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Examining the Relationship Between Inattention, Impulsivity, and Externalizing Behaviors in Children: Does Intelligence Play a Role?

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EXAMINING THE RELATIONSHIP BETWEEN INATTENTION, IMPULSIVITY,
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Acknowledgments

Abstract

This study gathered data using archival clinical files from the Murray State University Psychological Center, which provides psychological services to students, faculty, staff, and community members. The majority of the participants for the sample consisted of Caucasian (93%) males (60%) seeking an assessment ($N = 76$). Measures of externalizing behaviors and attentional problems were gathered from the Child Behavior Checklist (CBCL), and a measure of general cognitive ability (GAI) was gathered from the Wechsler Intelligence Scale for Children-Fourth Edition (WISC-IV). It was hypothesized that the relationship between impulsivity and externalizing behaviors would be more pronounced when intelligence is lower. While a correlational analysis confirmed that attentional problems did predict externalizing behaviors in children ($p< .001$), the moderation analysis was not significant, indicating that intelligence did not play a significant role in the relationship between impulsivity and externalizing behaviors.

Keywords: Attention Deficit/Hyperactivity Disorder (ADHD), Conduct Disorder (CD), Externalizing behaviors, Inattentive, Impulsivity, Intelligence, Child Behavior Checklist (CBCL), Wechsler Intelligence Scale for Children- Fourth Edition (WISC-IV)

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Chapter I: Review of the Literature

The idea of having a "difficult child" is concerning to any parent; no parent wants to be in a state of conflict with their child due to their child's behavioral problems. Problem behaviors in children, such as fighting and arguing, are often difficult for parents to handle, and can cause strain within the family dynamic (Cameron, 1977). Parents typically seek psychological treatment for their children when they start to disobey rules or when behavioral problems start to emerge in school settings. Behavioral problems can arise due to numerous risk factors, such as low birth weight, child temperament, and various environmental factors like poor parental practices and low socioeconomic status (Cameron, 1977; Harden et al., 2015; Jaffee & Price, 2007; Murray & Farrington, 2010). The interaction of poor parental practices and temperament have also been found to affect the development of behavioral difficulties (Kazdin, 1997; Murray & Farrington, 2010). Parental practices are influential in how a child develops and in therapy, clinicians treating children tend to focus more on parental techniques and practices to correct arising problematic behaviors.

Hyperactivity, child compliance, and tantrums are typical externalizing behaviors that are common in clinical populations, such as with conduct disorders, attention deficit/hyperactivity disorder, and intellectual disabilities (American Psychiatric Association, 2013). Children with externalizing behaviors that also exhibit inattentive and impulsive behaviors tend to deal with more chronic symptoms that persist into

adolescence and adulthood (Kuja-Halkola, Lichtenstein, D'Onofrio, & Larsson, 2015). The combination of these behaviors in children can progress into more serious societal problems if the child starts engaging in rule-breaking and aggressive behaviors. Children with ADHD often struggle in academic settings due to their inattentive nature, leading to lower intelligence as they age (Burns, Nettelbeck, & McPherson, 2009); their lower intelligence may then exacerbate any presence of impulsive or externalizing behaviors, leading to problematic outcomes for the individual. The juvenile justice system is a typical solution for these children, which leads to large public expenditures (Foster, Jones, & Conduct Problems Prevention Research Group, 2005) and the cycle of incarceration into adulthood (Jonson-Reid & Barth, 2000).

Understanding Externalizing Behaviors

The externalizing behaviors of a child can be defined as a group of negative behaviors that are demonstrated outwardly and are observable in the external environment (Liu, 2006). Children and adolescents that display problematic external behaviors often face scrutiny from caregivers, school systems, and even society in more severe cases. Severe forms of externalizing behaviors like extreme rule-breaking and aggression can lead to assigning certain diagnoses, such as conduct disorder (CD). The onset of CD can occur in childhood or adolescence, and the diagnostic criteria used to identify CD includes persistent aggressive tendencies aimed at people or animals, destruction of property, deceitfulness, and serious rule violating (American Psychiatric Association, 2013). Aggressive behaviors often manifest as social bullying, physical cruelty, and fighting, while property destruction is usually deliberate damage to another's belongings by way of fire setting or other serious means. Deceitfulness can be described

as lying or stealing, and serious rule violations often involve truancy behaviors at school and running away from home (American Psychiatric Association, 2013). The pervasive nature of CD symptoms tends to have implications for the individual through adolescence and often into adulthood (Frick & Viding, 2009).

The lifetime pervasiveness of conduct disorder is roughly 9.5% (Nock, Kazdin, Hiripi, & Kessler, 2006), and the presence of symptoms during childhood presents strong evidence as a possible precursor for antisocial personality disorder in adulthood. This connection has been explained as the natural progression of internalizing and externalizing childhood behaviors that continue into adulthood (Le Corff, 2014). The development of CD is the result of maladaptive behaviors, which exacerbate as the child ages. There is evidence that suggests individuals with early onset and life-long CD may suffer from neurobiological abnormalities and low intellectual abilities (Moffitt, 2006). These factors, combined with callous unemotional traits and anger dysregulation, may offer insight as to the mechanisms present in the development of CD (Pardini & Frick, 2013). Frick and Viding (2009) outline the developmental implications of the presence of callous unemotional traits, which are defined as a lack of guilt, empathy, and the ability to care about others' feelings. Individuals with life-long CD that are lacking in emotional empathy tend to experience a more chronic course of the disorder due to more externalizing behaviors (Frick & Viding, 2009; Pardini & Frick, 2013). Based on the research from a large twin study that was conducted to identify the etiological explanations for the development of CD, the genetic risk for antisocial behavior and the influence of poor parental techniques were the greatest predictive factors for the onset of CD (Slutske et al., 1997).

The typical antisocial behaviors and callous unemotional traits of CD, as well as emotional dysregulation, are often affected by impulsive features; the combination of these problematic traits and behaviors are associated with the development of antisocial personality traits (Waller, 2015). These antisocial traits may become damaging to the individual or others if the traits worsen over time, which is why treating children with externalizing behaviors early on is important. Some of the early risk factors of CD are impossible to change despite preventative or treatment programs like those identified below (Conduct Problems Prevention Research Group, 2013; Henggeler & Sheidow, 2012; Kazdin, 1997; Mabe, Turner, & Josephson, 2001). Important risk factors, such as genetics and infancy temperament (Holmes, Slaughter, & Kashani, 2001) are difficult to modify but the aggressive and impulsive behaviors in school-age children can be more susceptible to treatment.

The externalizing behaviors of CD have been widely studied in regards to the prevention of onset and treatment of problem behaviors. The Fast Track Intervention program was developed in an effort to increase positive behaviors and reduce criminal activity among children identified in school systems exhibiting high risk behaviors (Conduct Problems Prevention Research Group, 2013). The Fast Track Intervention is designed based on the transactional cascade model, which posits that children with biologically based impulse and behavioral difficulties are more likely to have parents that struggle with managing the child's problem behaviors. This is seen as a risk factor for developing skill deficits, social rejection in school, and developing pervasive externalizing and antisocial behaviors (Conduct Problems Prevention Research Group, 2013). The intervention focused on several important areas of a child's life that has been

linked to the onset of CD, such as poor parental practices, deficient social-cognitive and emotional coping skills, poor peer relations, and weak academic skills. After ten years of study, the researchers found that the intervention proved successful in reducing the risk of the development of CD, which highlights the importance of catching high risk behaviors early on (Conduct Problems Prevention Research Group, 2013).

Another study by Woolfenden, Williams, and Peat (2002) found that the use of parenting and family interventions during adolescence can help to reduce the frequency of criminal behaviors and reduce the time spent in juvenile justice facilities. Though therapy and controlled interventions are usually used to lessen the externalizing behaviors of CD, teaching coping skills can be as effective and have lasting changes. Singh and colleagues (2007) taught mindfulness techniques to a group of adolescents that engaged in disruptive and aggressive behaviors and found that there was a decrease in their aggressive behaviors. The mechanism underlying the mindfulness practices may increase the chances of positively changing brain functioning (Davidson et al., 2003) which could be helpful for individuals with life-long CD that struggle due to the neurobiological risk factors working against them.

Teaching skills through Parent Management Training (PMT) has been shown to help parents improve parenting practices through changing boundaries, limits, punishment, and structure in the home (Kazdin, 1997). PMT focuses on adding positive reinforcement in order to decrease unwanted behaviors of the child while increasing desired behaviors. Caregivers are taught how to deliver consequences and socially appropriate punishment, as well as how to show the child approval and appropriate affection when they are engaging in desirable behaviors (Kazdin, 1997). This technique

has proven successful and shown improvements in family relationships for a variety of child and adolescent problem behaviors in both clinical and nonclinical populations (Kazdin, 1997; Mabe, Turner, & Josephson, 2001). When PMT is combined with other empirically based treatments, such as multisystemic therapy and multidimensional treatment foster care, it can increase the efficacy and produce less externalizing and antisocial behaviors in children (Henggeler & Sheidow, 2012).

Despite the extensive knowledge of etiology, environmental factors, and successful intervention and treatment programs, typical treatment of the more extreme behaviors common of CD can result in incarceration at juvenile detention or civil commitment to mental health facilities (Holmes et al., 2001; Vaughn, Salas-Wright, DeLisi, & Maynard, 2014). Legal troubles and incarceration are common ways of dealing with early delinquency (Holmes et al., 2001; Nock et al., 2006), which has been linked to the start of the cycle of incarceration (Jonson-Reid & Barth, 2000). The cycle of incarceration is a vicious cycle that often begins with not receiving proper mental health services, and the incarceration of adolescents is greater among those who suffer from mental illnesses (Jonson-Reid & Barth, 2000).

An understanding of the behaviors of children with CD is required because these behaviors more often than not predict possible problems in adulthood. As children with CD mature into adulthood, they are more likely to suffer from comorbid conditions, such as substance use and depression, as well as engage in impulsive, antisocial, and criminal behaviors (Holmes et al., 2001; Offord & Bennett, 1994). These criminal behaviors in adolescents prove to have societal costs as well; it has been estimated that roughly $70,000 is spent during a seven-year period for an adolescent that has ended up in mental

health or juvenile justice facilities due to the impulsive aggressive and criminal behaviors associated with CD (Foster, Jones, & Conduct Problems Prevention Research Group, 2005). However, this may be a low estimate due to reports of spending $88,000 per adolescent and roughly $5.7 billion per year on confinement in juvenile justice facilities (Justice Policy Institute, 2009). Another recent report indicated that long-term costs of juvenile incarceration may realistically range from $8-21 billion (Justice Policy Institute, 2014).

Impulsivity and ADHD

Inattentive and hyperactive behaviors are common in children. It has been found that distractibility in young toddlers and infants tends to predict inattentive behaviors in older children and adolescents (Carlson, Jacobvitz, & Sroufe, 1995). Children who experience functional impairment due to high inattentive and/or hyperactive behaviors can meet clinical criteria for an attention deficit/ hyperactivity disorder (ADHD) diagnosis. The key features of ADHD include inattentive, hyperactive, and impulsive behaviors that interfere with overall functioning that develop before the age of twelve (American Psychiatric Association, 2013). ADHD was found to be considerably high in adult psychiatric clinical populations (Montes, 2007) and child populations (Scahill, 2000); however, the prevalence rates for ADHD in children are found to be highly variable. In community based studies conducted in 2000, the estimated prevalence ranged roughly from 2-17% (Scahill, 2000), and 6.4% in a study from a Chinese population (Sun, 2009). The DSM-5 (2013) reports a prevalence rate of 5% in child populations, and half of that for adult populations.

It is difficult to determine the concrete prevalence rates of children with ADHD due to the differences in symptoms; some children suffer from symptoms more so than others while others learn to adapt to their environment despite their inattentive and impulsive behaviors. A few examples of these behaviors in ADHD are interrupting others, difficulty waiting, and having the inability to be still for an extended period of time (American Psychiatric Association, 2013). Typical medications used to treat children with ADHD, such as Adderall and Ritalin ("Evaluating Prescription Drugs", 2012), help to reduce the core symptoms but it has been found that it is not very effective for long-term use (Goldman, Genel, Bezman, & Slanet, 1998).

PMT has proven to be an effective strategy for children with ADHD (Kazdin, 1997), but some symptoms of ADHD may not be as susceptible to treatment. In a multimodal treatment study of children with ADHD, Molina and colleagues (2009) tested the longitudinal efficacy of four treatment strategies: medication, multicomponent behavioral therapy, a combination of medication and behavioral therapy, and typical community based care. The results from this study indicated that neither type nor intensity of the therapeutic interventions predicted a more positive prognosis, but individuals with combined type (hyperactive-impulsive and inattentive) ADHD tended to struggle more in adolescence.

As an alternative treatment for ADHD, teaching neurofeedback has also been proven to be effective as a way to teach children with ADHD how to improve their cognitive and attentional performance. A clinical trial by Gevensleben and colleagues (2009) produced results indicating that neurofeedback can help children practice self-control, leading to less problematic ADHD symptomology. Several treatments are

available for children with ADHD because each child has their own individual risk factors. The best predictors of assessing the possible progression of ADHD symptom severity were found to be low socioeconomic status, low intelligence, individual symptom response to a specific treatment, and the presence of conduct problems (Molina et al., 2009). However, without any type of treatment, impulsive and inattentive symptoms of ADHD can significantly worsen and result in maladaptive externalizing behaviors later in life (Goldman, Genel, Bezman, & Slanet, 1998).

Connecting CD and ADHD

The defined relationship between antisocial and externalizing behaviors have been linked to problematic adolescent and adult behaviors (Harden et al., 2015; Holmes et al, 2001; Le Corff, 2014; Vaughn et al., 2014). The development of impulsive and antisocial behaviors is important to understand because of the potentially chronic course that could ensue. Noncompliance with maternal figures has been associated with higher externalizing behaviors in children with ADHD according to Anderson, Hinshaw, and Simmel (1994). This finding suggests that the temperament of children with ADHD may closely identify with CD diagnostic criteria and potential antisocial behaviors. The severity of ADHD has also been found to worsen with the development of antisocial and externalizing behaviors (American Psychiatric Association, 2013; Waschbusch, 2002).

A meta-analysis conducted by Waschbusch (2002) found that an individual experiencing comorbid externalizing behaviors and ADHD symptoms will demonstrate more severe pathology than either condition on its own. The comorbidity of ADHD and externalizing behaviors has been highly documented in the literature (Anderson, Hinshaw, & Simmel, 1994; Holmes et al., 2001; Waller, 2015; Waschbusch, 2002;

Woolfenden, Williams, & Peat, 2002) but it is difficult to know which came first, externalizing behaviors or ADHD symptoms. A recent twin study challenged the idea that ADHD symptomology typically precedes externalizing behaviors and found that early externalizing behaviors may predict ADHD symptoms in adolescence (Kuja-Halkola, Lichtenstein, D'Onofrio, & Larsson, 2015). However, the authors also found that these adolescent ADHD symptoms may be linked to rule-breaking and aggressive behaviors in adulthood. These results confirm the unwavering co-occurrence of ADHD symptoms and the externalizing behaviors typical of CD.

Holmes, Slaughter, and Kashani (2001) found that symptoms of ADHD are significant risk factors for the development of CD in children. The impulsive symptomology of CD is highly prevalent in ADHD populations, which typically present as hyperactive-impulsive behaviors. Children that experience co-occurring ADHD and CD diagnoses often exhibit behaviors that intensify, which develop into more chronic difficulties. The DSM-5 (2015) reports that the presentation of co-occurring CD and ADHD often leads to worse clinical outcomes due to behavioral symptoms that develop. Early onset of symptoms of inattentiveness, hyperactivity-impulsivity, and antisocial behaviors typically predict an increased risk of more severe behaviors, such as theft and aggression in adulthood (American Psychiatric Association, 2013). It is clear that the comorbid features of CD and ADHD should not be ignored, and that treatment of externalizing behaviors as a child could help to prevent the development of more chronic disorders, such as antisocial personality disorder. However, the role of intelligence is an important factor that should be considered when developing appropriate prevention strategies for both ADHD and CD.

Defining Intelligence

The construct of intelligence is important because it can be used to predict psychological functioning and eventual educational and occupational outcome (Wechsler, 2008). Assessments of intelligence typically test cognitive abilities at certain developmental stages, and measure cognitive functioning based on tests of processing abilities, comprehension, performance functioning, and discrimination of visual stimuli (Wechsler, 2008). The current literature suggests that the co-occurrence of intellectual disabilities and psychological disorders can be problematic. As defined by the DSM-5 (2013), intellectual disabilities result in deficits in intellectual and adaptive functioning, which can ultimately lead to problems with social interaction, independent living, academic learning, problem solving, and much more. Severity of the disability can range from mild to profound, with mild severity presenting as socially naïve and with problems regulating emotions. An individual with a profound intellectual disability would present with complete dependence on others and limited to no comprehension of language.

Many people with intellectual disabilities tend to have secondary comorbid psychological disorders (Cooper, et. al., 2007; Koskentausta, Iivanainen, & Almqvist, 2007). As stated by Koskentausta, Iivanainen, and Almqvist (2007), children with intellectual disabilities have an increased chance of developing a comorbid psychological disorder as they increase in age. In this same study, moderate intellectual disabilities were found to be at a higher risk for developing a comorbid condition. Common behaviors that were increased at the moderate severity level were social-relating problems, communication problems, and self-absorbed behaviors (Koskentausta, Iivanainen, & Almqvist, 2007). These behaviors can also be seen in children with CD.

Connecting CD and Intelligence

Children with moderately severe intellectual deficits have been found to have trouble relating socially and communicating properly, which can be common problems in children with CD. Part of the diagnostic criteria for CD includes bullying behaviors, as well as an additional specifier that can be applied in regards to limited prosocial emotions (American Psychiatric Association, 2013). This specifier relates to being unable to express feelings, lacking empathy, and lacking remorse. These behaviors may overlap with the disruptive and antisocial behaviors that are common in children with mild intellectual disabilities (Koskentausta, Iivanainen, & Almqvist, 2007).

A study was conducted to test the prevalence rates of different psychological disorders in adults with intellectual disabilities, with the results showing that problem behaviors were consistently high across all domains (Cooper, Smiley, Morrison, Williamson, & Allan, 2007). Despite several other studies stating that males show more problematic and impulse-control behaviors (American Psychiatric Association, 2013; Koskentausta, Iivanainen, & Almqvist, 2007; Nock et al., 2006), this study indicated that gender showed little to no difference in regards to these behaviors.

Though the externalizing behaviors of CD have been shown to be a co-occurring problem for individuals with intellectual disabilities, it is important to also understand the link between CD and normal intelligence. In an early longitudinal study by Schonfeld and colleagues (1988), lower IQ scores were found to be a key factor in predicting the development of CD in adolescence. A more recent review of CD risk factors proposed that low educational achievement and low IQ scores did predict externalizing behaviors and juvenile criminal behaviors (Murray & Farrington, 2010). Koolhof and colleagues

(2007) found that there is a relationship between juvenile criminal behaviors and low IQ, and that this connection may fluctuate based on level of impulsive behaviors.

Connecting ADHD and Intelligence

Working memory has been found to be highly dependent on sustained attention (Burns, Nettelbeck, & McPherson, 2009), which suggests that the deficits in problem solving and planning abilities of children who have ADHD may be related to intelligence. ADHD is a common co-occurring disorder for individuals across the intellectual spectrum (American Psychiatric Association, 2013). However, research indicates that children with both higher and lower intelligence with comorbid disorders tend to require more academic support (Antshel et al., 2007; Cooper et al., 2007). For example, children with ADHD and a higher intellectual quotient (IQ) typically had to repeat grade years and needed more academic help than the control group (Antshel et al., 2007). Another example is illustrated by Kuntsi and colleagues (2004), who tested a sample of five-year-old twins and found that children with ADHD were on average nine IQ score points below children without ADHD. The DSM-5 (2013) indicates that children with ADHD can have associated cognitive and academic deficits, which may be due to the characteristic inattentive behaviors in school. These moderate cognitive deficits, while not as severe as an intellectual disability, may explain some key impairments related to inattentive and impulsive behaviors (Burns, Nettelbeck, & McPherson, 2009; Koskentausta, Iivanainen, & Almqvist, 2007).

Due to the impulsive nature and the typical lower intelligence of individuals with ADHD, criminal behaviors can often arise as the individual ages (American Psychiatric Association, 2013). Assessing and treating these attentional and intellectual problems

early can have great advantages for later in life. However, the etiology of these behaviors may be linked in ways that are unavoidable. Kuntsi and colleagues (2004) found that ADHD and intelligence share a unique etiology that is strongly linked to genetic factors. These genetic factors are thought to increase the risk of developing intellectual and attentional deficits.

The Present Study

Assessing the role of intelligence in the link between CD and ADHD symptomology will add another dimension that has not been clearly researched. Though intellectual disabilities have been shown to co-occur with both CD and ADHD, the current study examined lower intelligence across a broader range in order to add to the literature on the role of intelligence in psychiatric disorders. Due to the well-established link between ADHD symptoms and externalizing behaviors (Anderson et al., 1994; Holmes et al., 2001; Liu, 2006), the current study aimed to understand the connections between the externalizing behaviors of CD, such as rule-breaking and aggressive behaviors, and the inattentive and impulsive symptoms associated with ADHD. This study used a moderation analysis to explore whether or not the strength of the relationship between impulsive and externalizing behaviors changes as intelligence varies. It was hypothesized that the relationship between impulsive and externalizing behaviors would be more pronounced when intelligence is lower.

Chapter II: Methods

Participants

The current study used 76 unique archival clinical records from the Murray State Psychological Center at Murray State University. To ensure a consistent operationalization of intelligence, only individuals over 6 years of age and under age 16 years and 11 months were included in the analysis. This age range was the one used by the Wechsler Intelligence Scale for Children (Wechsler, 2008). Additional inclusion criteria were: participants' parents or legal guardian must have completed a research consent form, and participants must have had at least one valid Child Behavior Checklist (CBCL) and one valid Wechsler Intelligence Scale for Children-Fourth Edition (WISC-IV) assessment on file. If more than one version of the CBCL was available, the primary caregiver that signed the informed consent was used. The primary investigator started coding files starting with the 2015/2016 academic year and proceeded to work backwards until a sufficient number of records meeting inclusion criteria were obtained.

Materials

Child Behavior Checklist (CBCL). The CBCL combines multiple accounts of a pen and paper report of common child behavior problems that help to describe a child's functioning. It is often completed by parents, guardians, and anyone that interacts with the child in a familial context, and can be used to identify common problems in children ages 6-18 (Achenbach & Rescorla, 2001). The Externalizing Behaviors scale and the

Attentional Problems Scale from the CBCL were used in this study. The Externalizing

grouping of the CBCL consists of the subscales rule-breaking behavior and aggressive

behavior. The rule-breaking behavior subscale consists of seventeen items, while the

aggressive behavior subscale is comprised of eighteen items. Examples of rule-breaking

behaviors items are "lacking guilt, breaking rules, truancy, and vandalism," while

aggressive behaviors can be identified as "arguing frequently, attacking others, and

disobedience at school and in the home" (Achenbach & Rescorla, 2001). Examples of the

ten items on the attentional problem behavior subscale include "the inability to

concentrate or sit still, impulsive behaviors, and inattentive behaviors" (Achenbach &

Rescorla, 2001). The T scores of rule-breaking and aggressive behaviors of the

Externalizing scale, as well as the T scores of the Attention Problems scale, were used in

the analysis.

The CBCL can be hand scored or be scored on the computer. For each, a raw

score is obtained from the sum of the items endorsed on the form. Based on the age and

gender of the child, the raw scores are graphed on a particular profile that has been

normed for their demographics. When graphing the raw scores, a percentage and a T

score are specified for their exact raw score (Achenbach & Rescorla, 2001). All ranges,

including the borderline and clinical ranges, from the syndrome profile were included in

this study.

The reliability of the Externalizing Behavior scale and its subscales of "rule-

breaking" and "aggressive behavior" indicate that reliability is fairly high for these

constructs, with an alpha range of 0.85 to 0.94 on the CBCL (Achenbach & Rescorla,

2001). The internal consistency of the Attentional Problems scale yields a Cronbach's

alpha coefficient of 0.86, indicating that these scales have high reliability (Achenbach & Rescorla, 2001).

Overall, the validity of the CBCL is strongly supported due to several improvements made over the years. All items on each scale were found to discriminate significantly from each other ($p <0.01$), indicating that there are in fact separate scales. The scale items have also shown significant correlations between the scales and DSM-IV checklist items ($p <0.001$). These findings indicate that the constructs tested by the CBCL are good predictors in detecting the presence of symptoms relating to CD or ADHD (Achenbach & Rescorla, 2001).

Wechsler Intelligence Scale for Children-Fourth Edition (WISC-IV). A full-scale IQ (FSIQ) score derived from the Wechsler Intelligence Scale for Children-Fourth Edition (WISC-IV) is typically a good measure of intellectual functioning. The FSIQ attempts to approximate a true IQ score using four reliable and valid scales, which are verbal comprehension, perceptual reasoning, working memory, and processing speed. Test-retest reliability coefficients range from .79 to .90 for all of the WISC-IV subtests, which indicates that the internal consistency of the measure is good (Wechsler, 2003). Wechsler (2003) has also specified that the generalizability of the measure is supported due to testing with special populations, such as individuals with ADHD and intellectual disabilities. Clinical judgement should be used when looking at test scores of children with ADHD because their FSIQ may be influenced by poor performance on working memory and processing speed measures (Wechsler, 2003). Due to this common discrepancy in children with ADHD, the General Ability Index (GAI) was used for the current study as a better indication of cognitive ability.

Though the GAI aims to measure cognitive abilities similar to the FSIQ, the GAI is less sensitive to the differences in processing speed and problem solving abilities on the WISC-IV (Bremner et.al., 2011). The GAI allows for the interpretation of reasoning abilities without the influence of processing speed. Another special consideration for testing children with ADHD is the presence of medication. Children who are taking medication for their ADHD symptoms are likely to have a more accurate representation of their intellectual functioning, whereas children not taking medication may perform poorly due to struggling with working memory and processing speed (Burns, Nettelbeck, & McPherson, 2009; Wechsler, 2003).The GAI is deemed to be the most stable representation of intelligence for individuals with ADHD because it is less sensitive to the discrepancy between working memory and processing speed, which is a strong indicator of inattentive symptoms (Raiford, Weiss, Rolfhus, & Coalson, 2005).

The WISC-IV presents strong evidence for the validity of the measure due to the extensive research conducted before publishing the fourth edition. As a predictive measure, the WISC-IV has shown to be a good indicator of future intellectual performance (Watkins, 2006; Wechsler, 2003). For example, Thaler, Bello, and Etcoff (2012) tested the predictive validity in regards to children with ADHD and found that poorer performance scores in working memory and processing speed did in fact predict ADHD symptomology severity, whereas higher intellectual functioning seemed to serve as a protective factor in regards to symptom severity as the child aged.

Based on the results from the factor analysis that studied the participants' cognitive response processes when responding to the items, the validity of the constructs and the test content were deemed to have strong theoretical and empirical evidence

(Wechsler, 2003). More recently, a confirmatory factor analysis was conducted to test the validity of the WISC-IV in neuropsychological populations, which yielded strong support for the validity of the constructs as well (Bodin, et. al., 2009).

Demographics. Information regarding the child's age, sex, ethnicity, and grade level was obtained from the archival files. Reason for seeking services was acquired and if the participant was assigned a diagnosis, this information was also gathered. Information about stimulant or non-stimulant medication use was obtained, as well as use on the day of testing because the use of stimulant medication while testing for ADHD may have implications. Due to the fact that the symptoms of ADHD may be controlled for with stimulant medication, these behaviors would likely not show up clearly as they would for an individual not prescribed stimulant medication.

Demographic analyses revealed that participants for this sample consisted of a majority of Caucasian (93%) males (60%). Average grade level was the 4th grade with 72.3% of the sample ranging from kindergarten to 5th grade, and 27.6% from 6th to 11th grade individuals. The sample consisted of 2.6% Hispanic, 1.3% African American, 1.3% Native American, and 1.3% biracial individuals. Of the sample, 94.4% of participants were presenting to the clinic seeking an assessment, 3.9% were presenting for therapy, and 2.6% did not indicate what they were seeking from the clinic.

Presenting problem was operationalized as the most important problem that was indicated on the initial paperwork form. For presenting problem, 40.8% of parents indicated that their child struggled with learning and study problems, 27.6% indicated problems with attention, 11.8% indicated problems with impulsivity, 9.2% indicated problems with aggression, 2.6% indicated problems with depressive symptoms, 2.6%

indicated problems with anxious symptoms, 2.6% indicated problems with relationships, and 1.3% indicated other problems. Participant diagnoses were coded based on diagnoses given by center clinicians following the Diagnostic and Statistical Manual of Mental Disorders criteria (American Psychological Association, 2000; American Psychiatric Association, 2013). After testing, 28.9% of the participants received no diagnosis, 48.7% were diagnosed with a neurodevelopmental disorder (see Table 1, pg. 31), 9.2% were diagnosed with an anxiety disorder, 5.3% were diagnosed with an impulse control disorder, 3.9% were diagnosed with other disorders that did not necessarily meet the criteria for a psychological disorder, 2.6% were diagnosed with depression, and 1.3% were diagnosed with obsessive-compulsive disorder.

It should be noted that the diagnostic criteria for diagnosing changed from the DSM-IV to the DSM-5 in 2013. Some of the diagnostic criteria changed for ADHD from the DSM-IV to the DSM-5, specifically the requirement of the behaviors showing up before age seven changed to before age twelve. Another change was that the DSM-5 requires several symptoms in each setting, such as educational and social settings, whereas the DSM-IV did not require several symptoms in each setting. The year of assessment was obtained, which showed that 6.6% were tested in 2016 (DSM-5), 25% were tested in 2015 (DSM-5), 26.3% were tested in 2014 (DSM-5), 32.9% were tested in 2013 (DSM-5), 7.9% were tested in 2012 (DSM-IV), and 1.3% were tested in 2011 (DSM-IV).

With regard to medication use, 51.3% of the sample did not report being prescribed a medication, 21.1% were prescribed a stimulant medication, and 13.2% were prescribed a medication that was not a stimulant. Fourteen and a half percent of the

sample did not include information regarding prescription medication use. On day of testing, information regarding prescription use was not recorded by the clinician for 42.1% of the sample while 51.3% of the participants did not take a prescribed medication, 2.6% of the participants took their prescribed stimulant, 2.6% withheld their prescription stimulant, and 1.3% of the participants withheld their non-stimulant prescribed medication.

Procedure

The participants did not experience any special procedure due to the data being gathered from existing clinic files. The necessary information from the files regarding the CBCL, the WISC-IV, and demographics was obtained and coded by the primary investigator. A random identifier was used instead of the client's name in order to prevent the identification of any client data in the research database. Along with the scale and subscale information of the measures, the year in which the assessments took place was obtained. If the GAI was not available from the WISC-IV information, it was calculated using the sum of the scaled scores to determine the GAI score, and the presence of significance was determined based on the critical value of the difference between the GAI and the FSIQ (Raiford et al., 2005).

Analytic Strategy

For this study, a linear regression model was used to explore the relationship between the independent, dependent, and moderating variables. PROCESS (version 2.10; Hayes, 2013) was used to conduct the moderation analysis and the Johnson-Neyman regions of significant analysis (Johnson & Neyman, 1936) was used as a planned follow-

up to explore the hypothesized interaction. In addition, the pick-a-point technique

(Rogosa, 1980) was used to visualize the hypothesized interaction at the IQ mean and one

standard deviation above and below the mean. The independent variable was the

Attention Problems scale of the CBCL, the dependent variable was the Externalizing

scale of the CBCL, and the moderating variable was the General Ability Index (GAI)

obtained from the WISC-IV.

Prior to the primary study analysis, a correlational analysis was conducted using

coded variables from the CBCL, the WISC-IV, and the demographic information. A

moderation analysis was then conducted to test the hypothesis. A power analysis testing

the three predictors (attention problems, externalizing behaviors, and GAI) was run with

G*Power (version 3.1.9.2), which indicated that a total sample size of 48 participants

were needed to yield a medium to large effect size using power $(1 - \beta)$ set at 0.80 and $\alpha =$

0.05; thus, the obtained sample size of 76 was sufficient to appropriately power all study

analyses.

Chapter III: Results

Prior to analysis, 20% of the cases were randomly chosen and double-entered to assess for any coding errors. One error was found and corrected, yielding a coding accuracy rate of 99.98%. Means, standard deviations, and correlation analyses between inattention symptoms, intelligence (GAI), externalizing behaviors, and relevant demographic variables are presented in Table 2 (pg. 32). Demographic variables deemed to be pertinent included stimulant medication use, diagnosis, sex, race, and grade level. Grade level was chosen as a way to look at functioning as opposed to age because children exhibiting more attentional problems may have been held back a year in order to succeed academically. Participants exhibiting externalizing behaviors were likely to receive a neurodevelopmental disorder diagnosis, $R^2 = .05$. Participants with attentional problems and externalizing behaviors were also more likely to be prescribed stimulant medication (attentional problems, $R^2 = .13$; externalizing behavior, $R^2 = .07$). The correlational analysis indicated that the participants presenting with attentional problems were significantly more likely to display externalizing behaviors as well ($R^2 = .29$; see Table 2).

The overall linear regression model, which consisted of the attentional problems scale (dependent variable), the externalizing behaviors scale (independent variable), and the GAI (moderator), was significant, $F (3, 72) = 11.71$, $p < .001$, $R^2 = .33$. The overall model, conditional effects, and interaction term are presented in Table 3. The interaction

term between GAI and attentional problems indicated that intelligence did not significantly moderate the relationship between attentional problems and externalizing behaviors nor was there a significant conditional effect of GAI on externalizing behavior. In this model, attentional problems significantly and positively predicted externalizing behaviors in the participants. This indicates that the more attentional problems that the individual experienced, the more likely they were to exhibit externalizing behaviors. Due to the fact that the interaction term approached significance, the Johnson-Neyman and the pick-a-point technique were run as exploratory analyses to better understand the interaction between GAI and attentional problems on externalizing behaviors.

The Johnson-Neyman analysis of the interaction effect indicated inattention symptoms significantly predicted externalizing behaviors in children when GAI scores were less than or equal to 117.12. It is important to note that only 15% of the sample had GAI scores above 117.12, ranging from 117.12 to 127. As illustrated in Figure 1, the scores estimated by the pick-a-point follow-up analysis revealed a significant conditional relationship between externalizing behaviors and attentional problems when GAI scores were held to one standard deviation below the mean (80.53), $B = .88$, $t\,(76) = 4.97$, $p <$ .001, at the mean (96.59), $B = .65$, $t\,(76) = 5.75$, $p < .001$, and one standard deviation above the mean (112.65), $B = .42$, $t\,(76) = 2.73$, $p < .007$.

Chapter IV: Discussion

The results from this study confirmed the well documented relationship between inattention and externalizing behavior. This study strengthens the argument that symptoms of ADHD and CD often overlap (Anderson et al., 1994), and when the symptoms are severe enough one may lead to the other (Kuja-Halkola, Lichtenstein, D'Onofrio, & Larsson, 2015). The sample used for this study is unique because it affirms the presence of the relationship between attentional problems and externalizing behaviors in a predominantly rural and underserved area, which is a needed area of research due to the higher rates of psychological problems in rural areas (Smalley et al., 2010). This study is also important because it acts as a replication for the many findings relating early inattention to externalizing behaviors in adolescence and early adulthood (Holmes et al., 2001; Waller, 2015; Waschbusch, 2002).

Even though intelligence did not show a moderating or conditional effect on the relationship between inattention and externalizing behaviors in this sample, intelligence may still play a role in the relationship between attentional problems and externalizing behaviors at extreme ranges. Based on previous research regarding both CD and ADHD, lower intelligence has been found to have an impact (Burns, Nettelbeck, & McPherson, 2009; Schonfeld, Shaffer, O'Connor, & Portnoy, 1988). Since intelligence has been found to be lower for both CD and ADHD community samples in previous studies, this study may challenge these findings because the results indicate that intelligence may not

directly influence higher externalizing behaviors when attentional problems are present. The results from this study should lead to follow-up studies regarding this relationship. Research should also be conducted to examine the high extreme range of intelligence because higher intelligence may act as a protective factor for the individual.

This study was unique in that it used the GAI as a measure of intelligence as opposed to the FSIQ in order to sensitively pick up on the inattentive symptoms of ADHD. One previous research study regarding intelligence in delinquent boys reported using a short-form version of the Wechsler Intelligence Scale for Children-Revised (WISC-R) to measure intelligence (Koolhof et al., 2007). The use of the GAI in the current study is a better measure of intelligence than the short-form because it provides flexibility but it is still highly correlated to the FSIQ (Bremner et al., 2011; Raiford et al., 2005). To the author's knowledge, this is the first study to explicitly state the use of a different estimate of intelligence when examining relationships with inattention and externalizing symptoms.

According to exploratory analyses, the relationship between attentional problems and externalizing behaviors may not occur at higher GAI scores. Intelligence may be a protective factor for these individuals because they may be thinking through their decisions before they act, which may play on the impulsive piece of ADHD. Future research should attempt to better understand the relationship between impulsivity and intelligence for gifted individuals with higher GAI scores, and how this could affect the expression of inattentive and externalizing behaviors.

An unexpected strength of the current study was the data collected from the large number of females. The proportion of females was higher for this study than previous

studies regarding ADHD and CD symptoms. For example, Koolhof and colleagues (2007) examined delinquent behaviors using only a male population. Anderson and colleagues (1994) also tested externalizing behaviors and ADHD using only male participants. Though externalizing behaviors and hyperactivity/impulsiveness are more typical of males, females typically show more relational aggression and inattentive features (American Psychiatric Association, 2013). While ADHD and externalizing behaviors are more characteristic of males, females still experience the externalizing behaviors of CD (7.1% lifetime prevalence; Nock et al., 2006) and ADHD symptoms (3:1 male to female ratio; Skounti, Philalithis, & Galanakis, 2006), suggesting that more research is needed to better understand how each disorder can be expressed differently by gender.

One of the limitations of this study was the wide range of diagnoses of the sample. This study aimed to look at the relationship between ADHD and CD symptoms, but 17% of the participants were diagnosed with other disorders, such as anxiety and depression, and 29% received no diagnosis. The results may have differed if the inclusion criteria stated that the individual must have had a diagnosis of ADHD or CD. However, the presence of other diagnoses for this sample is also strength because this sample better reflects actual clients who present at a treatment center. Amongst psychological disorders, comorbidity with other disorders is high amongst impulse-control disorders, which includes CD and ADHD (Kessler, Chiu, Demler, & Walters, 2005), and when diagnosed with CD, it is likely that a secondary diagnosis exists (Nock et al., 2006). Due to this, the range of diagnoses in this study appear appropriate, suggesting that these findings are applicable to the general population.

Another limitation of this study was the fact that it used archival records. Though all of the measures were administered by clinicians trained in the same clinical program, designing an in-person study would have allowed for greater control of data collection and measurement. For example, better collection and accurate reporting of information regarding medication use on day of testing would increase the validity of the obtained results. Future studies should address medication use because the current study lacked sufficient reporting of relevant information to fully explore this variable. A limitation in the analysis for this study was that the researchers did not control for some of the demographic variables. Demographic variables, such as medication use, were not run as covariates for this sample because there was not enough data in each category to adequately power the analysis. Future directions should attempt to over-sample for each category in order to properly control for these variables.

This study also did not explore any behavioral measures of ADHD, such as the Conners Continuous Performance Test-Third Edition (Conners CPT-3), to test for problems with attention. The Conners CPT-3 is a common measure used to differentiate specific ADHD symptoms from normal behaviors (Epstein et al., 2003). Using additional behavioral measures would contribute helpful information about the specific behaviors common in ADHD and CD. In addition to a behavioral measure of inattention, future research could use laboratory measures of aggression to allow for direct behavioral measurement of externalizing symptoms. Johnston and colleagues (1977) found that generalizable aggression can be induced in a laboratory setting. Frick and Viding (2009) have also found that children exhibiting the antisocial behaviors associated with CD

typically display reactive aggression in response to provocation, which would most likely translate to a laboratory setting if they were provoked.

Future research should also test across specific age groups to explore age as a moderating variable in children. In this study, children aged six years to 16 years and 11 months of age were included. Though the average age was nine years and the majority of the participants were elementary-school age, 27% of the participants were middle school and high school aged. The current study did not have an appropriate number of participants in each age range to power the analysis of age as a moderating factor. Looking at specific age ranges would be helpful because some of the symptoms of CD do not appear until adolescence (American Psychiatric Association, 2013). In addition to this, some symptoms of ADHD may be more prevalent in younger children than adolescents. Looking at the symptoms of Oppositional Defiant Disorder (ODD), which includes irritability and anger, argumentative behaviors, vindictiveness, and actively defying authority figures, may be more appropriate for the age range collected in this study because ODD typically precedes a diagnosis of CD (American Psychiatric Association, 2013). Looking at these variables in a longitudinal fashion would also be appropriate for expanding the knowledge on the effects of inattentive symptoms and externalizing behaviors over time.

For older children and adolescents, controlled substance use may be a key factor in studying externalizing behaviors over time due to the possible emergence of substance abuse during the teenage years. Myers and colleagues (1998) tested adolescents who met the criteria for CD and found that substance use positively predicted the development of antisocial personality disorder in adulthood. Due to the possible predictive factor that

substance use adds to the prognosis of CD, future research should gain information on medication and other substance use to determine the role of these substances in the relationship between inattentive and externalizing behaviors.

Another opportunity for future research should be to compare externalizing behaviors and attentional problems in typically developing children with a clinical sample. In this clinical sample, severe forms of both inattention and externalizing behaviors were apparent. To further the literature, it would be appropriate to understand the mild forms of inattention and how that could impact "acting out" behaviors in children who are not presenting for psychological services. It may also be helpful to look at some specific items on the rule-breaking behaviors scale from the CBCL to determine if certain behaviors are more likely to attribute to the incarceration of children and adolescents with attentional problems.

The findings from the current study replicated and confirmed the established relationship between inattention and externalizing behaviors. The obtained results also indicated that intelligence at extreme ranges may moderate this association, but evidence of significant moderation was not found in this sample. Since attentional problems in early childhood contribute strongly to externalizing behaviors in adolescence, and there is a documented genetic link for both CD and ADHD (Holmes et al., 2001; Slutske et al., 1997), future research should continue to examine the relationship between these disorders. Research should attempt to better understand this genetic link and how it may be influenced by environmental factors throughout a child's life. In addition to determining the genetic commonalities of the relationship between externalizing

behaviors and inattention, other environmental variables not discussed in the current

study should be explored.

Table 1. *Frequencies and percentages for types of Neurodevelopmental Disorders diagnosed.*

Neurodevelopmental Disorder	Frequency	Percentage
ADHD	24	64%
Autism Spectrum Disorder	3	8%
Fetal Alcohol Syndrome	1	3%
Intellectual Disability	4	10%
Learning Disability	4	10%
Pervasive Developmental Disorder	1	3%

Note. $N = 37$. Different diagnostic criteria were used in diagnosing due to the change from using the DSM-IV to the DSM-5 in 2014.

Table 2. *Means, standard deviations, and correlations among variables.*

Variable	M	SD	1	2	3	4	5	6
1. Externalizing Behaviors	58.51	12.99	-	.54**	-.09	.07	-.08	.26*
2. Attentional Problems	69.13	11.27	-	-	-.13	.16	.17	.35*
3. GAI	96.59	16.06	-	-	-	.07	-.08	-.28*
4. Grade Level	4.03	2.41	-	-	-	-	.02	.18
5. Sex (Female = 0)	39.5% Female		-	-	-	-	-	-.09
6. Stimulant Medication (Prescribed = 1)	21.1% prescribed		-	-	-	-	-	-

Note. Pearson's correlation coefficient (*r)* was used for comparisons between Externalizing Behaviors, Attentional Problems, and GAI variables. Spearman's correlation was used for comparisons involving grade level. Point-biserial correlations were used for comparisons involving sex and stimulant medication. The Externalizing Behaviors scale and Attentional Problems scale is from the Child Behavior Checklist (CBCL) and the variables are expressed as T-scores. GAI= General Ability Index from the Wechsler Intelligence Scale for Children-Fourth Edition (WISC-IV) and the variable is expressed as a scaled score. Stimulant Medication was coded as prescribed or not prescribed, and does not reflect medication use on the day of testing.

*p < .05

**p < .001

Table 3. *Overall model, conditional effects, and interaction effect estimating the severity of externalizing behaviors.*

	B	SE	t	*p*
Intercept	-79.93	52.36	-1.53	.130
GAI	.96	.52	1.85	.069
Attentional Problems	2.05	.76	2.70	.009
GAI X Attentional Problems	-.01	.01	-1.90	.062
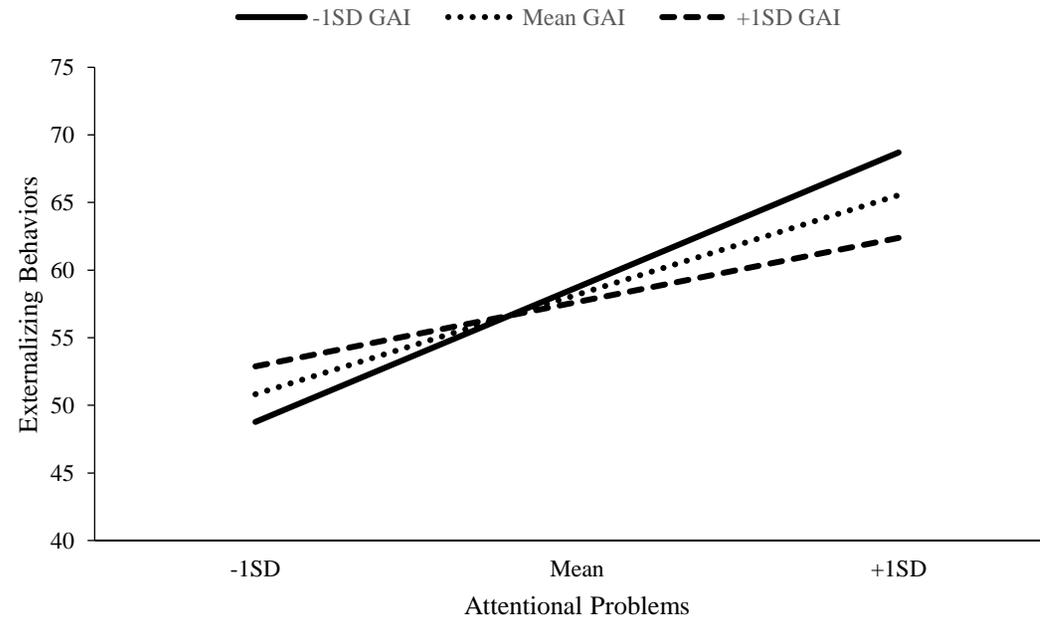
Figure 1. Predicted externalizing behaviors T-scores as a function of scores fixed at the mean, one standard deviation above the mean, and one standard deviation below the mean on the Attentional Problems Scale (CBCL) and GAI (WISC-IV). Larger T-scores indicate a greater severity of externalizing behaviors.

Appendix I: Supporting Documents

Descriptive Information

Sex

Sex	Code Number
Male	0
Female	1

Ethnicity

Ethnicity	Code Number
Caucasian	0
African-American	1
Hispanic or Latino	2
Native American	3
Asian or Pacific Islander	4
Other	5

Grade level

Grade	Code Number
Kindergarten	0
1st Grade	1
2nd Grade	2
3rd Grade	3
4th Grade	4
5th Grade	5
6th Grade	6
7th Grade	7
8th Grade	8
9th Grade	9
10th Grade	10
11th Grade	11
12th Grade	12

Reason for seeking services

Reason	Code Number
Seeking Assessment	0
Seeking Therapy	1

Top Presenting Problem

Most Important Presenting Problem	Code Number
Depression	0
Anxiety/Fears/Nervousness	1
Poor Anger Control/Aggressive Behaviors	2
Other Impulse Control Problems	3
Alcohol/Substance Abuse	4
Relationship/Interpersonal Difficulties	5
Family Conflicts	6
Learning/Study Problems	7
Problems with Attention/Concentration	8
Other	9

Diagnosis Given

Diagnosis Given	Code Number
No Diagnosis	0
Neurodevelopmental Disorder	1
Psychotic Disorder	2
Bipolar Disorder	3
Depressive Disorder	4
Anxiety Disorder	5
Obsessive-Compulsive Disorder	6
Trauma- or Stressor-Related Disorder	7
Dissociative Disorder	8
Somatic Symptom Disorder	9
Feeding and Eating Disorder	10
Elimination Disorder	11
Sleep-Wake Disorder	12
Disruptive, Impulse-Control, and Conduct Disorder	13
Gender Dysphoria	14
Substance-Related Disorder	15
Other Diagnosis	16

Medication Prescribed

Type of Medication	Code Number
Stimulant	0
Non-Stimulant	1
No Medication Prescribed	2
No Information Available	3

Current Medication Use

Use	Code Number
Stimulant Used Day of Testing	0
Stimulant Withheld Day of Testing	1
Non-Stimulant Used Day of Testing	2
Non-Stimulant Withheld Day of Testing	3
No Medication Prescribed	4
No Information Available	5

Year of Assessment: _____

Child Behavior Checklist

Attention Problems T Score: _____

Score Range	Code Number
50 – 64: Normal	0
65 – 69: Borderline	1
70 ≤ : Clinical	2

Rule-Breaking Behaviors T Score: _____

Score Range	Code Number
50 – 64: Normal	0
65 – 69: Borderline	1
70 ≤ : Clinical	2

Aggressive Behaviors T Score: _____

Score Range	Code Number
50 – 64: Normal	0
65 – 69: Borderline	1
70 ≤ : Clinical	2

Externalizing Behaviors T Score: _____

Score Range	Code Number
50 – 64: Normal	0
65 – 69: Borderline	1
70 ≤ : Clinical	2

Wechsler Intelligence Scale for Children- Fourth Edition (WISC-IV)

Full Scale Intellectual Quotient (FSIQ) Composite Score: _____

FSIQ	Code Number
69 and below: Extremely low	0
70-79: Borderline	1
80-89: Low Average	2
90-109: Average	3
110-119: High Average	4
120-129: Superior	5
130 and above: Very superior	6

General Ability Index (GAI)*: _____

GAI	Code Number
69 and below: Extremely low	0
70-79: Borderline	1
80-89: Low Average	2
90-109: Average	3
110-119: High Average	4
120-129: Superior	5
130 and above: Very superior	6

If reported and significant.

Verbal Comprehension Index Composite Score: _____

Similarities Scaled Score: _____

Vocabulary Scaled Score: _____

Comprehension Scaled Score: _____

Supplemental: Information Scaled Score: _____

VCI	Code Number
69 and below: Extremely low	0
70-79: Borderline	1
80-89: Low Average	2
90-109: Average	3
110-119: High Average	4
120-129: Superior	5
130 and above: Very superior	6

Perceptual Reasoning Index Composite Score: _____

Block Design Scaled Score: _____

Picture Concepts Scaled Score: _____

Matrix Reasoning Scaled Score: _____

Supplemental: Picture Completion Scaled Score: _____

PRI	Code Number
69 and below: Extremely low	0
70-79: Borderline	1
80-89: Low Average	2
90-109: Average	3
110-119: High Average	4
120-129: Superior	5
130 and above: Very superior	6

Working Memory Index Composite Score: _____

Digit Span Scaled Score: _____

Letter-Number Sequencing Scaled Score: _____

Supplemental: Arithmetic Scaled Score: _____

WMI	Code Number
69 and below: Extremely low	0
70-79: Borderline	1
80-89: Low Average	2
90-109: Average	3
110-119: High Average	4
120-129: Superior	5
130 and above: Very superior	6

Processing Speed Index Score: _____

Coding Scaled Score: _____

Symbol Search Scaled Score: _____

Supplemental: Cancellation Scaled Score: _____

PSI	Code Number
69 and below: Extremely low	0
70-79: Borderline	1
80-89: Low Average	2
90-109: Average	3
110-119: High Average	4
120-129: Superior	5
130 and above: Very superior	6

Appendix II: IRB Approval Letter

MURRAY STATE
U N I V E R S I T Y

Institutional Review Board

328 Wells Hall
Murray, KY 42071-3318
270-809-2916● msu.irb@murraystate.edu

TO: Michael Bordieri

        Psychology

FROM: Institutional Review Board

        Jonathan Baskin, IRB Coordinator

DATE: March 2, 2017

RE: IRB # ODF 17-13

Determination: Individuals not Identifiable - Activity does not involve human subjects as defined in 45 CFR 46.102(f)(2)

The MSU IRB has reviewed your student's application entitled, Examining the Relationship between Inattention, Impulsivity, and Externalizing Behaviors in Children. Based on the information supplied on this application, it has been determined that your student's project does not involve activities and/or subjects that would require IRB review and oversight. Your IRB application will be kept on file in the IRB office for a period of 3 years.

Please note that there may be other Federal, State, or local laws and/or regulations that may apply to your project and any changes to the subjects, intent, or methodology of your project could change this determination. You are responsible for informing the IRB of any such changes so that an updated determination can be made. If you have any questions or require guidance, please contact the IRB Coordinator for assistance.

Thank you for providing information concerning your student's project.

Opportunity
afforded

murraystate.edu

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