

# The Connections between Attention-Deficit/Hyperactivity Disorder and Levels of Criminal Behavior among Adults

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## Abstract

Grounded in the Gestalt versus feature intensive processing theory, the purpose of this quantitative non-experimental study was to investigate if higher levels of ADHD symptoms result in higher levels of criminal thinking or reasoning, whether gender influences levels of criminal thinking when controlling for levels of ADHD symptoms, and whether higher levels of ADHD symptoms correlate with higher numbers of incarcerations across the general adult population. A total of 93 participants completed the surveys. Results showed statistical significance across all three research questions, meaning higher levels of ADHD symptoms did correlate with higher criminal thinking, gender influenced levels of criminal thinking when controlling for levels of ADHD symptoms, and higher ADHD symptoms did correlate with number of incarcerations. The significant rate of ADHD symptoms within forensic populations would warrant further investigation into programs to assess inmates for ADHD to provide adequate psychiatric support for inmates and address female populations more adequately. This current study contributed to positive social change by addressing some gaps in the literature regarding levels of ADHD and levels of criminal thinking, gender and ADHD, and ADHD and rate of incarcerations. Positive social change can come from further research to develop better assessments, interventions, and training.

## Keywords

Attention Deficit Hyperactivity Disorder (ADHD), Brown Attention-Deficit Disorder Scales (BADDS), Gestalt and Feature-Intensive Processing Theory, Psychological Inventory of Criminal Thinking Styles (PICTS)

## 1. Introduction and Background

Attention deficit hyperactive disorder (ADHD) is a neurodevelopmental disorder

er that is typically diagnosed in childhood though symptoms often continue into adulthood (Lane & Chong, 2019; Roige-Castellvi et al., 2021). Deficits associated with ADHD include impulse control, judgement, problem-solving, planning, working memory, and decision-making (Cunial et al., 2019). ADHD can be divided into three subcategories, including predominantly impulsive/hyperactive, combined presentation, and predominantly inattentive presentation (Areces et al., 2018; Lane & Chong, 2019; Roige-Castellvi et al., 2021).

Individuals with ADHD are at a high risk for mental health problems such as antisocial behaviors, self-harm, disruptive behaviors, emotional problems, substance abuse, and defiant behaviors (Sayal et al., 2017). Additionally, people with ADHD often suffer from educational deficits, difficulties with relationships, difficulties with employment, negative parental engagement, and criminality (MacDonald & Sadek, 2021; Sayal et al., 2017). Individuals with ADHD are more likely to repeat grades in school and are three times more likely to drop out of high school compared with children without ADHD (Areces et al., 2018). Further, those with ADHD have made up about 30% of the forensic population for juveniles and about 26% for adults (Cunial et al., 2019). Additionally, individuals with ADHD have higher rates of recidivism and re-offend sooner compared with individuals who do not have ADHD (Cunial et al., 2019; Young et al., 2018).

Though much of the research on ADHD is focused on males, less is known about females with ADHD. Past research has shown that males with ADHD show higher rates of externalizing disorders such as ODD and CD, with higher rates of rule breaking behaviors and aggression (Slobodin & Davidovitch, 2019). Females with ADHD present with symptoms of internalization and inattention, resulting in less disruptive behaviors resulting in lower rates of referral's, diagnosis, and ultimately treatment.

Regardless of gender, those with ADHD are at two times the risk of being arrested compared and over three times the risk of incarcerated (Freckelton, 2020). Additionally, individuals with ADHD show higher recidivism rates and higher impulsive-reactive violent crimes compared with individuals without a diagnosis of ADHD (Barra et al., 2020; Philipp-Wiegmann et al., 2018). Criminal behavior can be explained, in part, by low levels of self-control and high levels of impulsivity, which are also defining features of ADHD. When exploring a possible correlation between ADHD and low levels of self-control, higher levels of ADHD measures significantly predict lower levels of self-control (Schoepfer et al., 2018). Some additional ADHD symptoms include the inability to think rationally about consequences to one's behavior, inattentiveness, and impulsivity, which can all be factors explaining the over representation of people with ADHD in the prison system (Freckelton, 2020).

Despite people with ADHD being overrepresented in the forensic population, they are under-recognized, under-diagnosed, and misdiagnosed within the general population, especially females and older children (Sayal et al., 2017; Young & Cocallis, 2019). Additionally, an estimated 5% of children with significant deficits in impulsivity, hyperactivity, and inattention fall just under the threshold

for a diagnosis (Sayal et al., 2017). Individuals with ADHD symptoms who do not qualify for a clinical diagnosis are at significantly greater risk of negative outcomes compared with controls (Kirova et al., 2019). Because individuals with ADHD are more vulnerable in the prison system and face unique challenges for treatment (Young & Cocallis, 2019), it is important to examine ways to address incarceration rates for this population.

Most researchers identifying links between ADHD and criminal behavior focus on participants with an ADHD diagnosis or individuals within the criminal justice system (Engelhardt et al., 2019). This current study was used to further this research using typically developing individuals who might have some ADHD symptoms to determine if a higher level of ADHD symptoms correlates to higher criminological cognitions. The significant rate of ADHD symptoms within forensic population warrants further investigation into programs to assess inmates for ADHD, to provide adequate psychiatric support for inmates, and to provide therapeutic programs specific to the treatment of ADHD (Schoepfer et al., 2018). Pharmaceutical therapies for individuals with ADHD within forensic populations could reduce rates of criminal behavior (Philipp-Wiegmann et al., 2018). Additionally, a focus should be placed on early intervention programs for juvenile offenders who present with ADHD symptomology to reduce the likelihood of further criminal trajectories.

#### **Purpose Statement**

The purpose of this quantitative, non-experimental study was to explore the connections between higher levels of ADHD symptoms and levels of criminal behavior using a typically developing adult population. First, I examined whether higher levels of ADHD scores on the Brown Attention-Deficit Disorder Scales (BADDs) led to higher levels of criminal thinking on the Psychological Inventory of Criminal Thinking Styles-Layperson Edition (PICTS-L). Additionally, I examined whether gender influenced PICTS-L scores while controlling for BADDs scores. Finally, I determined whether BADDs scores predicted a number of incarcerations.

#### **Research Questions**

Research Question 1: Do participants with higher levels of ADHD scores on the BADDs present with higher levels of criminal thinking on the PICTS-L?

$H_01$ : Participants with higher levels of ADHD scores on the BADDs do not present with higher levels of criminal thinking on the PICTS-L.

$H_11$ : Participants with higher levels of ADHD scores on the BADDs do present with higher levels of criminal thinking on the PICTS-L.

Research Question 2: Does gender influence levels on the PICTS-L when controlling for levels of ADHD on the BADDs?

$H_02$ : Gender does not influence levels on the PICTS-L when controlling for levels of ADHD on the BADDs.

$H_12$ : Gender does influence levels on the PICTS-L when controlling for levels of ADHD on the BADDs.

Research Question 3: Would levels on the BADDs and the PICTS-L reliably predict number of incarcerations across the adult population?

*H<sub>0</sub>3*: Levels on the BADDs and the PICTS-L does not reliably predict number of incarcerations across the adult population.

*H<sub>1</sub>3*: Levels on the BADDs and the PICTS-L does reliably predict number of incarcerations across the adult population.

#### **Assumptions, Limitations, and Delimitations**

This study included the use of the BADDs and the PICTS-L, questionnaires that participants completed online. The conclusions were made with the assumption that participants answered these questionnaires truthfully. I was not able to verify the information pertaining to ADHD symptoms or the criminal background of participants. Additionally, previous researchers have found that adults are more likely to under-report symptoms of ADHD, which may have affected the results of this study (Engelhardt et al., 2019). Further, the Diagnostic and Statistical Manual (DSM)-5 diagnostic criteria for ADHD based on children ages 4 - 17, contributing to limitations when looking at adults with ADHD symptoms (Dorr & Armstrong, 2019). In addition, most research on ADHD also uses predominantly male participants, which limits the understanding of females with ADHD. Finally, the way in which participants were recruited in this study (via social media platforms) might limit the reach to participants with more severe criminal histories such as violent offenses, which might have skewed the data.

This study included English speaking male and female participants who may have symptoms of ADHD or a criminal background. The delimitations included that the results of this study are not be generalizable to non-English speaking individuals. However, the information gathered from this study might be generalizable to individuals with ADHD or those with symptoms of ADHD who are at high risk for engaging in criminal behavior.

#### **Significance of the Study**

This study is significant because there is limited information on individuals with ADHD in the forensic population (Engelhardt et al., 2019; Philipp-Wiegmann et al., 2018). Even more limited is information on females with ADHD within the forensic population (Young & Cocallis, 2019). However, though prevalence rates of ADHD in the general population of children are around 3.4%, in the forensic population rates, of ADHD can be as high as 30.1% for juveniles and 26.2% for adult prisoners (Cunial et al., 2019). Thus, the social significance of this study includes the possibility to increase awareness for more prevention programs, ADHD specific treatment within correctional facilities, and the understanding of a need for referring more females for an evaluation when ADHD is a suspected possibility.

#### **Review of the Academic Literature**

##### ***History of ADHD***

ADHD type symptoms can trace back to early literature such as the Bible and Shakespeare. In 1902, Sir George Still described ADHD Sir George Still de-

scribed ADHD is a defective circumstance regarding the loss of moral control without impairment of intellect and physical disease visible (Freckelton, 2020). However, the DSM did not recognize ADHD until the second edition in 1968, including a disorder, referred to as *hyperkinetic impulse disorder*, which would resemble ADHD (Lane & Chong, 2019). The third edition of the DSM included attention deficit disorder with two subtypes: the presence or absence of hyperactivity. The revised version of the third edition includes the name ADHD with combined symptoms of hyperactivity, inattention, and impulsivity (Lane & Chong, 2019).

The most current diagnostic criteria are in the fourth edition of the DSM published in 1994. The three subtypes of ADHD are predominantly hyperactive/impulsive, combined type, or predominantly inattentive type. Additionally, the DSM requires that symptoms be present before the age of twelve. Symptoms must include observation in at least two different environments. Symptoms should not include a better explanation by another diagnosis, and symptoms should cause significant deficits in functioning in daily living, occupational, social, or school (Lane & Chong, 2019).

#### **Diagnostic Criteria**

The importance of the diagnostic criteria for ADHD in the DSM-5 establishes for children ages 4 - 17 is likely why many adults remain undiagnosed with only around 10% - 25% of adult diagnoses (Dorr & Armstrong, 2019). The diagnosis for hyperactivity/impulsivity and inattention types, includes having at least six symptoms that persist for at least 6 months (American Psychiatric Association, 2013). Symptoms should be inconsistent with developmental level and negatively affect academic, social, or occupational functioning (American Psychiatric Association, 2013). Symptoms for the inattention type, includes failure to attend to details, difficulty sustaining attention, and easily distracted. In addition, failure to follow through with instructions, difficulty organizing tasks, avoids tasks that involve high mental effort, frequently loses items, easily distracted by stimuli, and is forgetful during daily activities (American Psychiatric Association, 2013; Lane & Chong, 2019). The following are symptoms for hyperactive/impulsivity type: fidgets often, leaves seat frequently when expected to stay seated, runs or climbs when inappropriate, unable to engage in leisure activities quietly, uncomfortable being still for long periods, talks excessively, does not wait for turn in conversation, has difficulty waiting in lines, and often interrupts others (American Psychiatric Association, 2013; Lane & Chong, 2019). Symptoms of ADHD should be present before the age of 12, and symptoms should be observed in multiple settings (American Psychiatric Association, 2013).

Specifiers included in the ADHD diagnosis, are combining presentation with criterion met for both inattentive and hyperactive/impulsive, predominantly inattentive, and predominantly hyperactive/impulsive presentation (American Psychiatric Association, 2013). Additionally, specifiers include if the individual is in partial remission and if the severity is mild, moderate, or severe (American Psychiatric Association, 2013). Individuals who do not meet the diagnostic crite-

ria for ADHD but show some symptoms fits into the subthreshold ADHD category (Kirova et al., 2019). Individuals who fit into this subthreshold category suffer from higher rates of executive dysfunction, family dysfunction, school deficits, interpersonal impairments, cognitive impairment, juvenile delinquency, psychiatric comorbidity, and temperament problems (Kirova et al., 2019; Schneidt et al., 2020). Schneidt et al. (2020) posited that children with subthreshold symptoms also showed no negative outcomes related to the ADHD symptoms observed in childhood. The problem with subthreshold ADHD symptoms is that individuals often experience negative outcomes but are left with limited treatment and resource options due to a lack of diagnosis (Kirova et al., 2019). ADHD assessment is through binary diagnostics, biased toward symptomatic extremes. The results in a lower range in symptom scores, are not considered for a positive diagnosis. Females with fewer disruptive behaviors, and those with a higher socioeconomic status who miss the cutoff for an ADHD diagnosis are in the lower range (Kirova et al., 2019).

#### ***Possible Causes of ADHD***

Some of the causes of ADHD are still unknown. What is known is that ADHD comes from a combination of various environmental and genetic factors that affect the brain (Min et al., 2021; Roige-Castellvi et al., 2021). ADHD has a range of causes that produce changes to the brain's development, causing the symptoms associated with ADHD (Nunez-Jaramillo et al., 2021). Researchers who study the genetic factors of ADHD have discovered that neurotransmitters dopamine affects mood, cognition, memory, learning, and sleep. Neurotransmitters epinephrine and norepinephrine, which stimulates the central nervous system, are impacted in those with ADHD symptoms (Moise, 2018). Environmental factors include stress, psychosocial adversity, domestic violence, maternal mental illness, alcohol abuse, and smoking in childhood and prenatal exposure.

#### ***Treatment of ADHD***

Treatment for ADHD typically includes psychopharmacological and non-psychopharmacological treatments (Lane & Chong, 2019). Psychopharmacological treatments typically include stimulant medications, such as Ritalin or Adderall, and have been shown effective to reduce problematic symptoms. Individuals taking the drug methylphenidate have had better response speed and working memory, though these effects only lasted while taking the medication (Tamminga et al., 2021). Non-psychopharmacological interventions include parent training to improve parent-child interactions, cognitive behavioral therapy, mindfulness training, executive functioning training, and neurofeedback therapy (Lane & Chong, 2019). Although psychopharmacological interventions have been most effective in treating ADHD, a combination of medication and non-pharmacological interventions is typically most effective.

#### **ADHD Deficits**

##### ***Neuropsychological Deficits and ADHD***

One of the major neuropsychological deficits seen in individuals with ADHD is executive functioning deficits (Salomone et al., 2020). Executive functioning is

a cognitive process used to engage in appropriate problem-solving behaviors to reach future goals (Holst & Thorell, 2020; Khoury & Milligan, 2019). Executive functioning includes processes of memory, switching from one task to another, planning, and inhibition (Eskritt & Walsh, 2020; Holst & Thorell, 2020). Evidence exist to show that executive functioning deficits might be a core component of the neuropsychology of individuals with ADHD (Rosello et al., 2020; Thorell et al., 2019). Executive functioning deficits seen in individuals with ADHD can include deficits in inhibition, self-motivation, attention vigilance, time management, shifting, planning and organizing, and working memory (Rosello et al., 2020). In addition, executive functioning deficits often lead to individuals being unable to tolerate delayed rewards, and this can be symptomatic of adult ADHD (Dorr & Armstrong, 2019).

Although some individuals with ADHD do not suffer from executive functioning impairments, the subset of individuals with ADHD who do have executive functioning impairments suffer from significantly higher rates of problems in areas of occupational, academic, and higher rates of criminality (Holst & Thorell, 2020). Executive functioning deficits are seen in higher rates in the prison inmate population compared with the general population. Executive functioning deficits paired with trait impulsivity increases risk of risky behaviors (Jones et al., 2021). Even when controlling for antisocial personality disorder, the subset of individuals with ADHD who exhibited executive functioning deficits had high numbers of criminal acts and high numbers of arrests compared to those with ADHD who did not exhibit executive functioning deficits (Holst & Thorell, 2020).

### **Comorbid Disorders**

Oerbeck et al. (2017) explained that an increased risk of underrepresentation of people exist with ADHD because people with mental disorders are three times less likely to participate in population studies compared to those without mental illness. Oerbeck et al. further stated that researchers in one study found that nonparticipants were twice as likely to have ADHD compared with participants of that study. Creating a barrier when looking at the prevalence of co-occurring disorders among individuals with ADHD.

Katzman et al. (2017) stated that adults with ADHD have as high as an 80% chance of having at least one comorbid psychiatric disorder. Reale et al. (2017) stated that individuals with the combined type of ADHD, and those with more severe symptoms are more likely to have a comorbid disorder, compared with other subtypes of ADHD and those with less severe forms. Adults with ADHD are more likely to have co-occurring disorders of dysthymia, major depressive disorder, various mood disorders, substance abuse disorders, and anxiety disorders (Katzman et al., 2017). When an individual has co-occurring disorders, the diagnosis is difficult to treat ADHD. Katzman et al. (2017) stated that by treating an individual for their ADHD symptoms this individual could have a more positive trajectory with psychiatric morbidity in the future, possibly even preventing the emergence of additional disorders.

### ***ADHD and ODD***

Comorbid disorders are common among individuals with ADHD at a prevalence rate of around 67% - 69%, the most prevalent comorbid disorders involving disruptive behavior disorders (Oerbeck et al., 2017). One of these co-occurring disorders is ODD, with around half of the children diagnosed with ADHD also having a co-occurring disorder of ODD. ODD is characterized by irritable or angry mood, vindictive and disruptive behaviors, and argumentative. In addition, individuals with ODD struggle with school and forming friendships (Eskander, 2020). ADHD and co-occurring ODD are strong predictors of CD and worsen the severity of psychosocial dysfunction.

### **ADHD and Psychopathy**

Many researchers have noted a link between ADHD symptoms and psychopathic traits, antisocial personality disorder, and CD. Aggensteiner et al. (2019) stated that individuals with ADHD have a high comorbidity rate with conduct problems, at around 40% - 70%. In a study conducted by Machado et al. (2020), higher levels of ADHD symptoms, specifically hyperactivity and impulsive symptoms, directly correlated with higher levels of psychopathy. Other researchers have found higher psychopathy traits in ADHD adolescents, though these individuals did not meet the clinical range for a psychopathy diagnosis (Machado et al., 2020).

Individuals with ADHD scored higher on disinhibition and meanness scales than individuals without ADHD (Machado et al., 2020). Meanness refers to symptoms of lack of empathy, lack of attachments, excitement seeking, and cruelty. These symptoms might explain the social cognition impairments seen in individuals with ADHD, which can result in low effect or low empathy and deficits in reading social cues such as fear or sadness, leading to more aggressive behaviors (Machado et al., 2020). Furthermore, some researchers that have suggested that both ADHD and psychopathy share neurobiological differences in similar brain networks compared with healthy controls (Machado et al., 2020).

### **Male versus Female ADHD**

While there is a better understanding of how females present differently with ADHD than males, females are still underdiagnosed and undertreated for ADHD in childhood. Females receive diagnosis much later than males, leaving them untreated for longer periods of their lives (Kok et al., 2020). Females are more likely to present with ADHD-I (inattentive), while males are more likely to present with ADHD-HI (hyperactive/inattentive) type (Kok et al., 2020; Uribe et al., 2019). ADHD-I often results in emotional dysregulation, low levels of arousal, and withdrawal, leading to a misdiagnosis of various internalizing disorders such as depression or anxiety disorders (Kok et al., 2020). Misdiagnosis leads to individuals receiving inadequate treatment, resulting in worse academic outcomes and poor psychosocial functioning.

### **ADHD and Crime**

Holst and Thorell (2020) found that individuals diagnosed with ADHD in childhood were two to three times more likely to be arrested in adulthood com-



pared to those who were not diagnosed with ADHD. Additionally, Holst and Thorell concluded that 40% of adult prison inmates have ADHD, and 50% of adults referred to a clinic for ADHD had engaged in criminal behavior. Furthermore, Engelhardt et al. (2019) stated that over 50% of prison inmates screened for ADHD met the criteria for a retrospective diagnosis of ADHD in childhood, and many of these inmates, around two-thirds, met the adult criteria or were in partial remission for adult ADHD. Young and Cocallis (2019) reported that inmates with ADHD become involved with the criminal justice system earlier in life and have higher recidivism rates. Engelhardt et al. (2019) indicated, as many other researchers have, that further research is needed to understand the link between ADHD and criminal cognitive processes.

A key factor in understanding criminal behavior is to understand the system of criminogenic cognitions as this is what maintains the criminal lifestyle and is the area that should target treating individuals at risk or individuals who have already come in contact with the criminal justice system (Engelhardt et al., 2019). Criminogenic cognitions refer to a series of problematic thought patterns, also known as criminal thinking, which is an antecedent to criminal behaviors. Some examples of criminogenic cognitions would be blaming others and poor decision-making, maintaining a criminal lifestyle. Walters created the PICTS, which can quantitatively measure criminal thinking (Engelhardt et al., 2019).

Controversy existed as to which ADHD symptoms are related to criminal arrest histories. Some researchers have claimed that hyperactivity/impulsivity but not inattention was shown to predict criminal behaviors (Engelhardt et al., 2019). Other researchers have stated that inattention and hyperactivity/impulsivity links to the risk of criminal behavior. A study looking at ADHD symptoms and criminogenic cognitions by Engelhardt et al. (2019) found that the strongest predictor of criminal thinking was inattention and memory problems. Specifically, inattention links to the PICTS subscale cognitive indolence which refers to problem-solving, and discontinuity which refers to an inability to follow through on actions and thoughts (Engelhardt et al., 2019). While inattention was the highest predictor of criminal thinking, Engelhardt et al. (2019) also noted hyperactivity and impulsivity linked to criminal thinking via the PICTS subscale power orientation, which refers to control using manipulative and aggressive behaviors. However, impulsivity was more related to criminal thinking compared with hyperactivity.

Young et al. (2018) found that individuals in forensic settings with persisting ADHD symptoms into adulthood were six times more likely to engage in more aggressive incidents than prisoners with an antisocial personality disorder. Young and Cocallis (2019) found that while the observation of ADHD symptoms decrease as one ages in the general population, this decline is not observed across the prison population. Additionally, researchers have found that ADHD was the most common predictor of violent offending above substance misuse (Young et al., 2018).

### *Criminal Justice System*

Once in the criminal justice system, those individuals with ADHD misinterprets as having “bad behavior” or as “defiant” instead of having a treatable condition (Young & Cocallis, 2019). Additionally, a common criticism of ADHD is that it is a “made up” disorder without any biological basis (Lane & Chong, 2019). Avant (2019) estimated that at least one in three suspects coming in contact with a criminal justice professional has an ADHD diagnosis and therefore, these professionals should understand the traits of ADHD. One issue individuals with ADHD have in the criminal justice system enters into a plea bargain. Avant (2019) suggested that defendants with ADHD might have the capacity to understand what they agree to but that they might miss details, they process language differently, and their listening comprehension can be impaired. Young et al. (2018) stated that individuals with ADHD are more likely to have false confessions than the general population. Additionally, individuals with ADHD often act impulsively, which might lead an individual to plead guilty without fully grasping the consequences of that plea (Avant, 2019).

Although stimulant medication is considered the best option for the treatment of ADHD, the use of stimulant medication within the prison system is controversial (Young & Cocallis, 2019). Some prison systems might prohibit the use of stimulants for inmates with ADHD due to potential misuse. The risk of other inmates intimidating those inmates on medication results in further burden to security, increase risk of malingering, and increase the burden of medical professionals in the prison system. All of these issues create a barrier to treatment for those inmates with ADHD and a lack of medication to those who need it could create a tendency for those individuals to self-medicate with illegal substances (Young & Cocallis, 2019).

An individual with a predisposition to crime explained by Tolbaru (2020) is an individual who has excessive energy, impulsive, adventurous, aggressive, and destructive, or those who are hostile, authoritarian, and spiteful temperaments. Criminal behavior then occurs as a result of the predisposition for crime paired with the circumstantial factors (Tolbaru, 2020). Although stimulant medication is considered the best option for treatment of ADHD, the use of stimulant medication within the prison system is controversial (Young & Cocallis, 2019). Some prison systems might prohibit the use of stimulants for inmates with ADHD due to the potential for misuse, the risk of other inmates intimidating those inmates on medication resulting in further burden to security, increase risk of malingering, and an increase in burden to medical professionals in the prison system. All of these issues create a barrier to treatment for those inmates with ADHD and a lack of medication to those who need it could create a tendency for those individuals to self-medicate with illegal substances (Young & Cocallis, 2019).

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ments. Criminal behavior then occurs as a result of the predisposition for crime paired with the circumstantial factors (Tolbaru, 2020). Tolbaru (2020) suggested that an evaluation should occur when looking at how an individual gets involved in crime the biological, psychological, environmental, and social factors.

### **Theories on Crime**

#### ***Self-Control Theory***

Much of the research on individuals with ADHD and criminality concluded that individuals with ADHD who commit crimes are likely people with higher levels of impulsivity and lower levels of self-control. The self-control theory explained that self-control develops early in childhood, approximately under the age of 10, and remains stable throughout the life span (Forrest et al., 2018). Self-control, as it relates to this theory, would include both impulsivity and risk-seeking behaviors. Gettfredson and Hirschi's self-control theory states that all individuals start life in a primitive state without self-control and that parents can teach self-control (Forrest et al., 2018). When parents appropriately monitor their children and punish deviant behaviors, self-control is formed. However, with poor parenting, the child remains in this primitive state and continues into adolescence and adulthood with self-control deficits.

#### ***Criminal Lifestyle Theory***

As part of the criminal lifestyle theory, Glenn Walters separated criminals into four behavioral styles, including social and rule-breaking, interpersonal intrusiveness, self-indulgence, and irresponsibility (Vrucinic, 2019). Walters further proposed that a criminal lifestyle results from three factors: choice, conditions, and cognition. Interpersonal intrusiveness explained by Vrucinic (2019) as callously disregarding other's rights and feelings with little regard for the destructiveness of their behaviors. Interestingly, interpersonal intrusiveness has been linked to a lack of punishment by caregivers and is a characteristic said to have the least likelihood of change (Vrucinic, 2019). Interpersonal intrusiveness is predictive of individuals who engage in aggressive and violent acts towards others. Individuals who engage in criminal acts such as murder or rape are higher in interpersonal intrusiveness than criminals who engage in crimes involving arson or drug trafficking.

Career criminals who use crime to acquire money as a lifestyle are typically categorized into the behavioral styles of self-indulgence and social rule-breaking (Vrucinic, 2019). Vrucinic (2019) explained social rule-breaking as individuals who show a blatant disregard for societal norms and laws. Self-indulgence explained by Vrucinic is a lack of self-control and an ongoing pursuit of gratification regardless of the negative consequences.

Vrucinic (2019) stated that when evaluating criminals, it is important to look at behavior and thinking to better understand how criminal thinking styles fit into the criminal lifestyle. Vrucinic found that younger criminals are more likely to have a behavioral profile of social rule-breakers, compared with older criminals. Non-violent criminals scored higher on the discontinuity scale on the PICTS, which refers to being easily distracted. Comparing recidivists to non-

recidivists, Vrucinic concluded that recidivists had significantly higher scores on social rule-breaking and self-indulgence profiles, along with mollification, super-optimism, discontinuity, and entitlement, on the PICTS. Mollification refers to the justification of criminal behavior, super-optimism is confidence in avoiding negative consequences, and entitlement is thinking of the self as special (Vrucinic, 2019).

### **Criminal Personality Theory**

Jha and Sharma (2020) define personality as an individual's inside organizational system that makes up patterns of thoughts, behaviors, and feelings. Criminal personality theory focuses on the errors in thinking of the criminal behavior, which is based on the criminal's idea of their free will and the criminal's behavior being out of the criminal's choice (Jha & Sharma, 2020). Jha and Sharma (2020) researched criminal behavior by looking at criminal thinking styles and the variables of the criminal's personality. The concept that has often been linked to the criminal personality profile is that of antisocial personality disorder, which often begins in childhood and is defined as a high disregard for other people's rights (Jha & Sharma, 2020). Many of the ideas from the criminal personality theory were used when developing Walter's criminal lifestyle theory.

Aside from antisocial personality disorder, pathological personality describes a criminal's personality (Jha & Sharma, 2020). Pathological personality includes the following traits: negative affectivity, detachment, antagonism, disinhibition, and psychoticism (Jha & Sharma, 2020; Vrabel et al., 2019). Negative affectivity refers to negative emotions such as anger and the consequent behaviors of those negative emotions (Jha & Sharma, 2020). Detachment is the loss of interest in activities and social isolation. Antagonism includes aggressive tendencies and a sense of grandiosity. Disinhibition is a lack of understanding of the consequences of actions and behaviors of risk-taking and impulsivity (Jha & Sharma, 2020). Psychoticism is the detachment from reality and irrational thought patterns. The above personality traits can explain the personality traits of criminals and help explain the resulting behaviors observed in many criminal acts.

Psychoticism as noted by some researchers is a personality trait that is a strong predictor of criminal thinking. In contrast other researchers stated that pairing antisocial personality traits such as a lack of following social norms and a disregard of others paired with impulsivity and low self-control is a big determining factor for developing a criminal lifestyle (Jha & Sharma, 2020). Others claim that if an individual has an antisocial personality, they will behave and think as a criminal does, but if an individual does not have an antisocial personality this does not mean they do not engage in criminal thinking.

*Extroversion* is a personality trait that can also predict criminal thinking and behaviors. *Extroversion* is a personality trait that refers to a preference to remain in a state of high arousal resulting in a tendency to seek excitement (Jha & Sharma, 2020). People who have an extroversion personality are more likely to seek what they desire without thinking about which way is the right way to achieve these desires.

### Typical Demographics of Criminals

Demographics that are predictors of criminality include the level of education, employment status, family background, substance abuse, socioeconomic status, gender, and previous criminal history (Li et al., 2019). People who live in disadvantaged neighborhoods are more likely to engage in criminal behaviors. Disadvantaged neighborhoods have fewer job opportunities, fewer community services, limited adequate housing, and higher crime rates (Chamberlain & Boggess, 2018).

### Classification of Offenders

Criminals classify within three major categories: level of risk, offense type, or the number of dynamic risk factors (Ward & Carter, 2019). The level of risk separates offenders into low, moderate, or high categories. The level of risk is helpful in determining how to allocate resources given to those criminals at the highest risk. While this method is valid information, risk level does not lend information to which individual factors in treatment or addressing risk factors (Ward & Carter, 2019).

Often criminals are classified by offense type, such as violent or non-violent offenders. This classification method assumes that those who commit similar crimes share common emotional, cognitive, and behavioral problems (Ward & Carter, 2019). Ward and Carter (2019) argue that classifying offenders based on the offense does not help to explain the reasons as to why each offender committed the crime. For example, if two individuals commit a similar crime, one might have poor social skills, anxious around people, and have poor emotional regulation, while the other is socially high functioning and engages in the criminal act because of sexually deviant motivations (Ward & Carter, 2019).

Classification based on dynamic risk factors is used to group offenders by total number and types of dynamic risk factors (Ward & Carter, 2019). These risk factors could include deficits in self-regulation, poor problem solving, or impulsivity, to name a few. While these risk factors are reliable predictors of re-offending, Ward and Carter (2019) claimed that this classification method is a combination of casual constructs and mental or contextual concepts, which are theoretically incoherent.

Ward and Carter (2019) proposed that a better way to classify offenders would be to use a functional approach, referred to as the Functional Offending Behavior Classification Framework. A functional approach to why people commit crimes involves looking at motivations and opportunities within the environment to achieve goals (Ward & Carter, 2019). How one might achieve their needs or goals might be illegal or socially undesirable, though the act might be functional in getting that need met (Ward & Carter, 2019). Behavior is rarely random, and Ward and Carter (2019) claimed that behavior is a function of benefits, limitations in the environment, and internal resources to gain benefits and reduce losses to the individual.

### Neuroscience and Crime

Neuroscientists discovered variations in various brain regions, which can in

part, explain some criminal behaviors. Using neuroscience to understand criminal behavior in 1948, with the case of Phineas Gage (Hirschtritt et al., 2018). Phineas was a respectful and agreeable man until an iron rod accident where the rod went through his medial prefrontal cortex. After this accident, Phineas was impulsive, argumentative, unpredictable, and aggressive (Hirschtritt et al., 2018). This accident prompted many neuroscientists to evaluate how the brain affects personalities and behaviors, leading to criminal behavior.

Many studies are on offenders and traumatic brain injuries. Nagele et al. (2018) showed that the lifetime prevalence of traumatic brain injuries among the incarcerated ranged between 46% - 60%. Nagele et al. also found that traumatic brain injury prevalence ranged between 49% - 50% (Nagele et al., 2018). Additionally, there is also a higher rate of traumatic brain injury prevalence among high-risk populations such as the homeless and people living in poverty. Nagele et al. (2018) stated that neurocognitive deficits that result from brain injuries could often present as problem behaviors resulting from criminal thinking.

Psychopathy is associated with damage to the frontal lobe, a reliable predictor of criminal behavior (Andersson, 2017). People with frontal lobe damage have difficulty inhibiting and self-regulation of behaviors, making them more likely to engage in impulsive behaviors and aggression. While neuroscience can explain factors, which might lead to crime, it is still unclear if these changes in the brain are the cause or the effect of the environmental and social factors involved (Andersson, 2017).

Psychopathic traits have been linked to blunted cortisol reactivity when individuals with psychopathic traits experience stressors (Johnson et al., 2015). This stress reactivity affects how one processes social feedback resulting in failed socialization attempts and resulting in behavioral dysregulation. Johnson et al. (2015) stated that cortisol reactivity over time would change brain activation patterns, along with behavioral patterns.

One study using college students who rated high in psychopathic traits concluded that these individuals lacked increased cortisol levels when these individuals were faced with stress inducing stimuli (Johnson et al., 2015). Interestingly, Johnson et al. (2015) concluded that a blunted cortisol response to stressors did not correlate with individuals with psychopathic traits but that it was predictive of number of incarcerations. Individuals who had higher numbers of incarcerations indicated higher levels of blunted cortisol responses to stressors (Johnson et al., 2015). This research is important to this current study because it shows how number of incarcerations can affect cortisol levels and low cortisol levels have been linked to insensitivity to the pain of others.

Jorgensen et al. (2016) stated that neuroscience can help us understand how genetics and environmental factors help explain criminal behaviors. Drug abuse is a part of genetics and in part by environment. One example comes from a study conducted with monkeys who exhibited reductions in dopamine receptors after their social conditions were altered to that of low-dominance ranking order (Jorgensen et al., 2016). This change in the monkey's social environment changed

their physiology and as a result these monkeys demonstrated an increased reliance on cocaine.

### **Deficits and Crime**

#### ***Executive Functioning and Crime***

Executive functioning is important in emotional regulation, specifically in the use of mental flexibility and the need to shift from alternative solutions when one is faced with a conflict (Karlsson et al., 2016; Seruca & Silva, 2016). When an individual suffers from deficits in executive functioning, anger can result in aggressive behaviors because of a failure to use coping strategies paired with a lack of control over aggressive impulses (Seruca & Silva, 2016). Cruz et al. (2020) stated that executive dysfunction can be linked to impulsive and violent aggression. Karlsson et al. (2016) stated that lower levels of executive functioning have linked to higher numbers of violent offenses, compared to non-recidivists. Additionally, a deficit in executive functioning can lead to a lack of regulation of emotional responses when experiencing stressful situations and a poor interpretation of the environmental stressor, leading to an increased likelihood of hostile behaviors (Seruca & Silva, 2016).

Seruca and Silva (2016) discovered that inmates with executive functioning deficits, impulsivity, and thoughtlessness were more likely to become incarcerated for violent offenses whereas inmates with mental flexibility deficits were more likely to be incarcerated for property offenses, and deficits in set-shifting observed in both non-violent and violent offenders. Weizmann-Henelius et al. (2018) found that the combination of impulsivity and poor insight may be one of the biggest predictors of violent offending. In addition, these traits are often links to substance abuse, which further leads to violence.

#### ***Low Self-Control/Impulsiveness and Crime***

Some symptoms associated with ADHD increase rates of criminality are low self-control and high levels of impulsivity. Alford et al. (2020) explained impulsivity as a “predisposition toward rapid, unplanned reactions to internal or external stimuli without regard to the negative consequences of these reactions to the impulsive individual or others” (p. 1). Additionally, criminality links to substance use, Slobodin and Crunelle (2019) found that one-quarter of people who suffer from substance abuse disorders have a comorbid diagnosis of ADHD, and one possible explanation for this would be that impulsivity leads to experimentation with illicit drugs and alcohol. Substance use disorder further exacerbates the rates of criminal behavior, recidivism, and barriers to treatment.

Low self-control is one of the most important concepts in criminology because it is a consistent predictor of criminal and antisocial behavior. Tasharofi and Barnes (2019) stated that “impulse control is one of the most consistent predictors of antisocial behaviors” (pg. 240). Hoyle et al. (2018) described individuals with low self-control as having a “here and now” way of thinking as these individuals respond to immediate rewards without considering the consequences. Bobbio et al. (2019) and Hirtenlehner and Baier (2019) concluded that low self-control in combination with opportunities to engage in criminal behavior led to

higher levels of deviant behaviors. Low self-control was broken down by Walters (2017) behaviorally, which would include criminal impulsivity and attitudinal which would include reactive criminal thinking. Walters (2017) also suggested that impulsivity should be broken down into four dimensions lack of perseverance, lack of premeditation, increased sensation seeking, and urgency.

Billen et al. (2019) found that improvements in impulsivity or self-control are associated with the reduction in recidivism. Much debate in the forensic research community over if self-control is stable across the lifespan, as explained in Gottfredson and Hirschi (1990) stability thesis (Billen et al., 2019). Gottfredson and Hirschi went on to claim that self-control cannot be improved by interventions. While one study tested a boot camp type intervention for self-control and found that self-control was worsened from this intervention, other studies have found that self-control can be improved through evidence-based interventions (Billen et al., 2019). What is important to note is that the level of self-control at release from correctional facilities has been a reliable predictor of recidivism.

#### ***Self-Control and Morality***

Saramago et al. (2020) found that when a person experiences a conflict in moral beliefs as far as committing a crime, the result will influence the level of self-control. In other words, it is only when this moral conflict arises, that self-control becomes a relevant factor in criminal behavior. Therefore, People who have low levels of morality will often commit crimes when motivations are present (Saramago et al., 2020). Additionally, the ability for an individual to practice self-control will depend on the individual's level of executive functioning as well as situational factors such as levels of stress or intoxication. In closing this idea, researchers have shown that self-control is a stronger predictor of criminal behavior in those who rank lower in morality.

According to the situational action theory, individuals vary on levels of moral values, determining whether people see crime as a solution to a problem (Ivert et al., 2018). Within this theory, it is morality that determines offending and not low self-control. If one has a high level of moral reasoning, Ivert et al. (2018) suggested that self-control is irrelevant as this individual will not choose crime as a solution. The findings from this theory suggest that low self-control only becomes relevant in predicting crime when the individual has a low level of moral reasoning (Ivert et al., 2018).

#### ***Impulsivity and Attachment***

The attachment theory includes an explanation of major factors in criminal behavior. Attachment theory refers to the extent an individual bonds in childhood, specifically to parents (Li et al., 2019). Attachment development in childhood is important in developing physical and emotional security, which develops an appropriate social functioning, stress response, and coping strategies (Li et al., 2019). Li et al. (2019) found that lower levels of healthy attachments lead to an insecure and anxious person, which increases the likelihood of engaging in criminal behaviors. Additionally, Li et al. found that individuals who have poor attachment skills and who are impulsive are most likely to commit the most se-



vere crimes and are more likely to engage in more criminal behaviors (Li et al., 2019).

### **Gender and Criminal Thinking**

One of the most well-established findings across criminology research is that males commit the majority of crimes, though researchers in this area predict that the gap between male and female crime will narrow over time (Benson & Harbinson, 2020). For example, data from a Yale study in 1989 showed that two percent of a sample sentenced for security offenses were female, and in a similar study in 2020 twenty percent of a sample of securities offenses were female. In the same Yale study, fifteen percent of credit card fraud offenses were female, while in a similar study in 2020 up to thirty-eight percent of the sample of credit card fraud offenders were female (Benson & Harbinson, 2020).

What is interesting about the differences between gender and criminal thinking is that when using the PICTS with both male and female offenders of white-collar crimes, Benson and Harbinson (2020) found that the female participants scored higher than males on all eight criminal thinking styles. This is an unusual finding when considering that males are more likely to engage in criminal behaviors compared to females. Benson and Harbinson stated that the criminal behaviors were because the idea that women who engage in criminal behavior are more deviant than men. The possibility exist that women are more honest when completing self-reported questionnaires such as the PICTS (Benson & Harbinson, 2020).

Benson and Harbinson (2020) claimed that gender influences both the pathways that lead people to crime and the likelihood of involvement in criminal behaviors. One example of this idea would be that women are more likely to engage in criminal behavior if they have a history of abuse, substance abuse, mental health problems, and relationship issues, compared with males (Benson & Harbinson, 2020). Men and women also have different sociological-based concerns which drive how they relate to others and how they behave. Women are more apt to care for others, be affectionate, and be cooperative. On the other hand, men are expected to be dominant, competitive, decisive, and risk-taking as they work to succeed. If a female follows these social norms, the difficulty for that female to justify criminal behaviors becomes stronger. In contrast the social norms would be more compatible with criminal behaviors (Benson & Harbinson, 2020). In general, socially, women engage in criminal behaviors compared with males.

When comparing male vs. female rates of crime by looking at the number of arrests and time of incarceration, these numbers might not tell the whole story. For example, males are more likely arrested and serve longer sentences when compared to a female who commits the same crime (Beaver & Wright, 2019). Although this is true across different countries and various characteristics of the individual, a male is more likely to be treated more punitively at all levels of the criminal justice system. One reason for this difference across gender could be due to male offenders making up most of the violent and more severe crimes

compared to women. This difference could also be related to leniency given to women due to their roles as child care-takers (Beaver & Wright, 2019).

### **Motivations for Criminal Behavior**

#### ***Proactive or Reactive Criminal***

Continuing on the criminal thought process, it is important to look at the differences in criminal behavior by comparing the proactive versus the reactive criminal thought process. The proactive criminal thought process refers to the instrumental, planned, and calculated antisocial cognition, whereas the reactive criminal thought process refers to antisocial cognition's emotional and impulsive features (Walters, 2020). Murray et al. (2020) stated that researchers had found evidence that ADHD symptoms and reactive aggression share some neurocognitive bases. The reactive criminal thought process is also linked to less successful patterns of criminal behavior as this reckless nature is more likely to be detected by law enforcement (Walters, 2020). Though the proactive criminal is less likely to be caught by law enforcement and the nature of their criminal behavior, it could be predictive that a proactive criminal would more than likely causes more damage to society than a reactive criminal. While some researchers believe that classifying criminals as reactive or proactive is too narrow a classification and crimes typically involve a combination of both, most agree that classifying as reactive or proactive helps to identify the function of the criminal acts (Low & Day, 2017). Looking at the differences in instrumental versus reactive criminals helps to identify the different thinking styles and the goals of the criminal. Criminals can also be classified by under or over controls of angry emotion, which focuses on the regulation of problematic emotions.

Classifying criminals based on under-controlled or over-controlled refers to how the individual behaves or deals with emotions when faced with provocation. An under-controlled violent offender is chronically angry, who has little tolerance, and who has low self-control and low inhibition (Low & Day, 2017). An individual who fits into this category or an offender will become aggressive when faced with provocation. A chronically over-controlled offender is likely to experience low or no anger when engaging in violent acts. These individuals will rarely experience anger when provoked, and have a somewhat normal personality profile (Low & Day, 2017).

When comparing criminal thinking styles and gender, Benson and Harbinson (2020) found that women scored higher on reactive and proactive criminal thinking scales compared to males. It was also found that age was negatively related to proactive criminal thinking but did not have an effect on reactive criminal thinking (Benson & Harbinson, 2020). Education obtainment was negatively related to both proactive and reactive criminal thinking. As far as race, no difference exist between races on proactive criminal thinking, though Caucasians were more likely to score higher on reactive criminal thinking scales compared to African Americans.

In a study conducted by Walters (2018), the results concluded that black

males were more likely to rate higher on proactive criminal thinking and white males were more likely to rate higher on reactive criminal thinking. This determination could be due in part to the lower socioeconomic status of the black male and the need to use crime for financial reasons (Walters, 2018). The white female was found to have higher rates of reactive criminal thinking, which would follow in line with the emotional motivations in which females engage in criminal behaviors. Interestingly, when comparing white to black females, black females showed no statistical significance in reactive versus proactive criminal thinking.

### ***Age-Crime Relationship***

Vrucinic (2019) stated that age is one of the strongest predictors in criminal behavior, and this age-crime relationship has been seen to be true across societies and times. The *age-crime curve* refers to an increase in criminal behavior in adolescence, peaking in late adolescence, and then decreasing in adulthood (Chan & Chui, 2017). The younger a person is when they start engaging in criminal behaviors is predictive of the likelihood that the individual's criminal career will be longer (Vrucinic, 2019). Stated differently, engaging in criminal behavior younger is one of the best predictors of future criminal behavior. While younger criminals are more likely to be more involved in the criminal lifestyle, older criminals' involvement should decline because of factors such as maturation, aging, and an increase in the fear of the end of life in prison.

The age-crime relationship is explained by Rocque et al. (2019) as the result of psychosocial maturation. With psychosocial maturation comes better self-control, and individuals become more responsible, leading to less risky behaviors. Additionally, maturation includes areas of social, neurological, identity, psychological, and civic components (Rocque et al., 2019). Individuals who have a clear understanding as to who they are, have control over aggressive tendencies, planning skills, impulse control, and risk avoidance, are less likely to engage in criminal behaviors. Psychosocial maturation would explain why criminal behaviors increase in late adolescence or early adulthood and start to decline thereafter. Incarceration has been shown to slow the development of psychosocial maturation, which might explain why younger criminals engage in criminal behaviors over longer periods of their lives (Rocque et al., 2019).

### ***Criminal Motivations***

Kimmel and Rowe (2020) found that data from public health and criminological records showed most acts of violence were due to a personal grievance. These grievances often included betrayal, physical aggression, bullying, romantic rejection, loss of custody rights of children, and loss of a job (Kimmel & Rowe, 2020). Further, these grievances can result in a distorted preoccupation to "right the wrong" one feels from the injustice.

Interestingly, Kimmel and Rowe (2020) noted that upon review of brain imaging scans, it was found that when some people engage in revenge behaviors the same neural reward processing parts of the brain are activated, as seen when people with substance addictions use drugs. Similar to how environmental sti-

multi signal cravings from a drug addict, a grievance is the stimuli which trigger a craving for revenge (Kimmel & Rowe, 2020). While more evidence is needed to link violent acts to a sort of behavioral addiction, there is much neurobiological evidence linking revenge seeking to substance or other behavioral addictions.

Thylstrup and Hesse (2018) stated that there are four main motives for offending: perception of provocation, compliance to please peers or peer pressure, financial gain, and excitement. Additionally, committing crimes due to excitement, financial gains, or provocation, were all associated with antisocial personality traits (Thylstrup & Hesse, 2018). Further researchers found that impulsive and angry traits were associated with provocation and excitement, whereas criminal behaviors to comply were associated with neuroticism personality traits. Additionally, offending to comply was associated with avoidance, anxiety, and dependent personality traits, while severe drug addiction was associated to crimes motivated by financial gains (Thylstrup & Hesse, 2018).

### **Risk Factors and Crime**

Risk factors that make individuals more likely to engage in criminal behavior include individual risk factors, social risk factors, and environmental risk factors (Bobbio et al., 2020). Individual risk factors include habits, emotions, personal propensities, cognitions, and attitudes. Social risk factors involve; possible criminal influences from friends, family, school, and social environment. As far as environmental risk factors, this includes opportunities for crime such as unprotected properties, high crime rate neighborhoods, or vulnerable victims. Important to note is that one of these risk factors in isolation would not explain criminal behavior, but a combination of multiple risk factors (Bobbio et al., 2020).

The Triple Risk for Delinquency Model helps to explain chances of engaging in delinquent behaviors with the interaction of the following: personal risk factors, a lack of prosocial support, and exposure to environmental criminal opportunities (Bobbio et al., 2020). Personal risk factors can include low self-control, antisocial beliefs, poor interpersonal skills, or drug abuse. A lack of prosocial support could include delinquent friends or poor family bonds. Environmental criminal opportunities could include high crime rate neighborhoods, provocations, or unprotected properties. This triple risk model combines criminal motivation with criminal opportunities, where both are high there is a high probability of crime, when both are low there is a low probability of crime, and when one is high, and one is low there is a moderate risk of criminal behavior (Bobbio et al., 2020).

DeLisi et al. (2020) identified individuals with ADHD, Oppositional Defiant Disorder, and CD, as *fledging psychopathy*. A fledging psychopath refers to youth who have empathic deficits, conduct problems, attention, and hyperactive problems, self-regulation deficits, coldness, and callousness which is seen in psychopathy (DeLisi et al., 2020). The idea with the fledging psychopath is that juveniles with ADHD, CD, and ODD, are at 544% increased odds of being in the 90<sup>th</sup> percentile of the number of arrest charges. Important to note is that anyone of these disorders in isolation might not lead to offending in adulthood, the

combination of two or more of these disorders has been shown to result in a criminal lifestyle well into adulthood.

### ***Criminal Profile***

Individuals with mental health conditions and/or neurodevelopmental disorders are at a greater risk of being involved in the criminal justice system than neurotypical individuals (Roy et al., 2016). Roy et al. (2016) stated that individuals who suffer from mental illness are more likely to draw negative attention from society and more likely to draw attention from police officers. Particularly, people are at higher risk of drawing attention from authorities if they are young males, suffer from comorbid mental health issues, poor impulse control, are of minority background, have suffered victimization, suffer from comorbid health issues, and have a substance use disorder (Roy et al., 2016). Besides demographic and clinical variables, Roy et al. (2016) found that contextual variables are also important predictors of criminal justice involvement, such as poor social networks, lack of medical or psychiatric services, and lower socioeconomic status.

Violent offenders are more likely compared to non-violent offenders to come from low socioeconomic backgrounds have a history of self-harm, have low levels of social support, and have deficits in executive functioning, low self-control, and lowered inhibition (Caravaca-Sanchez et al., 2019). Additionally, violent offenders are more likely to have suffered violence and family trauma as children, more likely to suffer from mental health issues, and more likely to suffer from alcohol and drug abuse, compared with non-violent offenders (Caravaca-Sanchez et al., 2019). One combination that is especially predictive of violent offenses is early abuse history in combination with alcohol abuse. Interestingly, individuals with ADHD are more likely to suffer from poor parenting as a child, more likely to suffer from alcohol abuse, more likely to suffer from social deficits, have deficits in executive functioning, low self-control, and lowered inhibition, compared to individuals without ADHD (Caravaca-Sanchez et al., 2019).

### ***Risk Factors and Number of Incarcerations***

In a study conducted by Sanchez et al. (2020) concluded static and dynamic risk factors are associated with number of incarcerations. Criminal history being a major static risk factor while antisocial personality and criminogenic thinking being dynamic risk factors (Sanchez et al., 2020). Whited et al. (2017) found that criminal history as static risk factor was equally as predictive of recidivism as antisocial personality and criminogenic thinking. Additionally, Whited et al. (2017) found that antisocial attitudes were stronger predictors of criminal behavior compared with factors such as mental health, social class, parental variables, personal distress, and personality traits. While other researchers have found that past violent behavior, CD, genetic disposition, and ADHD were found to increase the risk of persistence in offending (Mulder et al., 2019).

Additional risk factors to multiple incarcerations can include demographic factors. Demographic risk factors include low levels of education, being single, and economic problems (Sanchez et al., 2020). Additionally, Individuals with mental health disorders and substance abuse are at a higher risk of multiple in-

carcerations. Walsh et al. (2020) found that substance abuse, low levels of education, and antisocial personality was statistically significant in predicting future incarceration, both number and duration spent incarcerated.

## 2. Research Method and Design

There is limited research on the overrepresentation of individuals with symptoms of ADHD in the forensic population. The purpose of this study was to investigate if higher levels of ADHD symptoms result in higher levels of criminal thinking or reasoning, whether gender influences levels of criminal thinking when controlling for levels of ADHD symptoms, and whether higher levels of ADHD symptoms correlate with higher numbers of incarcerations across the general adult population.

The design for this study included surveys as a tool to collect quantitative data on the trends involving levels of ADHD symptoms and criminal behavior. The numeric data collected from these surveys with use of the BADDS and the PICTS, was used to make interpretations of the statistical results and answer the research questions.

Participants of this study included adult male and females between 18 - 65 years old, of various socioeconomic status, various levels of education, and various occupations. A diagnosis of ADHD was not a criterion to participate in the study nor was a history of criminal convictions. Participants were intended to be representative of the general population.

### **Sample Size**

The sample size for this study was determined by using the G \* Power calculator. Each statistical analysis method, including the correlation coefficient, analysis of covariance (ANCOVA), and multiple regression was calculated with an error probability of .5 and a power of .8. Results from this calculation showed a total sample size of 136 was needed for this study.

### **Recruitment**

Participants in this study were recruited by email of contacts, snowball sampling, and requests on social media sites, including Facebook and LinkedIn. Recruitment of participants was conducted online within the United States. Online announcements of this study described the purpose of the study, the type of assessments used, anticipated time needed to complete the assessments, privacy and confidentiality policies, and my contact information.

### ***Participation Documents***

**Informed Consent.** The informed consent included a description and the purpose of the study, the types of information that would be gathered, and why participants were being asked to participate. Additionally, the informed consent included the risks and benefits of the study, outcomes, voluntariness, and confidentiality. Confidentiality included participants being aware through the informed consent that their personal information would be coded rather than including names of participants. As far as voluntariness, the informed consent in-

cluded information on how the participant could leave the online survey at any time. The informed consent also stated that the participants data will be securely stored for at least 5 years and may be further used in future studies. The informed consent was included into the online portal in which the participants completed the BADDs and the PICTS-L. Participants clicked “continue” to indicate consent before they moved onto survey questions. My email address was included on the informed consent form. Additionally, participants were informed that a summary of the results of the study will be available for them via LinkedIn and Facebook once the study has been completed.

**Demographic Questionnaire.** Once participants continued past the informed consent, they were asked to complete a demographic questionnaire. The demographic questionnaire started with participants responding to *are you at least 18 years of age?* If participants responded with *no* the survey ended; if they responded *yes* the participant continued. This questionnaire asked about gender with the options of (female/male/other), current age with options grouped across 10-year spans from 18 - 65, and if participants had been incarcerated ranging from *no* to *yes 1 - 2 times*, *yes 3 - 5 times*, or *yes 6+ times*. Additionally, participants were asked if they had an ADHD diagnosis with options ranging from *no*, *yes under the age of 18*, or *yes over the age of 18*. Incarceration history was not a factor in inclusion to the study, nor was gender. The age of the participants was part of the inclusion into the study, with age ranging from 18 - 65.

#### **Data Collection**

Data collection was conducted using the online platform Survey Monkey. Survey monkey is a customizable online database. The link to the survey was added to the invitation to participate letter and posted on Facebook and LinkedIn. The Survey Monkey platform allowed participants information to be securely stored and allows for the participants to remain anonymous.

Formal recruitment of participants was accomplished by posting the invitation to participate in this study flyer on Facebook and LinkedIn. The time frame for data collection was initially estimated to be 4 weeks to gather a sufficient number of participants, and data were collected for 1 full month. Most participants in the study completed the survey the first week that the survey was posted on LinkedIn and Facebook at 83 participants. By the week final week no new participants completed the survey and at that point it was determined that recruitment methods were exhausted across the social media platforms. At this point it was decided to end recruitment of participants and move forward with the statistical analysis.

The sample size for this study was calculated using G \* Power calculator, which resulted in 136 for the total sample size. The actual sample size for this study included a total of 129 participants, with 93 participants completing both the BADDs and the PICTS-L assessments. Participants who did not complete both assessments (36 participants) were removed from the statistical analysis. The smaller sample size was deemed valid for this current study once statistical analysis was conducted and statistical significance levels were observed across all

three research questions.

### ***Instrumentation***

Each participant completed the BADDs and the PICTS-L online and independently. Additionally, each participant completed a demographic questionnaire including gender (male, female, and other), age range (18 - 28, 29 - 39, 40 - 50, and 51 - 65), incarceration range (no, yes 1 - 2 times, yes 3 - 5 times, and yes 6+ times), diagnosis of ADHD (no, yes under the age of 18), and yes over the age of 18).

**The PICTS-L.** The PICTS-L was the selected assessment to measure criminal thinking. The PICTS-L was created to assess thinking patterns which hypothetically maintain a criminal lifestyle (Walters, 2013). The PICTS-L is a self-report norm-referenced self-reported assessment that is completed using a 4-point Likert scale, ranging from 1 being disagree to 4 being strongly agree.

The PICTS was originally designed by Walters in 1997, which included using the PICTS to predict recidivism in male participants after being released from a medium security prison (Walters & Lowenkamp, 2016). The PICTS includes eight domains: discontinuity-constitutes, mollification, cognitive indolence, entitlement, super-optimism, sentimentality, power orientation, and cutoff (Walters, 2001). These eight thinking styles are understood to play an influential part in criminality, and levels in these domains have shown to predict recidivism rates and outcomes upon release from incarceration. Additionally, the PICTS includes two validity measures, the confusion scale which assesses for exaggerated symptoms and the defensiveness scale assessing if the participant is responding for a more favorable impression of himself or herself (Walters, 2001).

The PICTS-L was created by Walters because the wording in the original PICTS was not appropriate for people who do not have a criminal history but might still be at risk or criminal thinking or reasoning. The PICTS-L selected for this study evaluated criminal thought process across a general population of people who may or may not have a history of criminal behavior (Walters, 2013). Mitchell et al. (2017) tested the validity of the PICTS-L with a population of college students without a criminal history and they found that the PICTS-L is a valid and reliable assessment to assess criminal thinking with a population of people who do not have a history of criminal behavior.

The BADDs was selected to assess for levels of ADHD symptoms. The BADDs is an age normed self-report questionnaire designed for the adult population and consisting of forty questions, which assesses five areas of functional impairment (Brown, 1996). These areas include organization, focusing on tasks, regulating alertness, managing emotions, and working memory or recall. The BADDs is scored from 1 - 4 and is classified into three groups: unlikely to have ADHD, unconfirmed, or highly likely to have ADHD (Kakubo et al., 2018). Interpretation from the BADDs uses a total score of less than 60 would indicate that ADHD is unlikely, to a total score of 70 or higher indicating more serious ADHD symptoms. Total score was from the BADDs, no subdomain clusters were included in the analysis. This assessment focuses on the severity of symp-



toms, which relates directly to the research questions of this study.

#### **Data Analysis Plan**

The raw data collected from the PICTS-L was manually scored and the raw scores were converted to t-scores for three thinking style scales: general criminal thinking (GCT), proactive, and reactive. The PICTS-L scores included the GCT scores include the sum of the raw scores for seven of the eight PICTS-L thinking style scales (Mo, Co, En, Po, So, Ci, and Ds; Walters, 2013). The Proactive scale included the sum of (Mo, En, Po, and So), and the Reactive scale included the sum of (Co, Ci, and Ds) raw scores (Walters, 2013).

The BADDs scores included the total sum of all responses and the raw scores were used in the statistical analysis. I decided to use raw scores for the BADDs instead of the t-scores because any participant who scored under 31 on the BADDs had a score of  $<40$  = ADD possible but not likely (Brown, 1996). In using the raw scores, the statistical analysis was more sensitive to seeing a difference when comparing variables using BADDs scores under that  $<40$  threshold (Brown, 1996). The t-scores on the three PICTS-L scales (GCT, P, and R), the BADDs raw scores, and the demographic information was entered into the Statistical Package for the Social Sciences (SPSS). Any participant who did not complete both the PICTS-L and the BADDs was removed from the sample and was not included in SPSS.

#### **Threats to Validity**

This study is not experimental, which eliminates threats to internal validity such as maturation, regression, or experimental mortality. This study included well-established psychometric assessments which have been tested for validity and reliability. Therefore, no threats to external validity were foreseen. One possible threat to internal validity that was identified was participant's willingness to answer questions truthfully about ADHD symptoms on the BADDs and criminal thinking on the PICTS-L. This possible threat to internal validity was addressed by explaining to participants that their personal information will be eliminated from the results of this study, and the informed consent given to the participants included information of their anonymity and privacy.

### **3. Results, Findings, Recommendations and Conclusions**

The final sample population consisted of 93 adults from a general neuro-typical population. In total, 129 participants started the survey, though 36 participants either stopped at the demographic questionnaire or completed the BADDs assessment but not the PICTS-L. These 36 participants were excluded from the sample.

The first research question "Do participants with higher levels of ADHD scores on the BADDs present with higher levels of criminal thinking on the PICTS-L?" did allow for the rejection of the null hypothesis. Using the Pearson  $r$  correlation coefficient, it was found that there is a significant positive relationship between BADDs scores and GCT scores,  $r(91) = .45, p < .01$ , showing that

participants with higher levels of ADHD scores on the BADDs do present with higher levels of criminal thinking on the PICTS-L.

The second research question “Does gender influence levels on the PICTS-L when controlling for levels of ADHD on the BADDs?” did allow for the rejection of the null hypothesis. Using the ANCOVA the results indicated statistical significance of the main effect for gender  $F(2, 89) = 19.78, p < .001$ , showing gender does influence levels on the PICTS-L when controlling for levels on the BADDs.

The third research question “Would levels on the BADDs and the PICTS-L reliably predict number of incarcerations across the adult population?” did allow for the rejection of the null hypothesis. The overall multiple linear regression model was significant,  $F(2, 90) = 12.63, p < .001, R^2 = .202$ , showing that levels on the BADDs and the PICTS-L does reliably predict number of incarcerations across the adult population.

ADHD is a neurodevelopmental disorder that is typically diagnosed in childhood, though symptoms of the disorder often continue into adulthood (Lane & Chong, 2019). Deficits associated with ADHD can include impulse control, judgement, problem-solving, planning, working memory, and decision-making (Cunial et al., 2019). The purpose of this study was to investigate if higher levels of ADHD symptoms result in higher levels of criminal thinking or reasoning, whether these higher levels correlate with incarcerations, and whether gender influences criminal thinking when controlling for levels of ADHD symptoms. The participants included a general population of individuals between the ages of 18 - 65. The BADDs was used to assess for levels of ADHD symptoms using the sum of the raw scores. The PICTS-L was used to assess for levels of criminal thinking using the GCT scale, and the Proactive and Reactive subscales.

#### **Population and Demographic Analysis**

A total of 93 adult participants completed the online survey. Participants answered the following demographic questions: age with ranges between 18 - 28, 29 - 39, 40 - 50, 51 - 65; gender with options other, male, or female; incarceration with options no, yes 1 - 2 times, yes 3 - 5 times, yes 6+ times; and ADHD diagnosis with options of no, yes under the age of 18, and yes over the age of 18. **Tables 1-4** show the demographics related to gender, age, number of incarcerations, and number of ADHD diagnoses. The demographics of this study are fairly evenly distributed and representative of the target population in relation to age, number of incarcerations, and ADHD diagnosis. Gender demographics were not consistent with a general population, as this sample population consisted of 79% female, 19% male, and 1% other.

#### **Research Question 1**

**RQ1:** Do participants with higher levels of ADHD scores on the BADDs present with higher levels of criminal thinking on the PICTS-L?

$H_0$  Participants with higher levels of ADHD scores on the BADDs do not present with higher levels of criminal thinking on the PICTS-L.

**Table 1.** Gender.

	Frequency	Percent of Population
Other	1	1.1
Male	18	19.4
Female	74	79.6
Total	93	100.0

**Table 2.** Age.

	Frequency	Percent of Population
18 - 28	8	8.6
29 - 39	38	40.9
40 - 50	28	30.1
51 - 65	19	20.4
Total	93	100.0

**Table 3.** Incarceration frequency.

	Frequency	Percent of Population
No	78	83.9
Yes 1 - 2 times	8	8.6
Yes 3 - 5 times	3	3.2
Yes 6+ times	4	4.3
Total	93	100.0

**Table 4.** ADHD diagnosis.

	Frequency	Percent of Population
No	75	80.6
Yes under 18	6	6.5
Yes over 18	12	12.9
Total	93	100.0

H<sub>1</sub> Participants with higher levels of ADHD scores on the BADDs do present with higher levels of criminal thinking on the PICTS-L.

Research question 1 was evaluated using the Pearson *r* correlation coefficient analysis. The Pearson *r* correlation coefficient is used to compare two variables which would test the null hypotheses that there is no relationship between levels of ADHD symptoms on the BADDs and levels of criminal thinking on the PICTS-L.

Walters (2013) stated “criminal thinking is conceptualized by lifestyle theory

as hierarchical nature, with general criminal thinking at the highest (and most general) level, proactive and reactive criminal thinking in the middle of the hierarchy” (p. 6). Additionally, Walters explained that the GCT score and the Reactive and Proactive higher order scales are the three most important scores from the PICTS (Walters, 2013). Walters further explained that the GCT is used to sort participants into overt criminal thinking, covert criminal thinking, and no criminal thinking, and the R and P scales are used to identify whether the participant has a criminal thinking style of reactive, proactive, or mixed. For reasons explained by Walters (2013), all three variables were run through the Pearson  $r$  correlation coefficient statistical analysis separately with the BADDs raw scores.

The Pearson  $r$  correlation coefficient was run in SPSS three times. The first was run with raw scores from the BADDs and T-scores from the GCT. It was found that there is a significant positive relationship between BADDs scores and GCT scores,  $r(91) = .45, p < .01$ . Since the  $p$ -value is less than .05, the null hypothesis is rejected. The results are shown below in Table 5. The alternative hypothesis is assumed as: participants with higher levels of ADHD scores on the BADDs do present with higher levels of criminal thinking on the PICTS-L.

Table 6 and Table 7 show the Pearson  $r$  correlation coefficient run with the two higher order PICTS-L scores (proactive and reactive). Table 6 shows the results of the PICTS-L and the proactive scores. Using these two variables statistical significance was not observed,  $r(91) = .45, p > .05$ . Finally, the output for the BADDs scores and the PICTS-L higher order scale (reactive) did show statistical significance,  $r(91) = .45, p < .01$  and is shown in Table 7.

### Research Question 2

**RQ2:** Does gender influence levels on the PICTS-L when controlling for levels of ADHD on the BADDs?

$H_0$  Gender does not influence levels on the PICTS-L when controlling for levels of ADHD on the BADDs.

$H_1$  Gender does influence levels on the PICTS-L when controlling for levels of ADHD on the BADDs.

**Table 5.** Correlations BADDs & GCT.

		Raw Score (BADDs)	T-score (GCT)
Raw Score (BADDs)	Pearson correlation	1	.447**
	Sig. (2-tailed)		.000
	<i>N</i>	93	93
T-score (GCT)	Pearson correlation	.447**	1
	Sig. (2-tailed)	.000	
	<i>N</i>	93	93

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

**Table 6.** Correlations BADDs & pro.

		Raw Score (BADDs)	T-score (Pro)
Raw Score (BADDs)	Pearson correlation	1	.181
	Sig. (2-tailed)		.083
	<i>N</i>	93	93
T-score (Pro)	Pearson correlation	.181	1
	Sig. (2-tailed)	.083	
	<i>N</i>	93	93

**Table 7.** Correlations BADDs & Rea.

		Raw Score (BADDs)	T-score (Rea)
Raw Score (BADDs)	Pearson correlation	1	.574**
	Sig. (2-tailed)		.000
	<i>N</i>	93	93
T-score (Rea)	Pearson correlation	.574**	1
	Sig. (2-tailed)	.000	
	<i>N</i>	93	93

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

Research Question 2 was evaluated using the ANCOVA. Hatcher (2013) explains the ANCOVA as it “allows researchers to determine whether there is a relationship between categorical predictor variable and continuous quantitative criterion variable after statistically controlling for variance that the criterion variable shares with another variable” (p. 374). Gender is the categorical variable, the levels on the PICTS-L is the predictor variable, and the levels of ADHD symptoms from the BADDs is the covariate.

Before running the analysis of covariance, the assumptions for the ANCOVA were conducted. To check for these assumptions, an analysis of variance was run through SPSS with the BADDs scores as the dependent variable and gender as the fixed factor. Table 1 shows that gender at  $p > .5$ , at a  $p$  value of 2.9 is not statistically significant between gender and BADDs scores, so it is assumed that the data is normally distributed between independent variables.

Next, the homogeneity of regression was measured with the GCT scores as the dependent variable, gender as the fixed factor, and BADDs scores as the covariate. Table 2 shows that when adding gender times BADDs scores, this model is not statistically significant at  $p > .05$ , at a  $p$  value of .12. These two statistical analysis show that the model has met the two assumptions to run the ANCOVA being that the covariate (BADDs scores) are independent of gender and the homogeneity of regression with gender times BADDs scores is also met (Table 8 and Table 9).

**Table 8.** Tests of between-subjects effects BADDs.

Dependent variable: Raw score (BADDs)					
Source	Type III sum of squares	df	Mean Square	F	Sig.
Corrected model	4101.499 <sup>a</sup>	2	2050.750	2.910	.060
Intercept	32,022.669	1	32,022.669	45.433	.000
Gender	4101.499	2	2050.750	2.910	.060
Error	63,434.458	90	704.827		
Total	250,145.000	93			
Corrected total	67,535.957	92			

a. R Squared = .061 (Adjusted R Squared = .040).

**Table 9.** Tests of between-subjects effects GCT.

Dependent variable: T-score (GCT)					
Source	Type III sum of squares	df	Mean Square	F	Sig.
Corrected model	3337.293 <sup>a</sup>	4	834.323	17.769	.000
Intercept	26,902.073	1	26,902.073	572.957	.000
Gender	472.641	1	472.641	10.066	.002
BADDs	1161.975	1	1161.975	24.748	.000
Gender * BADDs	5.631	1	5.631	.120	.730
Error	4131.868	88	46.953		
Total	181,756.000	93			
Corrected total	7469.161	92			

a. R Squared = .447 (Adjusted R Squared = 4.22).

The ANCOVA was then run through SPSS with PICTS-L scores as the dependent variable, gender as the fixed factor, and the BADDs scores as the covariate. The results indicated statistical significance of the main effect for gender  $F(2, 89) = 19.78, p < .001$ , showing gender does influence levels on the PICTS-L when controlling for levels on the BADDs. Conclusion: the null hypothesis is rejected for RQ2 and the alternative hypothesis is assumed as; gender does influence levels on the PICTS-L when controlling for levels of ADHD on the BADDs.

### Research Question 3

**RQ3:** Would levels on the BADDs and the PICTS-L reliably predict number of incarcerations across the adult population?

$H_0$  Levels on the BADDs and the PICTS-L does not reliably predict number of incarcerations across the adult population.

H<sub>1</sub> Levels on the BADDs and the PICTS-L does reliably predict number of incarcerations across the adult population.

Research Question 3 was evaluated using the multiple linear regression. The multiple linear regression is used to predict scores on one dependent variable using scores from two or more independent variables. The dependent variable in this study being number of incarcerations, and the independent variables being levels of ADHD symptoms on the BADDs and levels of criminal thinking on the PICTS-L. Before running the multiple linear regression, a statistical analysis was run to check for the dependent variable (incarcerations) being normally distributed. The below **Tables 10-14** does show incarceration number to be statistically significant at a  $p$  value of  $p < .001$ , which does violate the assumption for this model.

**Table 10.** Descriptive statistics.

	Mean	SD	N
Incarceration Num	.2796	.72780	93
Raw score (BADDs)	44.3118	27.09403	93
T-score (GCT)	43.2903	9.01036	93

**Table 11.** Correlations.

		Incarceration Num	Raw score (BADDs)	T-score (GCT)
Pearson Correlation	Incarceration Num	1.000	-.153	.327
	Raw score (BADDs)	-.153	1.000	.447
	T-score (GCT)	.327	.447	1.000
Sig. (1-tailed)	Incarceration Num	.	.071	.001
	Raw score (BADDs)	.071	.	.000
	T-score (GCT)	.001	.000	.
N	Incarceration Num	93	93	93
	Raw score (BADDs)	93	93	93
	T-score (GCT)	93	93	93

**Table 12.** Model summary.

Model Summary <sup>b</sup>									
Change Statistics									
Model	R	R <sup>2</sup>	Adjusted R <sup>2</sup>	SE of the estimate	R <sup>2</sup> change	F change	df1	df2	Sig. f change
1	.468 <sup>a</sup>	.219	.202	.65017	.219	12.639	2	90	.000

a. Predictors (constant), T-score (GCT), Raw score (BADDs); b. Dependent variable = Incarceration Num.

**Table 13.** ANOVA.

ANOVA <sup>a</sup>						
Model		Sum of squares	df	Mean square	F	Sig.
	Regression	10.686	2	5.343	12.639	.000 <sup>b</sup>
1	Residual	38.045	90	.423		
	Total	48.731	92			

a. Dependent variable = Incarceration Num; b. Predictors = (Constant), T-score (GCT), Raw score (BADDs).

**Table 14.** Coefficients.

Coefficients <sup>a</sup>									
Model		Unstandardized coefficients		Standardized coefficients	<i>t</i>	Sig.	Correlations		
		B	SE	Beta			Zero-order	Partial	Part
	(Constant)	-1.004	.335		-3.000	.003			
1	Raw score (BADDs)	-.010	.003	-.374	-3.596	.001	-.153	-.354	-.335
	T-score (GCT)	.040	.008	.495	4.751	.000	.327	.448	.442

a. Dependent variable = Incarceration Num.

The overall multiple linear regression model was significant,  $F(2, 90) = 12.63$ ,  $p < .001$ ,  $R^2 = .202$ . Additionally, the GCT score was statistically significant to account for a unique amount of variance in the dependent variable (number of incarcerations) at  $p < .001$ . The BADDs t-score also was statistically significant to account for a unique amount of the variance in the dependent variable (number of incarcerations) at  $p < .001$ . Concluding that the null hypothesis is rejected for RQ3, and the alternative hypothesis is accepted as Levels on the BADDs and the PICTS-L does reliably predict number of incarcerations across the adult population.

### Key Findings

The results of this study indicated support for the three alternative hypotheses of this study. For Research Question 1, this means that participants with higher levels of ADHD scores on the BADDs do present with higher levels of criminal thinking on the PICTS-L. For Research Question 2, this means that gender does influence levels on the PICTS-L when controlling for levels on the BADDs. Finally, for Research Question 3, this means that levels on the BADDs and the PICTS-L does reliably predict number of incarcerations across the adult population. Additionally, there were emerging ideas and hypotheses relating to proactive versus reactive criminal thinking and ADHD symptoms.

### Interpretation of Findings

The findings indicated that higher levels of ADHD correlate with higher levels of criminal cognitions, specifically reactive criminal cognitions. Results were also statistically significant showing gender does influence levels of criminal thinking



when controlling for levels of ADHD. Lastly, it was found that higher levels of ADHD symptoms correlate with higher rates of incarceration.

Another interesting finding of this current study was that in a population of 79.6% females, 80.6% of the population answered *no* to a diagnosis of ADHD, meaning only 20.4% of the population had an official ADHD diagnosis. Of this 20.4% of the population, only 6.5% had been diagnosed under the age of 18 with 12.9% being diagnosed over the age of 18 (see [Brown, 1996](#)). Using the BADDSS, a raw score over 40 - 54 represents that ADHD is probable and a raw score over 55 indicates highly probable (see [Brown, 1996](#)). Of the total population of participants, 44 participants scored over 40 on the BADDSS, which equates to 47% of the population ranging above that *probable* threshold for ADHD. Of the participants who scored over 40 on the BADDSS, 27 participants or 29% of the population scored over 55 indicating a *high probability* of ADHD. Thus, 26.6% of the population who stated *no* to an ADHD diagnosis though they have enough ADHD symptoms warrants further investigation into a possible diagnosis.

### **Theoretical Framework Considerations**

The theoretical framework for this study was the Gestalt and feature-intensive processing theory. Related to the study, individuals with ADHD or those with ADHD tendencies are more likely to respond to the world in gestalt terms ([Sharps et al., 2005](#)). Additionally, individuals with ADHD or individuals who have multiple ADHD symptoms yet do not meet the diagnosis level are likely to engage in dangerous behaviors. These dangerous behaviors could include substance use due to impulsivity and sensation seeking, though these behaviors should ultimately be evaluated through the cognitive processes. ADHD symptoms and a higher likelihood of substance use can be explained because of these individuals relying on a gestalt processing instead of feature-intensive processing ([Sharps et al., 2005](#)).

Although this study did not include testing the specifics of feature intensive versus gestalts processing across participants, a key finding did further link ADHD symptoms and gestalt processing to higher levels of criminal cognitions. While analyzing Research Question 1, the overall model was statistically significant across the GCT category, which includes seven of the eight total subdomains. Then, a statistical analysis was run for the Proactive and Reactive subscale, which showed that there was a correlation between higher levels of ADHD symptoms and higher levels of reactive scores, though higher levels of ADHD and proactive scores was not statistically significant. These findings as they relate to the Gestalt and feature-intensive processing theory are significant. Proactive criminal thinking is explained by [Walters \(2013\)](#) as calculated, unemotional, and well planned out. Reactive criminal thinking on the other hand is impulsive, responding without thinking of the consequences, and overly emotional responding to situations in the environment ([Walters, 2013](#)). There seems to be some similarities between proactive criminal thinking and feature-intensive processing, and reactive criminal thinking and gestalt processing.

### **Limitations**

One limitation of this study was small sample size; though the total participants included 129, only 93 completed both the BADDs and the PICTS-L. Most participants who started but did not finish the survey did stop after the BADDs assessment, which came before the PICTS-L. The assumption is that the 36 participants who did not finish the survey did so because the survey was long and time consuming. The total number of questions in the survey is 129 questions and average time to complete the survey is 15 minutes and 39 seconds.

A second limitation of the study was an uneven number of males to females, with 79% of the sample being female. This limited the ability to compare males to females, with such a low portion of male participants. Though this is a limitation of this study, it could also be counted as a benefit due to the lack of information on females in this area.

A third limitation of this study is that a small percentage of the population had been incarcerated, and it is unknown the timeframe from the time these individuals had been incarcerated to the time they had taken the survey. Of the 93 participants in this study, 16.1% stated they had been incarcerated at least once in their lifetime.

### **Recommendations**

A recommendation for future research is to limit the number of questions on the survey so that more participants are likely to complete the survey. Additionally, though this study included number of times individuals had been incarcerated, *incarceration* was not clearly defined, and this number did not account for criminal behaviors in which participants were not prosecuted. A clear operational definition of “incarceration” would be beneficial in future studies. Additionally, future studies could include questions in the demographic questionnaire, which could account for number of criminal offenses which went unnoticed. This information might give a lower threshold for individuals who have engaged in criminal behavior but did not get caught by authorities.

### **Further Analysis on Proactive vs Reactive and ADHD**

This current research included PICTS-L scales GCT, Proactive, and Reactive scales. The GCT scale refers to a participant’s likelihood of engaging in GCT (Walters, 2013). The Proactive and Reactive scores shows where the individual is on the spectrum from proactive to reactive criminal thinking, with proactive being calculated and unemotional and reactive being over emotional and impulsive. The BADDs assessment was used for total score though this assessment also includes clusters; activation, attention, effort, affect, and memory (Brown, 1996). The activation scale refers to difficulties in organizing and starting work related tasks. The attention scale refers to sustaining attention and distractibility. The effort scale refers to energy and speed in which one processed information. The affect scale refers to difficulties with mood and sensitivity to criticism. Last, the memory scale refers to forgetfulness and difficulties with recall.

Attention-deficit/hyperactivity disorder includes the hyperactive/impulsive type, the inattentive type, and the combined presentation. For the inattention

type, some symptoms include failure to attend to details, difficulty sustaining attention, difficulty organizing tasks, avoid tasks that involve high mental effort, frequently loses items, and is forgetful during daily activities (American Psychiatric Association, 2013; Lane & Chong, 2019). As far as the hyperactive/impulsivity type, some symptoms include fidgets often, leaves seat frequently when expected to stay seated, unable to engage in leisure activities quietly, talks excessively, has difficulty waiting in lines, and often interrupts others. Anker et al. (2021) stated that it is likely “criminal acts by people with hyperactive-impulsive symptoms are more due to sensation and novelty-seeking and less planned and proactive” (p. 4).

A strong link between ADHD and criminality is impulsivity. Engelhardt et al. (2019) stated “to date there has been very little research on the cognitive processes underlying (or supporting) criminal behavior that might help explain the ADHD-criminality link, beyond low self-control” (p. 3). The hyperactive/impulsivity type of ADHD is thought to have a similar basis in impaired neurocognitive functions as reactive aggression or reactive criminal thinking (Murray et al., 2020). On this continuum of proactive and reactive aggression/criminal thinking, one would assume then that individuals with ADHD who engage in criminal behavior would be explained as reactive criminal thinkers and not proactive. Yet, individuals with ADHD have high rates of comorbidities with antisocial personality disorder (Anker et al., 2021). Individuals with antisocial personality disorder typically have proactive criminal cognitions in that their criminal behavior is calculated and unemotional.

I recommend in further research that this phenomenon of the spectrum of proactive criminal cognitions to reactive criminal cognitions and how ADHD fits in would be further explored. Specifically, referring to this current research, breaking apart from the BADDs scores into the clusters of activation, attention, effort, affect, and memory might have provided information to the identification of specific ADHD symptoms which could explain the ADHD and proactive criminal cognition link.

In this current study the Pearson  $r$  correlation coefficient analysis did not find statistical significance with a positive relationship between higher ADHD scores and higher proactive criminal thinking scores. Researchers might benefit from comparing ADHD inattentive, ADHD hyperactive/impulsive, and ADHD combined type, to levels of reactive and proactive criminal cognitions, to determine if it is the subtype of ADHD which correlates to proactive versus reactive criminal thinking. For example, does an individual with ADHD hyperactive/impulsive score higher on the reactive scale while an individual with ADHD inattentive score higher on the proactive scale, with ADHD combined scoring in the middle of proactive and reactive criminal thinking.

#### **Biopsychosocial and Environmental Factors**

This study lacked information on participants pertaining to environmental, psychological, social, and familial factors. Moise (2018) stated that psychosocial,

domestic violence, prenatal exposure to drugs and alcohol, family environment, and maternal mental illness, all increase the risk of an ADHD diagnosis. Additionally, Engelhardt et al. (2019) stated that poor academic performance, defiance behaviors, aggression, and poor parental management, could put individuals at risk for ADHD and criminal behavior. Future studies in this area might benefit from gathering more information on participants as far as environmental, psychological, social, and familial factors. With this information, one might be able to gain a better understanding of the factors associated with the ADHD-criminality link.

### **Implications**

Individuals with ADHD are overrepresented in the forensic population, yet this ADHD-criminality link is not fully understood (Sayal et al., 2017). Further, Young and Cocallis (2019) stated that ADHD is highly prevalent in the prison system, yet ADHD is underdiagnosed and misdiagnosed. Prevalence rates of ADHD in the general population of children are around 3.4%, whereas the forensic population rates of ADHD can be as high as 30.1% for juveniles, and 26.2% for adult prisoners (Cunial et al., 2019). Schoepfer et al. (2018) found that “only a comparatively small number of studies exist that address ADHD in a criminological context specifically, or that sought to directly measure the association between ADHD and some aspect of criminal or deviant behavior” (p. 2). Individuals with ADHD suffer from a host of deficits in the areas executive functioning, occupational functioning, emotional dysregulation, social functioning, familial problems, and higher rates of comorbid disorders.

When looking at ADHD symptoms and how this relates to criminal thinking, gender is an important factor though research is lacking on females and ADHD (Young & Cocallis, 2019). An interesting study by Madsen et al. (2018) might show that in relation to diagnosing females with ADHD, bias might limit the results. Madsen et al. (2018) explained that when giving therapists vignettes of males and females and asking them to diagnose based on the information in the vignettes, these therapists diagnosed twice as many males than females with ADHD, even though the only difference in the vignettes was gender. With female incarcerations growing quickly, increasing 18% from 2010-2014, the focus of research in this area should include females (Emerson, 2018).

The high rates of ADHD symptoms within forensic populations would warrant further investigation into programs to assess inmates for ADHD, to provide adequate psychiatric support for inmates, and to provide therapeutic programs specific to the treatment of ADHD (Schoepfer et al., 2018). Philipp-Wiegmann et al. (2018) found that pharmaceutical therapies for individuals with ADHD within forensic populations could reduce rates of criminal behavior. Additionally, a focus should be placed on early intervention programs for juvenile offenders who present with ADHD symptomology in order to reduce the likelihood of further criminal trajectories.

### **Social Change**

Implication for social change would include further research to develop better

assessments, interventions, and training. Specifically, more research is needed regarding females with ADHD symptoms and females who engage in criminal activity. [Young and Cocallis \(2019\)](#) stated, there is limited information on females with ADHD within the forensic population. Additionally, [Kok et al. \(2020\)](#) found that even as females are diagnosed, they are typically diagnosed much later in life compared to males which leave them untreated for longer periods of their lives.

More research is needed on appropriate assessments which can be used in prisons and jails to screen for ADHD upon entry. [Engelhardt et al. \(2019\)](#) stated that over 50% of prison inmates who were screened for ADHD met criteria for a retrospective diagnosis of ADHD in childhood and many of these inmates met the adult criteria or were in partial remission for adult ADHD. Also, more research is needed to determine effective interventions to prevent high-risk individuals from engaging in criminal activity due to ADHD symptoms and treatments for those who have committed crimes.

Lastly, research on effective training on working with individuals with ADHD for correctional officers and mental health professionals would be beneficial to improve the treatment outcome of those served. [Young and Cocallis \(2019\)](#) found that once individuals with ADHD enter into the criminal justice system, they are often misinterpreted as having “bad behavior” instead of having a treatable condition. In addition, [Avant \(2019\)](#) estimated that at least one in three suspects coming into contact with a criminal justice professional have an ADHD diagnosis.

This current research addresses positive social change by adding to the current research on ADHD and criminal cognitions or reasoning. Specifically, this research added to a gap in the research literature by using a sample of adults from a general population. Using a general population allowed for more information on individuals who might not have had an ADHD diagnosis but showed ADHD symptoms and those who might not have had a criminal record but engaged in criminal thinking, to expand this area of research to the general population.

#### 4. Conclusion

Within the forensic population rates of individuals with ADHD can be as high as 30.1% for juveniles, and 26.2% of adult prisoners ([Cunial et al., 2019](#)), yet research in this area is lacking. Individuals with ADHD struggle with a unique set of challenges that not only increases the likelihood of criminality but also reduces the likelihood of rehabilitation ([Hogue et al., 2017](#)). Individuals with ADHD are more likely to struggle with poor judgment, deficits in impulse control, poor planning, and poor family relationships, higher rates of disruptive behaviors, higher rates of substance abuse, and higher rates of comorbidities, compared with individuals without ADHD. Further, individuals with ADHD are at a high risk for mental health problems which can include antisocial behaviors, self-harm,

disruptive behaviors, emotional problems, substance abuse, and defiant behaviors (Sayal et al., 2017).

A study conducted by Engelhardt et al. (2019) showed that over 50% of the prison inmates who were screened for ADHD met the criteria for a retrospective diagnosis of ADHD in childhood and many of these inmates, around two-thirds met the adult criteria or were in partial remission for adult ADHD. Researchers have also shown that inmates with ADHD are involved in the criminal justice system earlier in life and have higher rates of recidivism (Young & Cocallis, 2019). Additionally, researchers have found that ADHD was the most common predictor of violent offending above substance misuse (Young et al., 2018).

Research on the ADHD-criminality link is limited, and it is even further limited with female participants. Females with ADHD present with fewer disruptive behaviors compared to males and this might account for part of the reason why females often go undiagnosed (Kirova et al., 2019). Even as females are diagnosed, they are typically diagnosed much later than males, leaving them untreated for longer periods of their lives (Kok et al., 2020). Much of the research included male participants only. When searching for research articles on either females and ADHD or females and crime, the results were limited to none. With the growing number of women committing crimes, research on the ADHD-criminality link involving female participants is critical.

The social significance of further research in this area would be an effort to increase awareness in the hopes of more prevention programs, ADHD specific treatment within correctional facilities, and the understanding of a need for referring more females for an evaluation when ADHD is a suspected possibility. Additionally, with so many individuals with ADHD coming in contact with law enforcement, a further understanding of these individuals might lead to better training for law enforcement and correctional officers.

### Conflicts of Interest

The author declares no conflicts of interest regarding the publication of this paper.

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