47. doi:10.1007/s004060170067

- Molina, B. S. G., Bukstein, O. G., & Lynch, K. G. (2002). Attention-deficit/hyperactivity disorder and conduct disorder symptomatology in adolescents with alcohol use disorder. *Psychology of Addictive Behaviors, 16*, 161-164. doi:10.1037/0893-164X.16.2.161
- Molina, B. S. G., Bukstein, O. G., & Lynch, K. G. (2002). Attention-deficit/hyperactivity disorder and conduct disorder symptomatology in adolescents with alcohol use disorder. *Psychology of Addictive Behaviors, 16*, 161-164. doi:10.1037/0893-164X.16.2.161
- Montejano, L., Sasané, R., Hodgkins, P., Russo, L., & Huse, D. (2011). Adult ADHD: Prevalence of diagnosis in a US population with employer health insurance. *Current Medical Research And Opinion, 27*(Suppl 2), 5-11. doi:10.1185/03007995.2011.603302
- Mordre, M., Groholt, B., Kjelsberg, E., Sandstad, B., & Myhre, A. (2011). The impact of ADHD and conduct disorder in childhood on adult delinquency: A 30 years follow-up study using official crime records. *BMC Psychiatry, 11*, doi:10.1186/1471-244X-11-57
- Murphy, K. R., Barkley, R. A., & Bush, T. (2002). Young adults with attention deficit hyperactivity disorder: Subtype differences in comorbidity, educational and clinical history. *Journal Of Nervous And Mental Disease, 190*(3), 147-157. doi:10.1097/00005053-200203000-00003
- Murphy, K., & Barkley, R. A. (1996). Attention deficit hyperactivity disorder adults: Comorbidities and adaptive impairments. *Comprehensive Psychiatry, 37*(6), 393-401. doi:10.1016/S0010-440X(96)90022-X

- Meyers, L. S., Gamst, G., & Guarino, A. J. (2006). *Applied multivariate research: Design and Interpretation*. Thousand Oaks, CA: Sage Publications.
- Meyers, L. S., Gamst, G., & Guarino, A. J. (2013). *Applied multivariate research: Design and Interpretation*. Los Angeles: Sage Publications.
- Nigg J. T, Blaskey LG, Huang-Pollock CL & John OP (2002) ADHD symptoms and personality traits: Is ADHD an extreme personality trait? *The ADHD Report* 10:6-11.
- Nigg, J. T., John, O. P., Blaskey, L. G., Huang-Pollock, C. L., Willicut, 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. doi:10.1037/0022-3514.83.2.451
- Nigg, J. T., Goldsmith, H., & Sachek, J. (2004). Temperament and Attention Deficit Hyperactivity Disorder: The Development of a Multiple Pathway Model. *Journal Of Clinical Child And Adolescent Psychology*, 33(1), 42-53.  
doi:10.1207/S15374424JCCP3301\_5
- Nigg, J. (2001). Is ADHD a disinhibitory disorder?. *Psychological Bulletin*, 127(5), 571-598.
- Nijs, P., Ferdinand, R., & Verhulst, F. (2007). No hyperactive-impulsive subtype in teacher-rated attention-deficit/hyperactivity problems. *European Child & Adolescent Psychiatry*, 16(1), 25-32. doi:10.1007/s00787-006-0572-1
- Norman, W. (1963). Toward an adequate taxonomy of personality attributes: replicated factor structure in peer nomination personality ratings. *Journal of Abnormal Psychology*, 66: 574-83.

- O'Cleirigh C, Ironson G, Weiss A & Costa PT (2007) Conscientiousness predicts disease progression (CD4 number and viral load) in people living with HIV. *Health Psychology* 26:473-480.
- Paris, J. (2015). Applying the principles of psychotherapy integration to the treatment of borderline personality disorder. *Journal of Psychotherapy Integration*, 25(1), 13-19. doi:10.1037/a0038767
- Parker, J. A., Majeski, S. A., & Collin, V. (2004). ADHD symptoms and personality: Relationships with the five-factor model. *Personality And Individual Differences*, 36(4), 977-987. doi:10.1016/S0191-8869(03)00166-1
- Parker, J. A., Majeski, S. A., & Collin, V. (2004). ADHD symptoms and personality: Relationships with the five-factor model. *Personality And Individual Differences*, 36(4), 977-987. doi:10.1016/S0191-8869(03)00166-1
- Paunonen, S., & Ashton, M. (2001). Big five factors and facets and the prediction of behavior. *Journal Of Personality And Social Psychology*, 81(3), 524-539.
- Polanczyk, G., de Lima, M., Horta, B., Biederman, J., & Rohde, L. (2007). The worldwide prevalence of ADHD: A systematic review and metaregression analysis. *The American Journal Of Psychiatry*, 164(6), 942-948.  
doi:10.1176/appi.ajp.164.6.942
- Pomerleau, O. F., Downey, K. K., Stelson, F. W., & Pomerleau, C. S. (1995). Cigarette smoking in adult patients diagnosed with attention deficit hyperactivity disorder. *Journal Of Substance Abuse*, 7(3), 373-378. doi:10.1016/0899-3289(95)90030-6

- Rachel G. Klein, P. (n.d). Clinical and Functional Outcome of Childhood Attention-Deficit/Hyperactivity Disorder 33 Years Later. *Arch Gen Psychiatry*, 69(12), 1295-1303.
- 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.  
doi:10.1177/107319119800500104
- Ramsay, J. R., & Rostain, A. L. (2003). A cognitive therapy approach for adult attention deficit/hyperactivity disorder. *Journal Of Cognitive Psychotherapy*, 17(4), 319-334. doi:10.1891/jcop.17.4.319.52537
- Ramsay, J. (2010). ADHD in adulthood. In , Nonmedication treatments for adult ADHD: Evaluating impact on daily functioning and well-being (pp. 9-35). Washington, DC US: American Psychological Association. doi:10.1037/12056-001
- Ramsay, J. R. (2010). CBT for Adult ADHD: Adaptations and hypothesized mechanisms of change. *Journal Of Cognitive Psychotherapy*, 24(1), 37-45.
- Reimherr, F. W., Marchant, B. K., Olsen, J. L., Wender, P. H., & Robison, R. J. (2013). Oppositional defiant disorder in adults with ADHD. *Journal Of Attention Disorders*, 17(2), 102-113. doi:10.1177/1087054711425774
- Rector NA; Bagby RM; Huta V; Ayearst, L. (2012). Examination of the trait facets of the five-factor model in discriminating specific mood and anxiety disorders. *Psychiatry Research*, 199(2), 131-139. doi:10.1016/j.psychres.2012.04.027
- Retz, W., & Rösler, M. (2009). The relation of ADHD and violent aggression: What can we learn from epidemiological and genetic studies. *International Journal Of Law & Psychiatry*, 32(4), 235-243. doi:10.1016/j.ijlp.2009.04.006

- Rey, J. M., Singh, M., Andrews, G., & Andrews, G. (1995). Continuities between psychiatric disorders in adolescents and personality disorders in young adults. *The American Journal Of Psychiatry*, *152*(6), 895-900.
- Reynolds, S. K., & Clark, L. (2001). Predicting Dimensions of Personality Disorder From Domains and Facets of the Five Factor Model. *Journal Of Personality*, *69*(2), 199-222.
- Richards, T. L., Deffenbacher, J. L., Rosén, L. A., Barkley, R. A., & Rodricks, T. (2006). Driving anger and driving behavior in adults with ADHD. *Journal Of Attention Disorders*, *10*(1), 54-64. doi:10.1177/1087054705284244
- Robin, A. L., Tzelepis, A., & Bedway, M. (2008). A cluster analysis of personality style in adults with ADHD. *Journal Of Attention Disorders*, *12*(3), 254-263. doi:10.1177/1087054708316252
- Ross, D., M., & Ross, S., A. (1976). *Hyperactivity: Research, theory, and action*. Wiley: New York.
- Rosenfield, G., B., & Bradley, C. (1948). Childhood behavior sequelae of asphyxia in infancy. *Pediatrics* 2: 74-84.
- Salmela-Aro, K., Read, S., Nurmi, J., Vuoksimaa, E., Siltala, M., Dick, D. M., & ... Rose, R. J. (2012). Personal goals and personality traits among young adults: Genetic and environmental effects. *Journal Of Research In Personality*, *46*(3), 248-257. doi:10.1016/j.jrp.2012.01.007
- Secnik, K., Swensen, A., & Lage, M. (2005). Comorbidities and costs of adult patients diagnosed with attention-deficit hyperactivity disorder. *Pharmacoeconomics*, *23*(1), 93-102. doi:10.2165/00019053-200523010-00008

- Semiz, U., Basoglu, C., Oner, O., Munir, K., Ates, A., Algul, A., & ... Cetin, M. (2008). Effects of diagnostic comorbidity and dimensional symptoms of attention-deficit-hyperactivity disorder in men with antisocial personality disorder. *The Australian And New Zealand Journal Of Psychiatry*, *42*(5), 405-413.  
doi:10.1080/00048670801961099
- Soto, C. J., John, O. P., Gosling, S. D., & Potter, J. (2011). Age differences in personality traits from 10 to 65: Big Five domains and facets in a large cross-sectional sample. *Journal Of Personality And Social Psychology*, *100*(2), 330-348.  
doi:10.1037/a0021717
- Spencer, T., Wilens, T., Biederman, J., Wozniak, J., & Harding-Crawford, M. (2000). Attention-deficit/hyperactivity disorder with mood disorders. In T. E. Brown (Ed.), *Attention-deficit disorders and comorbidities in children, adolescents, and adults* (pp. 79-124). Arlington, VA US: American Psychiatric Publishing, Inc.
- Spinath, B., Stiensmeier-Pelster, J., Schöne, C., & Dickhäuser, O. (2002). SELLMO – Skalen zur Erfassung der Lern- und Leistungsmotivation. Testmanual [SELLMO – Learning and achievement motivation assessment scales. Manual]. Göttingen: Hogrefe.
- Steer, R. A., Ranieri, W. F., Kumar, G., & Beck, A. T. (2003). Beck Depression Inventory-II items associated with self-reported symptoms of ADHD in adult psychiatric outpatients. *Journal Of Personality Assessment*, *80*(1), 58-63.  
doi:10.1207/S15327752JPA8001\_14
- Steer, R. A., Ranieri, W. F., Kumar, G., & Beck, A. T. (2003). Beck Depression Inventory-II items associated with self-reported symptoms of ADHD in adult

psychiatric outpatients. *Journal Of Personality Assessment*, 80(1), 58-63.

doi:10.1207/S15327752JPA8001\_14

Still, George, F. (1902). Some abnormal psychical conditions in children: the Goulstonian lectures. *Lancet*: 1008-1012.

Tanya E. Froehlich, M. (n.d). Prevalence, Recognition, and Treatment of Attention-Deficit/Hyperactivity Disorder in a National Sample of US Children. *Arch Pediatric Adolescent Medicine*, 161(9), 857-864.

Unnever, J. D., & Cornell, D. G. (2003). Bullying, Self-Control, and ADHD. *Journal Of Interpersonal Violence*, 18(2), 129.

Valero, S., Ramos-Quiroga, A., Gomà-i-Freixanet, M., Bosch, R., Gómez-Barros, N., Nogueira, M., & ... Casas, M. (2012). Personality profile of adult ADHD: The alternative five factor model. *Psychiatry Research*, 198(1), 130-134.

doi:10.1016/j.psychres.2011.11.006

Van Ameringen, M., Mancini, C., Simpson, W., & Patterson, B. (2011). Adult attention deficit hyperactivity disorder in an anxiety disorders population. *CNS Neuroscience & Therapeutics*, 17(4), 221-226. doi:10.1111/j.17 55-5949.2010.00148.x

Van Dijk, F., Lappenschaar, M., Kan, C., Verkes, R., & Buitelaar, J. (2011). Lifespan attention deficit/hyperactivity disorder and borderline personality disorder symptoms in female patients: A latent class approach. *Psychiatry Research*, 190(2-3), 327-334. doi:10.1016/j.psychres.2011.06.023

Volkow, N. D., Wang, G., Newcorn, J. H., Kollins, S. H., Wigal, T. L., Telang, F., & ...

- Swanson, J. M. (2011). Motivation deficit in ADHD is associated with dysfunction of the dopamine reward pathway. *Molecular Psychiatry, 16*(11), 1147-1154. doi:10.1038/mp.2010.97
- Weiss, M. (2000). Weiss Functional Impairment Rating Scale Self-Report. British Columbia: University of British Columbia
- Widiger, T., Costa, P. (2013). Personality disorders and the five factor model of personality (3<sup>rd</sup> ed). Washington DC: American Psychological Association
- White, J. D. (1999). Personality, temperament, and ADHD: A review of the literature. *Personality And Individual Differences, 27*(4), 589-598. doi:10.1016/S0191-8869(98)00273-6
- Reimherr, F. W., Marchant, B. K., Williams, E. D., Strong, R. E., Halls, C., & Soni, P. (2010). Personality disorders in ADHD Part 3: Personality disorder, social adjustment, and their relation to dimensions of adult ADHD. *Annals Of Clinical Psychiatry, 22*(3), 103-112.
- Whiteside, S. P., & Lynam, D. R. (2001). The five factor model and impulsivity: Using a structural model of personality to understand impulsivity. *Personality and Individual Differences, 30*, 669-689. doi:10.1016/S0191-8869(00)00064-7
- Wilens, T. E., Martelon, M., Joshi, G., Bateman, C., Fried, R., Petty, C., & Biederman, J. (2011). Does ADHD predict substance-use disorders? A 10-year follow-up study of young adults with ADHD. *Journal Of The American Academy Of Child & Adolescent Psychiatry, 50*(6), 543-553. doi:10.1016/j.jaac.2011.01.021
- Willcutt, E. G. (2012). The prevalence of DSM-IV attention-deficit/hyperactivity disorder: A meta-analytic review. *Neurotherapeutics, 9*(3), 490-499. doi:10.1007/s13311-012-0135-8

Witkiewitz, K., King, K., McMahon, R. J., Wu, J., Luk, J., Bierman, K. L., & ...

Pinderhughes, E. E. (2013). Evidence for a multi-dimensional latent structural model of externalizing disorders. *Journal Of Abnormal Child Psychology*, *41*(2), 223-237. doi:10.1007/s10802-012-9674-z

Young, S. (2005). Coping strategies used by adults with ADHD. *Personality And Individual Differences*, *38*(4), 809-816. doi:10.1016/j.paid.2004.06.005

Yurica, C. (2002) Inventory of cognitive distortions. Philadelphia: Philadelphia College of Osteopathic Medicine.