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Attention Deficit Hyperactivity Disorder in The Forensic Population

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Walden University
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Abstract

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BCBA, University of West Florida, 2019

MA, Argosy University, 2016

BS, University of Phoenix, 2015

Dissertation Submitted in Partial Fulfillment

of the Requirements for the Degree of

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Abstract

Individuals with attention deficit hyperactivity disorder (ADHD) are overrepresented in the forensic population, but there is a lack of research explaining this phenomenon. The purpose of this quantitative nonexperimental study was to investigate if higher levels of ADHD symptoms result in higher levels of criminal thinking or reasoning and whether gender influences levels of criminal thinking when controlling for levels of ADHD symptoms. Lastly, this study was designed to determine if higher levels of ADHD symptoms correlate with higher numbers of incarcerations across the general adult population. Gestalt versus feature intensive processing theory was used in this study to better understand how individuals with ADHD process decisions on a spectrum from gestalt processing to feature intensive processing. 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.

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Dedication

I dedicate this dissertation to my daughter, Fayth. I have been on this educational journey your whole life. You have sacrificed as much as I have for this accomplishment. Thank you for being my motivation.

To my youngest daughter, Kiera. As you have also been a part of this journey and have also sacrificed. To both Fayth and Kiera, I love you very much!

To my nephew, Eugene. You are never forgotten. “Days will pass and turn to years, but I will always remember you with silent tears” – Fayth.

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To Dr. Jana Price-Sharps, thank you for all that you have done. You have had such a huge impact on my life. You believed in me, even as I didn't believe in myself. Dr. Little, thank you as well. I could not have done this without you guys!

To my mom, thank you for all that you have done over the years. All your support has made this possible.

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Chapter 1: Introduction to the Study

Attention deficit hyperactive disorder (ADHD) is a neurodevelopmental disorder 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).

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.

This chapter includes an outline of some key research articles ranging from impulse control, predictors of criminal behavior, differences between gender, subthreshold ADHD, environmental and social risk factors, and reactive verses proactive criminal thinking. Additionally, this chapter includes the problem statement, purpose of the study, an explanation of the theoretical framework, the nature of the study, and key definitions of terms used. Lastly, this chapter includes the assumptions of the study, scope and delimitations, limitations of the study, and the significance of the study.

Background

Individuals with ADHD are overrepresented in forensic populations (Freckelton, 2020), especially females who are over represented in the severe ADHD subtype category (Barra et al., 2020). However, though research has shown that females ranked higher on inattention symptoms, there was no difference between genders on hyperactivity and impulsivity (Slobodin & Davidovitch, 2019). This overrepresentation of individuals with ADHD could be caused by poor impulse control and the desire for instant gratification over the consideration of the consequences (Freckelton, 2020). Additionally, individuals with ADHD are at significantly high risk for antisocial outcomes and neurocognitive impairments such as poor planning, memory dysfunction, working memory, and the inability to engage in future directed behavior (Freckelton, 2020).

Symptoms of ADHD have also been strongly related to criminogenic cognitions such as inattention, which has been strongly associated with discontinuity, cutoff, and cognitive indolence in addition to impulsivity (Engelhardt et al., 2019). However, symptoms of hyperactivity may not be related to criminogenic cognitions (Engelhardt et al., 2019). Regardless, similar research has shown that higher levels of ADHD symptoms and lower levels of self-control are predictors of criminal behavior (Shoepfer et al., 2018). Further, reactive criminal thinking is emotional and impulsive in response to a threat in the environment, lacking self-control, whereas proactive criminal thinking is calculated and predatory (Walters, 2017).

Research has described the relationship between ADHD and other disorders, which could lead to delinquent behaviors. For instance, ADHD has been linked to conduct disorder (CD), and oppositional defiance disorder (ODD), with an emphasis on environmental and genetic factors (Azeredo et al., 2018). Individuals with ADHD share some common genetics with those who have CD and ODD, and they also have a predisposition to engage in similar maladaptive behaviors. Additionally, high levels of comorbidity with these disorders can be attributed to a general syndrome of disruptive behaviors. Individuals with ADHD might also present with symptoms of CD or ODD due to a lack of social skills, which would affect an individual's relationships with friends and family and often results in problem behaviors. Similarly, ADHD may co-occur with intermittent explosive disorder (IED), and aversive childhood experiences increases the odds criminal behaviors (Barra et al., 2020). Individuals with severe ADHD symptoms are more likely to suffer from high adverse experiences and IED.

Research on risk factors for delinquency has also shown that juveniles who were older, living in a one parent household, poor parenting practices, use of alcohol and drugs, living in criminogenic neighborhoods, low levels of self-control, and had antisocial peers, engaged in more criminal behaviors compared with a non-antisocial group (Bobbio et al., 2020). Older age and unemployment before incarceration are further risk factors for reincarceration (Sanchez et al., 2020). Additionally, individuals who engage in property offences and those who have disciplinary infractions in prison are at risk for reincarceration (Sanchez et al., 2020). Drug use while in prison and being treated for mental health and substance use in prison are other risk factors for recidivism (Sanchez et al., 2020).

Problem Statement

ADHD is an early-onset neurodevelopmental disorder that involves symptoms including impulsivity, inattention, and hyperactivity, and it has an estimated prevalence of 7.2% worldwide (Slobodin & Davidovitch, 2019). People with ADHD are more likely to have lower levels of education, higher rates of alcohol and drug abuse, be unemployed, suffer from homelessness, and engage in more risky behaviors compared to individuals without ADHD symptoms (Garcia et al., 2019; Young et al., 2018). Additionally, individuals with ADHD have a high rate of comorbidity with ODD at around 60% and CD at a comorbidity rate of 16–20% (Azeredo et al., 2018). Comorbidity of these disorders are also influenced by environmental factors such as socioeconomic disadvantage, high crime rates, maternal depression, inadequate parental supervision, and parental alcohol and drug problems (Azeredo 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 (Shoepfer 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).

Purpose

The purpose of this quantitative, non-experimental study was to further explore the connections between higher levels of ADHD symptoms and levels of criminal behavior using a typically developing adult population. 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 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_0$1: Participants with higher levels of ADHD scores on the BADDS do not present with higher levels of criminal thinking on the PICTS-L.

$H_1$1: 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_0$2: Gender does not influence levels on the PICTS-L when controlling for levels of ADHD on the BADDS.

$H_1$2: 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_0$3: Levels on the BADDS and the PICTS-L does not reliably predict number of incarcerations across the adult population.

$H_1$3: Levels on the BADDS and the PICTS-L does reliably predict number of incarcerations across the adult population.

Theoretical Framework

The theoretical framework for this study was based on the gestalt and feature-intensive processing theory. Sharps (2003) first described the gestalt and feature intensive processing theory in his book *Aging, Representation, and Thought: Gestalt and Feature-Intensive Processing*. Sharps (2003) explained that the term "gestalt" refers to the "relatively holistic processing of a given representational configuration, with limited reference to the specific or defining features of that configuration" (p. 88). Sharps went on to explain that gestalt processing is often used as a "default setting" as it requires less energy and is faster to process compared with feature intensive processing. Processing is on a continuum of gestalt and feature intensive processing; where gestalt processing is fast, feature intensive processing provides more of a comprehensive analysis for complex decision-making problems. Gestalt is thus a cognitive process of evaluating stimuli based on relational information as a whole and feature-intensive as observing information based on item-specific characteristics (Sharps & Nunes, 2002).

Gestalt and feature-intensive processing theory includes the degree to which information is processed as more of a feature-intensive or gestalt manor. Based on this theory, people with ADHD might have more gestalt tendencies, compared with feature-intensive processing, explaining that individuals with ADHD have "tendencies toward the relatively rapid but general appraisal of stimuli, with limited attention to specific features" (Sharps et al., 2010, p. 587). Gestalt processing also tends to mask risks

associated with risky behaviors, whereas feature-intensive processing tends to result in a better understanding of decisional consequences (Sharps et al., 2005). Gestalt and feature-intensive processing theory provided guidance on evaluating the thought process of individuals with ADHD and the risky behaviors they might engage in by evaluating the cognitive processing associated with the choice to engage in risky behaviors, which can lead to higher rates of interactions with the criminal justice system.

Nature of the Study

This study was conducted using a quantitative, non-experimental research design. This design involves observing and analyzing relationships among variables (Appelbaum et al., 2018, p. 13). Key variables included simple correlations between higher levels of ADHD on the BADDS and higher levels of criminal thinking on the PICTS-L. I examined whether gender (categorial variable) influenced levels on the PICTS-L (continuous variable) when controlling for levels of ADHD on the BADDS (covariate). I also examined whether levels on the BADDS and PICTS-L predicted number of incarcerations (dependent variable).

Definitions

Attention deficit hyperactivity disorder (ADHD): A neurodevelopmental disorder that is typically diagnosed in childhood but can also be present in adults. Deficits associated with ADHD can include impulse control, judgement, problem-solving, planning, working memory, planning, and decision-making (Cunial et al., 2019).

Brown Attention-Deficit Disorder Scales (BADDS): Self-report questionnaire that is designed for the adult population and consisting of 40 questions, which assesses five areas of functional impairment associated with ADHD (Kakubo et al., 2018).

Gestalt and feature-intensive processing theory: Sharps and Nunes (2002) explained gestalt as a cognitive process of evaluating stimuli based on relational information as a whole and feature-intensive as observing information based on item-specific characteristics.

Psychological Inventory of Criminal Thinking Styles (PICTS): An assessment that evaluates for criminal thinking styles, which includes eight domains: discontinuity-constitutes, mollification, cognitive indolence, entitlement, super-optimism, sentimentality, power orientation, and cutoff (Walters, 2001).

Assumptions

This study included the use of the BADDS and the PICTS-L, which are questionnaires that participants completed online. The conclusions made from the results of these questionnaires were made with the assumption that participants answered these questionnaires truthfully.

Scope and Delimitations

This study included English speaking male and female participants who may have symptoms of ADHD or a criminal background. The results of this study are not be generalizable to non-English speaking individuals. But 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.

Limitations

I was not able to verify the information given pertaining to ADHD symptoms or 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 are based on children ages 4–17, which contributes to limitations when looking at adults with ADHD symptoms (Dorr & Armstrong, 2019). 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.

Significance

This study is significant because limited information is available 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% of 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.

Summary

Individuals with ADHD are more likely than those without ADHD to have deficits in impulse control, planning, and judgement. These deficits lead to poorer educational outcomes, differences in relationships with parents, higher rates of disruptive behaviors, and high rates of comorbidities with other mental illnesses including substance abuse. Thus, individuals with ADHD are more likely to come in contact with the criminal justice system compared with individuals without ADHD. 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 there is sparse research on individuals with ADHD in the forensic psychology literature. This quantitative, non-experimental study was used to investigate if higher levels of ADHD scores on the BADDS will result in higher levels of criminal thinking on the PICTS-L, if gender influences levels of criminal thinking, and if higher levels of ADHD scores reliably predict number of incarcerations across adult populations.

Chapter 2 will include a review of the literature on ADHD symptoms and criminal thinking. This will include a background on ADHD, deficits individuals with ADHD suffer from, co-occurring disorders, and studies on ADHD and criminal thinking. Additionally, Chapter 2 will go over the research on criminal thinking, including motivations, types of criminal thinking, risk factors, and environmental factors of criminal thinking.

Chapter 2: Literature Review

Individuals with ADHD are more likely to engage in criminal behaviors compared with individuals without ADHD (Engelhardt et al., 2019; Holst & Thorell, 2020; Young & Cocallis, 2019). But there is a need for more information on the link between ADHD and criminality. The purpose of this study was to investigate how levels of ADHD symptoms affect levels of criminal thinking. Additionally, this study investigated if there is a statistically significant difference between males and females as it relates to symptoms of ADHD and criminal cognitions. Finally, this study involved comparing levels of ADHD symptoms and number of incarcerations across the adult population.

This chapter will include a review of the literature on ADHD and criminal behavior, covering topics such as a brief history of ADHD, diagnostic criteria, ADHD prevalence, emotional dysregulation, neuropsychological and developmental deficits, biopsychosocial information on ADHD, parental styles of children with ADHD and their effects, and ADHD and peer relationships. Additionally, this chapter will include research on theories on ADHD and crime, comorbid disorders, the differences in males and females, ADHD treatments, crime and ADHD, impulsivity, executive functioning, self-control, and criminal profiles.

Literature Search Strategy

The literature search strategy included the use of Google Scholar and Walden University library, including the following databases: PsycARTICLES, PsychiatryOnline, PsychINFO, and the Criminal Justice Database. The main key words used in the literature review were *ADHD* or *attention deficit hyperactivity disorder* plus one of the following:

violent offending, *crime*, *criminal thinking*, *criminality*, *criminal behavior*, *socioeconomic status*, *parenting styles*, *females*, *occupational*, *treatment*, *co-occurring disorders*, *comorbid disorders*, *substance abuse*, *education*, *developmental deficits*, *criminal justice system*, *executive functioning*, *impulsivity*, *emotional dysregulation*, *neuropsychological*, *social deficits*, *peer relationships*, and *delinquency*. Parameters for specified years searched were 2016–2021. Some articles were included from 2015 if the article was highly relevant to the study or included historical information. Research articles used in this study were verified as peer-reviewed articles.

Theoretical Foundation

Gestalt and Feature-Intensive Processing Theory

Gestalt and feature-intensive processing theory is the theoretical foundation of this study. Gestalt and feature-intensive processing looks at decision making from a cognitive perspective (Sharps et al., 2005). When individuals engage in decision making using a feature-intensive process they will break apart choices based on gains and risks, which makes an individual less likely to engage in harmful behaviors (Sharps et al., 2005). For an individual to engage in feature-intensive processing they must have the ability to sustain attention, which is a primary deficit in individuals with high levels of ADHD symptoms. Individuals with ADHD or those with ADHD tendencies are more likely to respond to the world in gestalt terms (Sharps et al., 2005). Gestalt processing refers to quick decisions based on limited cognitive information and more of an impulsive response. Thus, individuals with ADHD or individuals who have multiple ADHD symptoms yet do not meet the diagnosis level are likely to engage in dangerous

behaviors (Sharps et al., 2005). These dangerous behaviors include substance use due to impulsivity and sensation seeking, though these behaviors should ultimately be evaluated through the cognitive processes.

Literature Review

ADHD

History

ADHD type symptoms can be traced back to early literature such as the Bible and Shakespeare. In 1902, a Sir George Still described ADHD as "a defect of moral control without general impairment of intellect and without physical disease" (Freckelton, 2019, p. 820). 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 being the presence or absence of hyperactivity, and the revised version of the third edition changed the name to ADHD with combined symptoms of hyperactivity, inattention, and impulsivity (Lane & Chong, 2019). The most current diagnostic criteria are included in the fourth edition of the DSM published in 1994, with the three subtypes of ADHD being predominantly hyperactive/impulsive, combined type, or predominantly inattentive type. Additionally, the DSM requires that symptoms be present before the age of 12, symptoms must be observed in at least two different environments, symptoms should not be explained better by another diagnosis, and symptoms should cause significant deficits in functioning in daily living, occupational, social, or school (Lane & Chong, 2019).

Diagnostic Criteria

It is important to note that the diagnostic criteria for ADHD in the DSM-5 was established for children ages 4–17, which is likely why many adults remain undiagnosed with only around 10–25% of adult diagnoses (Dorr & Armstrong, 2019). For both hyperactivity/impulsivity and inattention types, an individual must meet at least six symptoms that persist for at least 6 months (American Psychiatric Association, 2013). Symptoms should be inconsistent with developmental level and must negatively affect academic, social, or occupational functioning (American Psychiatric Association, 2013). For the inattention type, the symptoms include failure to attend to details, difficulty sustaining attention, distracted when spoken to, fails 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 are also included in the ADHD diagnosis, including combined 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 criteria for ADHD but show some symptoms are considered to fit 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, compared with controls (Kirova et al., 2019; Schneidt et al., 2020), though a study of children with subthreshold symptoms also showed no negative outcomes related to the ADHD symptoms observed in childhood (Schneidt et al., 2020). 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 is assessed through binary diagnostics, which is biased toward symptomatic extremes (Kirova et al., 2019). This results in a lower range in symptom scores, which is not considered for a positive diagnosis (Kirova et al., 2019). Often it is females, individuals with fewer disruptive behaviors, and those with a higher socioeconomic status who miss the cutoff for an ADHD diagnosis (Kirova et al., 2019).

Possible Causes of ADHD

Some of the causes of ADHD are still unknown, though what is known is that ADHD comes from a combination of various environmental and genetic factors that

affect the brain (Min et al., 2021; Moise, 2018; Roige-Castellvi et al., 2021). ADHD has a range of causes that produces changes to the development of the brain causing the symptoms associated with ADHD (Nunez-Jaramillo et al., 2021). Researchers who study the genetic factors of ADHD have found that neurotransmitters such as dopamine, which affects mood, cognition, memory, learning, and sleep, and neurotransmitters such as 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 (Moise, 2018).

Children who have been exposed to alcohol prenatally are 15 times more likely to suffer from ADHD compared with controls (Sandtorv et al., 2018). Rates of ADHD are observed at a high rate in the population of individuals with fetal alcohol spectrum disorders, at around 60% in the United States (Khoury & Milligan, 2019). Additionally, children who were prenatally exposed to opioids and other substances were found to have more ADHD symptoms compared to those who were not exposed to drugs prenatally (Nygaard et al., 2016; Sandtorv et al., 2018). These children have significant difficulties regulating attention and had behavioral problems, exhibiting more anxiety, aggression, and depression, compared with non-exposed children (Nygaard et al., 2016). Further, adults with ADHD have a higher likelihood of substance use disorders, so it could be possible that some of these prenatally exposed children could be genetically predisposed to ADHD (Sandtorv et al., 2018). Lastly, reports of these children's internalizing and

externalizing problems seemed to trend upward as they get older, meaning their problem behaviors were reported to get worse with age (Nygaard et al., 2016).

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 in reducing problematic symptoms (Lane & Chong, 2019). 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). Though the use of psychopharmacological interventions has been most effective in the treatment of ADHD, a combination of medication and non-pharmacological interventions is typically most effective (Lane & Chong, 2019).

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 can be explained by 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; Thorell et al, 2019). There is evidence 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). 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 (Holst & Thorell, 2020). 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).

Occupational Functioning and ADHD

Many adults diagnosed with ADHD suffer from occupational deficits. Around 34% of adults with ADHD were found to be employed full-time and a rate of

unemployment of adults with ADHD is around 22% (Holst & Thorell, 2020). Unemployment has been linked to criminal behavior due to a lack of social ties, a lack of stability, and a lack of economic independence (Baloch & Jennings, 2018). Conversely, employment increases the likelihood of individuals have stable housing and health care (Baloch & Jennings, 2018).

Emotional Dysregulation and ADHD

Emotional dysregulation can be common in individuals with ADHD (Anker et al. 2021; Hirsch et al., 2018). Emotional dysregulation refers to a lack of inhibition with negative and positive emotions, and a deficit in self-regulatory behaviors (Hirsch et al., 2018). Emotional dysregulation often leads to a poor self-concept and a poorer quality of life (Hirsch et al., 2018). Additionally, youth with ADHD present with more negative emotion reactivity when faced with a stressful situation compared with youth without the diagnosis while also requiring more time to regulate negative emotions (Babinski & Welkie, 2020). Emotional dysregulation on a clinical level presents similarly to ODD, which has been linked to antisocial behavior (Anker et al., 2021). It is important to note that most emotion regulation research involving participants with ADHD has been conducted with male participants, so there is a lack of understanding as to how females with ADHD regulate emotions.

Social Functioning and ADHD

Individuals with ADHD also often struggle with social functioning, which can include relationships with family members, partners, and friends. Social functioning deficits in individuals with ADHD might be explained by reaction time variability, which

was seen to lower social competence and increase proactive and reactive aggression (Tamm et al., 2019). Social deficits with family members can be explained through ADHD being a highly heritable disorder, resulting in siblings and parents either also having the disorder themselves or some ADHD symptoms and making familial relationships more difficult (Holst & Thorell, 2020). Additionally, relationships are often formed at work or school; because individuals with ADHD often have high rates of unemployment or absenteeism, these individuals have less opportunities to develop relationships compared to those without ADHD (Holst & Thorell, 2020). Children with ADHD are peer-rejected in school at an estimated 50–80% compared to typically developing children at 10–15% (Kok et al., 2016). Children with ADHD are more likely to display isolation and withdrawal from their peers compared with typically developing peers (Kok et al., 2016). Furthermore, children with ADHD show greater social deficits compared with children with other psychiatric conditions such as depression, conduct problems, anxiety, and learning problems (Kok et al., 2016). Therefore, individuals with ADHD often engage in behaviors such as defiance, oppositionality, and non-compliance, which limit the opportunities to engage in social learning (Kok et al., 2016).

Further, females who suffer with difficulties in peer functioning might be more affected compared with males (Kok et al., 2016). Females typically have more of an intimate social network and higher peer attachment compared with males, which may explain why females with ADHD are more likely than males to suffer from low self-esteem problems (Kok et al., 2016). Females with ADHD might be more likely to suffer from deficits in social functioning because peers are more likely to tolerate ADHD

symptoms in males, as females with hyperactive ADHD symptoms, can be considered more deviant compared with males (Kok et al., 2016). Therefore, females with ADHD are more likely to stand out resulting in more peer dislike and victimization, increasing depression and other internalizing problems often seen in females with ADHD (Kok et al., 2016). In a study comparing females with ADHD and females without ADHD, Kok et al. (2016) found that peer rejection resulted in more problem behaviors, eating pathology, substance use, depressed and anxious behavior, and lower levels of academic functioning. Additionally, peer rejection resulted in an increase in peer victimization, school expulsions, bullying behaviors, and aggression, among females with ADHD (Kok et al., 2016). Finally, social skill impairment seen in females with ADHD can result in long-term behavioral and emotional impairments throughout adolescence and into adulthood (Kok et al., 2016).

Van Der Maas et al. (2018) found that the link between ADHD and criminality might be best explained by poor social bonds. Van Der Maas et al. (2018) stated that ADHD in childhood can cause problems with early socialization, which could then lead to maladaptive behaviors in adulthood. This phenomenon can be explained by social bond theory, which suggests that "the greater the stake that one has in conformity, the lesser the chances one will commit a crime" (Van Der Maas et al., 2018, p.122). Van Der Maas et al. (2018) found that when weak social bonds were included in a statistical model the link between ADHD and arrest history was no longer statistically significant. These researchers found that individuals with ADHD who also scored lower on social bond indicators were more likely to engage in substance use and criminal behavior, compared

with those with ADHD who did not suffer from poor socialization (Van Der Maas et al., 2018).

Cortez-Carbonell and Ceric (2017) explained that individuals with ADHD have difficulties interpreting nonverbal social cues such as facial expressions and this results in a lack of appropriate social interactions. Cortez-Carbonell and Ceric (2017) and Borhani and Nejati (2018) found that adults with ADHD performed significantly worse than controls on identifying the facial expression of anger. These researchers explained that part of the social deficit seen in those with ADHD could be explained by the misinterpretation of emotions perceived by non-verbal cues (Cortez-Carbonell & Ceric, 2017). This facial emotion deficit could be explained in part by impulsivity, though other researchers have found that individuals with ADHD struggled with processing emotion stimuli but not with non-emotion stimuli (Cortez-Carbonell & Ceric, 2017).

ADHD and Family Stressors

One hypothesis that might account for higher rates of crime among individuals with ADHD is the "child effect" which explains the way parents respond to challenging behaviors in children with ADHD symptoms (Schoepfer et al., 2018). Poor parental control is the underlying concept in developing low self-control, which is one of the main traits associated with criminal behavior (Schoepfer et al., 2018). In other words, it may not be an ADHD diagnosis in isolation which leads individuals to higher rates of crime, but instead that a child's disruptive behavioral problems lead to poorer parental styles, resulting in some children developing low levels of self-control and therefore a higher risk of criminality.

Parents of children with ADHD have been reported to experience high levels of stress, which has shown to be higher than that of parents of children with autism spectrum disorder and parents of children with physical conditions such as HIV (Leitch et al., 2019). One explanation for the stress faced by these parents is the high likelihood that parents of children with ADHD suffer from their own mental health issues, such as having ADHD themselves (Leitch et al., 2019).

Participants of a qualitative study conducted by (Leitch et al., 2019) reported their child's problem behaviors as a "wrecking ball" and "ADHD rampage" as they talked about intensive and destructive outbursts from their child. Additionally, these parents talked about being in a state of constant hypervigilance as they felt that siblings were impacted, the marital relationship was stressed, and dealing with societal judgments (Ben-Naim et al., 2019; Leitch et al., 2019). Additionally, these parents faced a lack of needs met due to low support from schools, lack of support from medical professionals, and a lack of parenting groups for parents of children with ADHD (Leitch et al., 2019). Lastly, one parent stated that children with ADHD are not well cared for in schools because ADHD is not seen as a "serious disorder" and this parent went on to say, children are "falling through the cracks… they're not bad enough and they're not good enough to get by on their own" (Leitch et al., 2019, p. 7).

Parental stress can lead to poor monitoring of a child's behavior, an increase in corporal punishment, and controlling non-supportive parenting styles (Leitch et al., 2019). Additionally, Biondic et al. (2019) found that the parent-child interaction of parents and children with ADHD can consist of high levels of conflict and low levels of

warmth. Poor parenting in turn can result in an increase in ADHD symptoms, a reduction in the quality of the parent-child relationship, and a poorer prognosis for treatments (Leitch et al., 2019; Li, 2019).

Parents of children with ADHD are typically less involved, less warm, are inconsistent with punishment and are more likely to be overprotective or controlling compared to parents of typically developing children (Demmer et al., 2018). Higher levels of ADHD symptoms in children have also been linked to maternal hostility, parental stress, and poor monitoring and supervision (Demmer et al., 2018). The parent-child relationship as it relates to poor parenting and higher levels of ADHD has shown to be bi-directional (Demmer et al., 2018). That is, higher levels of symptoms of ADHD observed in the child results in poorer parenting and poorer parenting is predictive of higher levels of ADHD symptoms from the child (Demmer et al., 2018).

Family Stressors and Male Versus Female

Child maltreatment and other familial stressors has been linked to an increased risk of delinquency and mental disorders for both males and females, though some researchers have shown that females who have suffered from child maltreatment are more closely tied to delinquency when compared to males (Herrera & Stuewig, 2017). One study by Gallo et al. (2018) found that each exposure to maltreatment in childhood increased the risk of anxiety and depression in adulthood and these results showed the effect to be larger in female participants. Herrera and Stuewig (2017) found that females who were abused and neglected in childhood were more likely to have an arrest history compared with females who did not suffer abuse. While the male participants in this

study had an increased risk of offending, the link of childhood maltreatment and criminal behavior later in life was not as strong compared to the female participants (Herrera & Stuewig, 2017).

Herrera and Stuewig (2017) found that females might be more strongly influenced by child maltreatment as family bonds are more of a protective factor for females compared with males. Further, Herrera and Stuewig (2017) noted that internalizing behaviors such as depression are positively associated with adult crime in females but not in males. This is important when looking at the differences between males and females with ADHD, as females are more likely to suffer from depression and other internalizing problems.

Herrera and Stuewig (2017) noted that it is depression symptoms in females that have a stronger link to criminal behavior, compared with social or family risk factors. Additionally, Herrera and Stuewig (2017) found that when comparing males and females in disrupted family relationships, family problems were statistically significant to depression in the female participants but not the male participants. Herrera and Stuewig (2017) found that the link from depression to crime in females might be due to feeling indifferent about one's own personal safety, which leads to unsafe and unhealthy behaviors leading to interactions with deviant peers.

When evaluating the differences in male children, Demmer et al. (2018) stated that male children typically receive more of an authoritative parenting style from their caregivers. Male children are more likely than females to receive corporal punishment and verbal hostility, while also more likely to receive fewer displays of warmth and

emotional understanding from their parents (Demmer et al., 2018). Demmer et al. (2018) also pointed out that parents of children with ADHD are more likely to tolerate internalizing behaviors from female children and externalizing behaviors from males (Demmer et al., 2018). Looking at the differences in parenting styles with male versus female children is important because parenting styles affect levels of ADHD symptoms and gender affects both parenting styles and ADHD symptoms.

As explained in more detail in the theories section, Gottfredson and Hirchi's self-control theory explains that self-control, is learned at an early age, which is largely developed by parental styles (Forrest et al., 2019). When parents engage in a low level of monitoring and punishment of deviant behaviors, the child does not learn self-control and with low self-control the child is more likely to engage with deviant peers and later crimes. Muftic and Updegrove (2017) found that males reported lower levels of self-control, higher rates of violent behaviors, and more exposure to poorer parental techniques as children, compared with female participants. Low self-control is predictive of criminal and antisocial behaviors (Forrest et al., 2019).

Comorbid Disorders

When looking at comorbid disorders, Oerbeck et al. (2017) pointed out that there is an increased risk of underrepresentation of people 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. (2017) further stated that researchers in one study found that nonparticipants were twice as likely to have ADHD compared with

participants of that study. This is 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 ADHD the combined type 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 it is often difficult to diagnose and 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 at 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 (Oerbeck et al., 2017). ODD is characterized by irritable or angry mood, vindictive and disruptive behaviors, and argumentative (Eskander, 2020). In addition, individuals with ODD struggle with school and forming friendships (Eskander, 2020).

ADHD and cooccurring ODD is a strong predictor of CD and worsens the severity of psychosocial dysfunction (Eskander, 2020).

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) it was found that 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 was found to score higher on disinhibition and meanness scales compared with individuals without ADHD (Machado et al., 2020). Meanness refers to symptoms of lack of empathy, lack of attachments, excitement seeking, and cruelty (Machado et al., 2020). This might be explained by the social cognition impairments seen in individuals with ADHD, which can result in low affect or low empathy and deficits in reading social cues such as fear or sadness, which can lead to more aggressive behaviors (Machado et al., 2020). Further, there are 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).

One commonality between ADHD, CD, ODD, and psychopathy is a deficit in facial emotion recognition (Schonenberg et al., 2019). Particularly, individuals with one

or more of these disorders is likely to have a deficit in the detection of sadness and fear in others (Schonenberg et al., 2019). A lack of the processing of negative social feedback can explain callousness, poor empathy, and a lack of disinhibition (Schonenberg et al., 2019). Additionally, deficits in reading the facial cues of others have been linked to aggression, hostility, and other disruptive and socially inappropriate behaviors (Schonenberg et al., 2019).

ADHD and Substance Use

ADHD is a strong predictor of substance use disorders (Benjamin & Sadek, 2021). Wojciechowski (2018) stated that impulsivity being a main characteristic of ADHD, is one of the main predictors of substance use. Binge drinking is one major concern among adolescents and young adults with ADHD as this population of people is five times more likely to engage in binge drinking compared to individuals who do not have ADHD (Wojciechowski, 2018). The consumption of alcohol, as is true with other substances, can lead to violent behavior due to direct toxicological effects (Wojciechowski, 2018). In addition, Rocca et al. (2019) found that substance use can be connected to criminal behavior due out of the necessity to obtain more of the substance. Lastly, Rocca et al. (2019) stated that alcohol abuse and crime could go hand in hand due to the risk factors associated with both, such as in the case of an ADHD diagnosis linked to both higher rates of crime and binge drinking.

Hogue et al. (2017) stated that substance use among adolescents with ADHD is highly prevalent, at around 25% to 66%. These researchers pointed out two possible explanations for the high co-occurrence of ADHD and substance use being traits of

generalized deviance proneness and substance use-specific risk (Hogue et al., 2017). Generalized deviance proneness refers to impairments seen in clients with ADHD such as academic failure, conduct problems, and social deficits, which increases the risk of deviant peer environments, increasing the risk of substance use (Hogue et al., 2017). Substance use-specific risk refers to ADHD specific impairments that result in difficulties with negative affect, conduct problems, and coping skills, that increase the risk of deviant peer involvement, further increasing the risk of substance use (Hogue et al., 2017).

Once an individual with ADHD is engaging in substance use, they are more likely to struggle through treatment compared with those who do not have ADHD. Hogue et al. (2017) found that individuals with ADHD are more likely to transition from infrequent substance use to severe use faster, have more severe symptoms, drop out of treatment earlier, suffer from worse treatment outcomes, and return to substance use faster after treatment, compared to those without ADHD. It is for this reason that many researchers suggest the need to treat the ADHD-related problems as the main focus when individuals with ADHD are in treatment for substance use disorders.

Male Versus Female ADHD

While there is now a better understanding of how females present differently with ADHD compared to males, females are still underdiagnosed and undertreated for ADHD in childhood. 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). 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, which can lead to a misdiagnosis of various internalizing disorders such as depression or anxiety disorders (Kok et al., 2020). When a misdiagnosis is made, individuals gain inadequate treatment, resulting in worse academic outcomes and poor psychosocial functioning (Kok et al., 2020).

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 compared to those who were not diagnosed with ADHD. Additionally, Holst and Thorell (2020) found that 40% of adult prison inmates have ADHD and 50% of adults referred to a clinic for ADHD had engaged in criminal behavior. Further, Engelhardt et al. (2019) stated that over 50% of 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. Young & Cocallis (2019) reported that inmates with ADHD become involved with the criminal justice system earlier in life and have higher rates of recidivism. Engelhardt et al. (2019) pointed out 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 be targeted to treat 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 (Engelhardt et al., 2019). Some examples of criminogenic cognitions would be blaming others and poor decision making, which can maintain a criminal lifestyle. Walters created the PICTS, which can be used to quantitatively measure criminal thinking (Engelhardt et al., 2019).

There is controversy 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). Though other researchers have stated that inattention and hyperactivity/impulsivity were both linked to the risk of criminal behavior (Engelhardt et al., 2019). In a study looking at ADHD symptoms and criminogenic cognitions by Engelhardt et al. (2019), they found that the strongest predictor of criminal thinking was inattention and memory problems. Specifically, inattention was linked 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 was linked to criminal thinking via the PICTS subscale power orientation, which refers to control using manipulative and aggressive behaviors, but that impulsivity were 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 compared with prisoners with antisocial personality disorder. Young

and Cocallis (2019) found that while ADHD symptoms are observed to decrease as one ages in the general population, this decline is symptoms in 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 are often misinterpreted 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 is deciding to enter into a plea bargain. Avant (2019) suggested that defendants with ADHD might have the capacity to understand what they are agreeing 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 compared with the general population. Additionally, individuals with ADHD often act impulsively, which might lead an individual to pleading guilty without fully grasping the consequences of that plea (Avant, 2019).

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 (Young & Cocallis, 2019). 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 is explained by Tolbaru (2020) as an individual who has excessive energy, impulsive, adventurous, aggressive, and destructive, or those who are hostile, authoritarian, and despiteful temperaments. Criminal behavior then occurs as a result of the predisposition for crime paired with the circumstantial factors (Tolbaru, 2020). Tolbaru (2020) suggested that when looking at how an individual gets involved in crime the biological, psychological, environmental, and social factors should all be evaluated. The next couple of pages will include various theories in which researchers have sought to better understand crime.

When one evaluates crime, it is important to understand the operational definition of crime or criminal behavior. Andersson (2017) defined crime as "a type of action or omission which constitutes an offense punishable by the law" (p. 107). More importantly, Andersson (2017) warned "one must also take into account that behavior which is deemed criminal may vary from one culture to another and may also be contingent upon historical and social context in which 'normality' and 'deviance' is conceptualized" (p.

106). Andersson (2017) gave examples of how some use of narcotics and some domestic violence is not deemed criminal within some cultures. Andersson (2017) goes on to point out that "there is a fundamental belief that governmental power in defining crime is part of the problem" (p. 107). Lastly, what is considered a crime at one point in time may not be considered a crime at a different point in time. For example, before the Sexual Offenses Act in 1967, homosexuality was considered both a mental illness and a crime (Andersson, 2017).

Literature Review on Crime

Theories On Crime

Self-Control Theory

Much of the research on individuals with ADHD and criminality shows 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 established in 1990 by Gettfredson and Hirschi explains that self-control develops early in childhood, approximately under the age of 10, and remains stable throughout one's 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 self-control can be taught by parents (Forrest et al., 2018). When parents appropriately monitor their children and punish deviant behaviors self-control is formed but with poor parenting the child remains in this primitive state and continues into adolescence and adulthood with self-control deficits (Forrest et al., 2018).

Criminal Lifestyle Theory

Glenn Walters, as part of the criminal lifestyle theory 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 is a result of three factors: choice, conditions, and cognition (Vrucinic, 2019).

Interpersonal intrusiveness was 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 compared with criminals who engage in crimes involving arson or drug trafficking (Vrucinic, 2019).

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 was explained by Vrucinic (2019) as 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 both behavior and thinking, to better understand how criminal thinking styles fit into the

criminal lifestyle. Vrucinic (2019) found that younger criminals are more likely to have a behavioral profile of social rule-breakers, compared with older criminals. It was also found that non-violent criminals scored higher on the discontinuity scale on the PICTS, which refers to being easily distracted. When comparing recidivists to non-recidivists, Vrucinic (2019) found 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 that of confidence in being able to avoid negative consequences, and entitlement is thinking of the self as special (Vrucinic, 2019).

Criminal Personality Theory

Jha and Sharma (2020) define personality as ones inside organizational system that makes up one's patterns of thoughts, behaviors, and feelings. Criminal personality theory, developed by Yochelson and Samenow's (1976), 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 personality of the criminal. 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 Walters criminal lifestyle theory.

Aside from antisocial personality disorder, pathological personality has also been used in describing the personality of a criminal (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 (Jha & Sharma, 2020). Antagonism includes aggressive tendencies and a sense of grandiosity (Jha & Sharma, 2020). Disinhibition is a lack of understanding of the consequences of one's actions and behaviors of risk-taking and impulsivity (Jha & Sharma, 2020). Psychoticism is the detachment from reality and irrational thought patterns (Jha & Sharma, 2020). The above personality traits can be used to explain the personality traits of criminals and help explain the resulting behaviors observed in many criminal acts.

Psychoticism is noted by some researchers as a personality trait that is a strong predictor of criminal thinking. While other researchers stated that the pairing of 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 clearly 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 (Jha & Sharma, 2020).

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 (Jha & Sharma, 2020).

Typical Demographics of Criminals

Demographics that are predictors of criminality include one's 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 are classified 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 (Ward & Carter, 2019). Level of risk is useful in determining how to allocate resources given to those criminals at highest risk (Ward & Carter, 2019). While this method is useful, information on risk level does not lend information to which factors of the individual should be targeted in treatment or how these risk factors can be addressed (Ward & Carter, 2019).

Often criminals are classified by offense type, such as violent or non-violent offenders. This method of classification 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. In two individuals who 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 due to 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 (Ward & Carter, 2019). While these risk factors are reliable predictors of re-offending, Ward and Carter (2019) claimed that this method of classification 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 looking at why people commit crimes involves looking at one's motivations and opportunities within one's environment to achieve one's goals (Ward & Carter, 2019). The way in which 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 one's own environment, and internal resources to gain benefits and reduce losses to the individual.

Motivation to behave in certain ways is triggered internally such as morals and self-control, and externally such as a hostile environment or healthy social bonds (Ward & Carter, 2019). A functional way for one to earn money might be to get a job, or to sell drugs, both behaviors serve the same function of earning money (Ward & Carter, 2019). The individual who sells drugs to earn money might do so due to a maladaptive learning history and an environmental goal to needs mismatch (Ward & Carter, 2019).

All individuals need money for basic necessities, though some individuals might have the tools to earn money appropriately, such as a good education, high levels of self-control, and so on, while the other suffers from mental illness and poor social bonding, for example (Ward & Carter, 2019). When looking at criminal behavior functionally, one must determine what that individual's needs are and how that individual can meet those needs in a socially appropriate way (Ward & Carter, 2019). A criminal classification based on the motivations of the individual might be the most functional when looking at treatment options and ways of reducing crime. Each classification system has its pros and cons and is useful both individually and in combination, depending on the purpose of the researcher or practitioner.

Neuroscience and Crime

Neuroscientists have discovered variations in various brain regions which can in part, explain some criminal behaviors. Using neuroscience to understand criminal

behavior can be seen in 1948, with the case of Phineas Gage (Hirschtritt et al., 2018). Phineas was a respectful and aggregable man until an iron rod accident where the rod went through his medial prefrontal cortex (Hirschtritt et al., 2018). 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 which can lead to criminal behavior.

Many studies have been done 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%. It was also found that among juvenile delinquents 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 homeless and people living in poverty (Nagele et. al., 2018). Nagele et. al. (2018) stated that neurocognitive deficits that result from brain injuries can often present as problem behaviors resulting from criminal thinking.

Psychopathy is associated with damage to the frontal lobe, which can be a reliable predictor of criminal behavior (Andersson, 2017). People with frontal lobe damage have difficulty with the inhibition and self-regulation of behaviors, making them more likely to engage in impulsive behaviors and aggression (Andersson, 2017). 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 are faced with stressors (Johnson et al., 2015). This stress reactivity affects how one processes social feedback resulting in failed socialization attempts and results in behavioral dysregulation (Johnson et al., 2015). Johnson et al. (2015) stated that cortisol reactivity over time will change brain activation patterns, along with behavioral patterns.

One study using college students who rated high in psychopathic traits found 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) found that a blunted cortisol response to stressors did not correlate with individuals with psychopathic traits but that it was predictive of number of incarcerations. That is, individuals who had higher numbers of incarcerations showed 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 one's cortisol levels and low cortisol levels have been linked to insensitivity to the pain of others (Johnson et al., 2015).

Jorgensen et al. (2016) stated that neuroscience can help us understand how genetics and environmental factors help explain criminal behaviors. Drug abuse can be explained in part by 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 (Jorgensen et al., 2016).

The prefrontal portion of the brain is responsible for behavioral inhibition, planning, and abstract thought (Jorgensen et al., 2016). Using neuroscience to understand criminal behaviors, it was found that incarcerated violent offenders had lower levels of gray matter in the prefrontal regions of the brain compared with non-offenders (Jorgensen et al., 2016). This same reduction in prefrontal gray matter is seen in people who meet the clinical criteria for psychopathy (Jorgensen et al., 2016).

The amygdala is the area of the brain which promotes fear in dangerous situations creating the fight or flight response, but it is also responsible for recognizing emotions in others and learning from punishment (Jorgensen et al., 2016). Dysfunctional amygdala and poor prefrontal cortex functioning have been observed in individuals with IED (Jorgensen et al., 2016). Upon examining the brain of Charles Whitman who killed fourteen people in 1966 during a shooting spree, doctors found a tumor pressing against his amygdala (Jorgensen et al., 2016).

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

Low Self-Control/Impulsiveness and Crime

Some symptoms often associated with ADHD that have been shown to 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 to others" (p. 1). Additionally, criminality has also been linked 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. Tasharrofi 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) found 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. There has been much debate in the forensic research community over if self-control is stable across one's 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 (Billen et al., 2019).

Self-Control and Morality

Saramago et al. (2020) found that when one is faced with a conflict in moral beliefs as far as if one should commit a crime, the result will be influenced by one's 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. 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 (Saramago et al., 2020). In closing this idea, researchers have shown that self-control is a stronger predictor of criminal behavior in those who rank lower in morality (Saramago et al., 2020).

According to the situational action theory, individuals vary on levels of moral values, and this determines whether one sees 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 look to 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).

When looking at gender differences between self-control and moral reasoning as it pertains to offending, Ivert et al. (2018) found no differences between males and females in self-control. This is an interesting finding as low self-control is one primary causes of crime, yet it does not explain gender differences in crime (Ivert et al., 2018). Moral values, on the other hand, did more strongly explain offending in females compared to males (Ivert et al., 2018). Females typically rate higher in moral values and this may be explained by gender norms (Ivert et al., 2018). The higher level of moral values in females could explain some of the reasons why males commit a substantially larger and more severe number of crimes compared with females (Ivert et al., 2018).

Impulsivity and Attachment

One major factor in criminal behavior can be explained with attachment theory. 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 one's likelihood of engaging in criminal behaviors. Additionally, Li et al. (2019) found that individuals who have poor attachment skills and who are impulsive are most likely to commit the most severe crimes and are more likely to engage in more criminal behaviors (Li et al., 2019).

Empathy and Crime

O'Neill (2020) proposed that the gender gap among offenders could be due to levels of empathy. Empathy refers to one's ability to recognize the emotions of others and recognize how one's actions affect the emotions of others (O'Neill, 2020). Warden (2019) explained empathy as "standing in another person's shoes to feel and think as they do" (p. 953). A high level of empathy is thought to inhibit offending because the negative reactions to the individual's antisocial behaviors deter one's likelihood of future antisocial behaviors (O'Neill, 2020).

Females generally have higher levels of empathy scores on tests compared to males. O'Neill (2020) suggested that females are socialized to be care-oriented and that empathic behaviors are reinforced in women but discouraged in men because these behaviors are not seen as masculine. Lastly, O'Neill (2020) pointed out that criminologists have found empathy to be inversely associated with offending.

Dryburgh and Vachon (2019) stated that while gender differences among empathy and aggression are clear, how empathy relates to aggression is still unclear. Dryburgh and Vachon (2019) did replicate research on gender and empathy and how this affects aggression. What these researchers found was that women were more empathetic compared with men (Dryburgh & Vachon, 2019). It was also found that women were less aggressive compared with men and that a deficit in affective empathy was associated with aggression (Dryburgh & Vachon, 2019).

Morrow (2020) stated that empathy includes both affective empathy and cognitive empathy and where there is a deficit in one usually results in an overall deficit in

empathy. Cognitive empathy refers to an individual having perspective-taking abilities to intellectually understand another person's experiences (Morrow, 2020). Affective empathy refers to the observer's emotional response to another's emotional state, which could be a product of mirror neurons in the brain in response to facial cues (Morrow, 2020). In a study completed by Estevez et al. (2019) found that aggressors involved in school shootings had lower scores in both affective and cognitive empathy compared to controls. Deficits in empathy have been seen in higher rates among offenders compared with the general population.

Zonneveld et al. (2017) compared at-risk children with controls on affective empathy and cognitive empathy when viewing videos of fearful people or people who were in pain. These researchers found that the at-risk children showed lower levels of affective empathy, but not cognitive empathy compared to controls (Zonneveld et al., 2017). What this meant was that the at-risk children could understand the emotions of others in the videos but that they had trouble experiencing the negative emotions of others. Zonneveld et al. (2017) suggested that the results of this study indicated that those with deficits in affective empathy are more likely to engage in harmful behaviors towards others.

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 (Benson & Harbinson, 2020). 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 compared to males on all eight criminal thinking styles. This is an unusual finding when one considers that males are more likely to engage in criminal behaviors compared to females. Benson and Harbinson (2020) stated that this could have been due to the idea that women who engage in criminal behavior are more deviant than men. Or it is possible 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 expected to care for others, be affectionate, and cooperative (Benson & Harbinson, 2020). Men, on the other hand, are expected to be dominant, competitive,

decisive, and risk-taking as they work to succeed (Benson & Harbinson, 2020). If a female is to follow these social norms, it would be more difficult for that female to justify criminal behaviors. Whereas the social norms of a male would be more compatible with criminal behaviors (Benson & Harbinson, 2020). In general, it is less socially acceptable for women to engage in criminal behaviors compared with males.

It is important to note that 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 to be arrested and serve longer sentences when compared to a female who commits the same crime (Beaver & Wright, 2019). 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 (Beaver & Wright, 2019). 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 (Beaver & Wright, 2019). This difference could also be related to leniency given to women due to their roles as child care-takers (Beaver & Wright, 2019).

Women and Crime

While the majority of research within the forensic population is focused on males, annually around 1 million women are sentenced to jail each year. As other researchers have noted, Emerson (2018) found a rise in rates of women incarceration from 15% of total population rates to 18% between 2010-2014, with male incarceration rates decreasing by 3.2% around the same time. Link and Oser (2017) stated that the number of women in prison increased 587% from 1980 to 2011. Thomson (2017) stated that the

incarceration rates of women have been rising faster than incarceration rates of men over the last couple of years.

Women who engage in criminal behaviors typically come from low-resourced areas with a lack of job opportunities and lower socioeconomic status (Emerson, 2018). When comparing women to men, women are more likely to be incarcerated for drug-related offenses, though males are more likely to engage in drug-related violence (Thomson, 2017). Further, these women are often struggling with substance abuse, personal trauma, mental illness, and past experiences of childhood or intimate partner abuse and sexual abuse (Emerson, 2018). These past experience traumas often lead to poor coping strategies, which in turn lead to higher rates of substance abuse and often revictimization (Emerson, 2018).

Motivations are different in women offenders compared to male offenders and research has been conducted in this area with violent offenders. Women are most likely to commit violent offenses towards intimate partners due to an abusive relationship (McKeown & McCrory, 2019). In comparison, men are more likely to commit violent acts towards an intimate partner with motivations of jealousy, control, and low self-esteem (McKeown & McCrory, 2019). Additionally, females who engage in violent crimes are less likely to use weapons compared with males (McKeown & McCrory, 2019). Females who commit a robbery offense are likely to be less violent during the robbery compared to a male committing the same crime (McKeown & McCrory, 2019). Women are more likely to commit crimes towards people closest to them whereas males are more likely to commit crimes involving strangers (McKeown & McCrory, 2019).

Lasty, women are more likely to engage in reactive aggression which is emotionally driven and impulsive (McKeown & McCrory, 2019).

Motivations for Criminal Behavior

Proactive or Reactive Criminal

Continuing on the idea of 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. Proactive criminal thought process refers to the instrumental, planned, and calculated antisocial cognition, whereas reactive criminal thought process refers to the emotional and impulsive features of antisocial cognition (Walters, 2020). Reactive criminal thought process would be more in line with criminals who have ADHD, due to impulsiveness and lack of planning (Walters, 2020). Murray et al. (2020) stated that researchers have found some 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, because 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 cause more damage to society compared with 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 overcontrols of angry emotion, which focuses on the regulation of problematic emotions (Low & Day, 2017).

Classifying criminals based on under-controlled or over-controlled refers to looking at how the individual behaves or deals with emotions when faced with provocation. An under-controlled violent offender is one who 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 of offender will become aggressive when faced with provocation (Low & Day, 2017). 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 they will 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 (Benson & Harbinson, 2020). As far as race, there was no difference between races on proactive criminal thinking, though Caucasians were more likely to score higher on reactive criminal thinking scales compared to African Americans (Benson & Harbinson, 2020).

In a study conducted by Walters (2018), it was found 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 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 (Walters, 2018). Interestingly, when comparing white to black females, black females showed no statistical significance in reactive verse proactive criminal thinking (Walters, 2018).

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 due to factors such as maturation, aging, and an increase in the fear of the end of life in prison (Vrucinic, 2019).

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 (Rocque et al., 2019). Psychosocial maturation would explain why criminal behaviors increase in late adolescence or early adulthood and start to decline thereafter (Rocque et al., 2019). It is important to note that incarceration has been shown to slow one's 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 one's 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 (Kimmel & Rowe, 2020).

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 stimuli 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 (Kimmel & Rowe, 2020).

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 was associated with neuroticism personality traits (Thylstrup & Hesse, 2018). 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 (Bobbio et al., 2020). Social risk factors involve; possible criminal influences from friends, family, school, and one's social environment (Bobbio et al., 2020). As far as environmental risk factors, this includes opportunities for crime such as unprotected properties, high crime rate neighborhoods, or vulnerable victims (Bobbio et al., 2020). It is important to note 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 one's 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 (Bobbio et al., 2020). 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 (Bobbio et al., 2020). 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 90th percentile of the number of arrest charges (DeLisi et al., 2020). It is important to note 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 (DeLisi et al., 2020).

Criminal Profile

Individuals with mental health conditions and/or neurodevelopmental disorders are at a greater risk of being involved in the criminal justice system compared with 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, 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), it was found that many 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 incarcerations (Sanchez et al., 2020). 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.

Summary

This literature review included possible ADHD deficits which might lead to criminal thinking, such as impulsivity, occupational deficits, social deficits, family problems, and poor executive functioning skills. Though, as many researchers have described and have been quoted in this chapter, there is a gap in the literature on why individuals with higher levels of ADHD symptoms are overrepresented in the forensic populations. Additionally, it has been noted in many research articles that most of this research consists of male participants with limited information on the female population. Further, no studies were found in the literature examining if higher ADHD symptoms reliably predicted number of incarcerations.

The purpose of this study is to investigate how levels of ADHD symptoms affect levels of criminal thinking, if levels of ADHD symptoms affect females differently compared with males, and if higher levels of ADHD symptoms affect the number of incarcerations among adult participants. This literature review addressed the current research on ADHD symptoms and various areas of criminal thinking. Additionally, this literature review covered research on feature intensive processing, the theoretical foundation of this study.

A big part of this literature review included ADHD deficits, such as neuropsychological, executive functioning, occupational, impulsivity, emotional dysregulation, social, family bonds, and family stressors. Additionally, individuals with

ADHD typically suffer from comorbid disorders such as ODD, CD, psychopathy, and substance use disorders. These deficits along with the co-occurring disorders were then explained as far as how these factors put individuals at higher risk of criminal thinking and criminal behaviors.

This literature review then includes the differences between males and females with ADHD symptoms and how this relates to criminal thinking. Women are typically diagnosed with ADHD much later in life or not at all due to various reasons such as reporting bias. This lack of understanding about women and ADHD puts women at a disadvantage as treatment is delayed or inadequate due to a misdiagnosis.

A review of biological, psychological, environmental, and social factors associated with criminal thinking were included in this chapter. Along with demographic variables such as level of education, employment status, family background, socioeconomic status, gender, and previous criminal history. An explanation of criminal thinking using neuroscience was included, looking at frontal lobe damage, blunted cortisol, and genetics.

One of the biggest factors linking ADHD symptoms to criminal behavior is low self-control or impulsivity. The theoretical framework for this study is Gestalt vs Feature-Intensive Processing Theory, which helps to explain how some individuals with ADHD process information on more of a gestalt processing. Gestalt processing refers to quick decisions as opposed to feature intensive processing which breaks down choices to look at risks vs gains. Further, some researchers found that it is morality paired with

impulsivity which leads to crime, and this could explain why females commit less crime compared with males.

Chapter 3 will include the research methods of this quantitative non-experimental research design. The research methods will include research and design, an explanation of the sample population and sampling procedures, and how the participants were recruited. Additionally, chapter 3 will include information on informed consent, the demographic questionnaire, data collection methods, instrumentation, data analysis plan, threats to validity, and ethical concerns.

Chapter 3: Research Method

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. This chapter includes the research design and rationale, methodology, population, sampling procedures, data analysis plan, threats to validity, and ethical concerns. Additionally, this chapter includes how the participants of the study were recruited, informed consent, and the demographic questionnaire.

Research Design and Rationale

This quantitative study followed a non-experimental correlational design to look at the differences between individuals with higher levels of ADHD symptoms and criminal thinking, whether there are any gender differences, and how this relates to number of incarcerations. 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:

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_0$1: Participants with higher levels of ADHD scores on the BADDS do not present with higher levels of criminal thinking on the PICTS-L.

$H_1$1: 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_0$2: Gender does not influence levels on the PICTS-L when controlling for levels of ADHD on the BADDS.

$H_1$2: 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_0$3: Levels on the BADDS and the PICTS-L does not reliably predict number of incarcerations across the adult population.

$H_1$3: Levels on the BADDS and the PICTS-L does reliably predict number of incarcerations across the adult population.

Methodology

Sample Population and Sampling Procedures

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 0.5 and a power of 0.8. 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 were 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. As far as confidentiality, participants were made aware via the informed consent that their personal information would be coded rather than including names of participants. As far as

voluntariness, the informed consent included 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?" and 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

The data collection for this study was managed through survey monkey. Survey monkey is an online database which customizable. The link to the survey was added to the invitation to participate letter which was then posted on Facebook and LinkedIn. The Survey Monkey platform allowed participants information to be securely stored and allows for the participants to remain anonymous.

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 (Walters, 2013).

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 (Walters, 2001). 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 was selected for this study to evaluate 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.

BADDS. 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 (Kakubo et al., 2018). For the purpose of this current research, total score was used from the BADDS, no subdomain clusters were included in the analysis. This assessment focuses on one's severity of symptoms, 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. It was 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.

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? Research question 1 was evaluated using the Pearson *r* correlation coefficient analysis. The Pearson *r* correlation coefficient is explained as "the degree of the linear relationship between two variables" (Yockey, p. 156). Additionally, the values of the correlation coefficient range from 1.0 as a perfect relationship to -1.0 meaning a perfect negative relationship (Yockey, 2008). 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.

Research Question 2

Does gender influence levels on the PICTS-L when controlling for levels of ADHD on the BADDS? Research question 2 will be evaluated using the ANCOVA. The ANCOVA is used to determine if there is a relationship between a categorical predictor variable and a continuous quantitative criterion variable when controlling for the variance that the criterion variable shares with another variable (Hatcher, 2013). Gender would be the categorical variable, the levels on the PICTS-L would be the predictor variable, and the levels of ADHD symptoms from the BADDS would be the covariate.

Research Question 3

Would levels on the BADDS and the PICTS-L reliably predict number of incarcerations across the adult population? Research question 3 was evaluated using the multiple linear regression. As explained in Chapter 3, the multiple linear regression is

used to predict scores on one dependent variable using scores from two or more independent variables (Hatcher, 2013). 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. The multiple liner regression will be used to determine if higher levels of ADHD symptoms and higher levels of criminal thinking significantly predict number of incarcerations.

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.

Ethical Procedures

To address ethical concerns, an informed consent was provided to each participant before they agreed to complete the survey. The American Psychological Association (2017) states that participants of a study should be provided with informed consent information that explains the reasoning behind the study, procedures of the study, and their right to withdraw from the study, limits of confidentiality, and potential risks and

benefits of the study, in a language which participants understand. Additionally, the American Psychological Association (2017) states that when using participants personal information in a study, the researcher has an obligation to take precautions necessary to keep this information confidential.

Summary

Research in the forensic psychology literature is limited in investigating the reasons why individuals with ADHD symptoms are overrepresented in the prison system. Individuals with ADHD often struggle with higher levels of impulsivity, and deficits across executive functioning, socialization, educational, and occupational skills. These deficits can lead to social isolation, unemployment, and poor planning, which results in higher risks of criminal behaviors. The purpose of this current study is to help fill the gap in the literature on ADHD and criminal thinking.

This chapter included a description of the research methods of this study, to answer the research questions (1) do participants with higher levels of ADHD scores on the BADDS present with higher levels of criminal thinking on the PICTS-L, (2) does gender influence levels on the PICTS-L when controlling for levels of ADHD on the BADDS, and (3) would levels on the BADDS and the PICTS-L reliably predict number of incarcerations across the adult population. This chapter included the research and design, sample population and sampling procedures, and sample size. Additionally, this chapter included how participants were recruited, information on informed consent, the demographic questionnaire questions, data collection methods, instrumentation, data analysis plan, threats to validity, and ethical concerns.

The statistical analysis that was used for 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, was a simple correlation. Research question (2) does gender influence levels on the PICTS-L when controlling for levels of ADHD on the BADDS was analyzed using the ANCOVA. As far as research question (3) would levels on the BADDS and the PICTS-L reliably predict number of incarcerations across the adult population, a multiple regression analysis was used.

Data collection was conducted using the online platform Survey Monkey. Participants were recruited using social media platforms including LinkedIn and Facebook. The sample size for this study was calculated using G*Power calculator the results were indicated as 136 total sample size.

Chapter 4 will include a brief review of the purpose of the study, the research questions, and hypotheses. Additionally, chapter 4 will include time frame for data collection, any discrepancies in the data collection, demographic characteristics of the participants, and the results of the study.

Chapter 4: Results

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. Individuals with ADHD are overrepresented in the forensic population, yet few studies have been conducted to examine this phenomenon. Additionally, the studies in this area are typically conducted across individuals who have an ADHD diagnosis along with individuals who have a criminal record. Excluding individuals due to a lack of diagnosis can be problematic due to the large number of people who go undiagnosed. The purpose of this study was to add to the current research in this area using a general population including females, individuals who do not have an ADHD diagnosis, and those who might not have a criminal record.

Gestalt and feature intensive processing theory were used as the theoretical framework for this study. This theory helps to explain a spectrum of thinking from "gestalt" to "feature intensive processing" where gestalt processing includes looking at a tasks or items as a whole and feature intensive processing breaks everything down into its smaller parts (Sharps, 2003). It is likely that individuals who either have ADHD or show symptoms process information using more of a gestalt processing, which could hinder their ability to problem solve effectively (Sharps et al., 2010).

Participants of this study included a general population of adults ranging from 18–65 years of age. The participants included a general population of individuals, an ADHD

diagnosis nor a criminal history excluded participants from the study. The BADDS was used to assess for levels of ADHD symptoms. The PICTS-L was used to assess for levels of criminal thinking.

This chapter includes statistical results from this study, final demographics (age range, gender, if ADHD diagnosis was given, and range number of incarcerations), and time taken for data collection. Additionally, this chapter will include details from the statistical analysis and describe statistically significant findings.

Data Collection

Approval to move forward with data collection was confirmed by the Walden University Institutional Review Board (07-08-21-0725681) on July 8, 2021. 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, from July 8, 2021 to August 7, 2021. 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 of 8/2/2021 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.

As described in Chapter 3, the sample size needed 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 actual data collection of the data used in this study is consistent with the outlined plan in Chapter 3. 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.

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.

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	93	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

Results

Data were taken from Survey Monkey from the 93 participants who completed both the BADDS and the PICTS-L. From the BADDS the total raw score was used. From

the PICTS-L the GCT, the Proactive subscale and Reactive subscales were used. After manually scoring each of the assessments, the results were added to SPSS. In SPSS, the demographic information was added to each participant number. Then, the BADDS and the PICTS-L was added to each participant. The results of this study are explained below per research question.

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.

H_1 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.

Tables 6 and 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.

Table 5

Correlations BADDS & GCT

		Raw Score (BADDS)	T-score (GCT)
Raw Score (BADDS)	Pearson correlation	1	.447**
	Sig. (2-tailed)		.000
	N	93	93
T-score (GCT)	Pearson correlation	.447**	1
	Sig. (2-tailed)	.000	
	N	93	93

**. Correlation is significant at the 0.01 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
	N	93	93
T-score (Pro)	Pearson correlation	.181	1
	Sig. (2-tailed)	.083	
	N	93	93

Table 7

Correlations BADDS & Rea

		Raw Score (BADDS)	T-score (Rea)
Raw Score (BADDS)	Pearson correlation	1	.574**
	Sig. (2-tailed)		.000
	N	93	93
T-score (Rea)	Pearson correlation	.574**	1
	Sig. (2-tailed)	.000	
	N	93	93

**. Correlation is significant at the 0.01 level (2-tailed)

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.

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 $p > 0.5$, 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 $p > 0.05$, at a p value of 0.12. 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

Tests of Between-Subjects Effects BADDS

Dependent variable: Raw score (BADDS)

Source	Type III sum of squares	df	Mean Square	F	Sig.
Corrected model	4,101.499[a]	2	2,050.750	2.910	.060
Intercept	32,022.669	1	32,022.669	45.433	.000
Gender	4,101.499	2	2,050.750	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	3,337.293[a]	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	1,161.975	1	1,161.975	24.748	.000
Gender*BADDS	5.631	1	5.631	.120	.730
Error	4,131.868	88	46.953		
Total	181,756.000	93			
Corrected total	7,469.161	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_1 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. As explained in Chapter 3, 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 Table 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*
IncarcerationNum	.2796	.72780	93
Raw score (BADDS)	44.3118	27.09403	93
T-score (GCT)	43.2903	9.01036	93

Table 11

Correlations

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

Table 12

Model Summary

Model Summary[b]

Model	*R*	R^2	Adjusted R^2	*SE* of the estimate	Change Statistics				
					R^2 change	F change	df1	df2	Sig. f change
1	.468[a]	.219	.202	.65017	.219	12.639	2	90	.000

a. Predictors (constant), T-score (GCT), Raw score (BADDS)
b. Dependent variable = IncarcerationNum

Table 13

ANOVA

ANOVA[a]

Model		Sum of squares	df	Mean square	F	Sig.
1	Regression	10.686	2	5.343	12.639	.000[b]
	Residual	38.045	90	.423		
	Total	48.731	92			

a. Dependent variable = IncarcerationNum
b. Predictors = (Constant), T-score (GCT), Raw score (BADDS)

Table 14

Coefficients

Coefficients[a]

Model		Unstandardized coefficients		Standardized coefficients			Correlations		
		B	*SE*	Beta	*t*	Sig.	Zero-order	Partial	Part
1	(Constant)	-1.004	.335		-3.000	.003			
	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 = IncarcertationNum

The overall multiple linear regression model was significant, F (2, 90) = 12.63, p < .001, *R squared* = .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.

Summary

This chapter summarized the results looking at levels of ADHD symptoms, levels of criminal cognitions, gender, and number of incarcerations. The final sample population consisted of 93 adults from a general neurotypical 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 liner regression model was significant, F (2, 90) =12.63, $p<.001$, *R squared*= 0.202, showing that levels on the

BADDS and the PICTS-L does reliably predict number of incarcerations across the adult population.

Chapter 5 will include a further summary of the key findings and how the findings of this study relate to the researcher outlined in Chapter 2. Additionally, Chapter 5 will include the limitations of this study, recommendations for future research in this area, and the theoretical framework considerations.

Chapter 5: Discussion, Conclusions, and Recommendations

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 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. This chapter will include a summary of the key findings and how the findings of this study relate to the researcher outlined in Chapter 2. Additionally, Chapter 5 will include the limitations of this study, recommendations for future research in this area, and the theoretical framework considerations.

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 verses reactive criminal thinking and ADHD symptoms, which will be described later in this chapter.

Interpretation of Findings

The purpose of this quantitative non-experimental study was to investigate if higher levels of ADHD symptoms across the general population is predictive of higher levels of criminal thinking, if gender influences levels of criminal thinking when controlling for ADHD symptoms, and if higher levels of ADHD symptoms reliably predict number of incarcerations across adult populations. It was found 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 BADDS, 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 BADDS, which equates to 47% of the population ranging above

that “probable” threshold for ADHD. Of the participants who scored over 40 on the BADDS, 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 (Sharps et al., 2005). 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 due to these individuals relying on a “gestalt” processing instead of feature-intensive processing (Sharps et al., 2005).

Though this study did not include testing the specifics of feature intensive verses 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. It is assumed 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 being 129 questions and average time to complete the survey being 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

One 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 (Walters, 2013).

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 (Brown, 1996).

As explained in Chapter 2, ADHD 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 (American Psychiatric Association, 2013; Lane & Chong, 2019). 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).

As explained further in Chapter 2, 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.

It is recommended 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.

It must be noted that 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

Based on this current research and the research outlined throughout Chapter 2, 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. As 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 & 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, Avent (2019) estimated that at least one in three suspects coming into contact with a criminal justice professional has 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.

Conclusions

The purpose of this study was to investigate how levels of ADHD symptoms affect levels of criminal thinking. Also, to determine if gender influences levels of criminal thinking when controlling for levels of ADHD symptoms. Finally, this study included comparing levels of ADHD symptoms and the number of incarcerations across the adult population.

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, 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).

To this day, research on the ADHD-criminality link is limited, 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 outlined in chapter 2 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 females 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 lend to better training for law enforcement and correctional officers.

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Appendix A: Demographic Questionnaire

1. Are you at least 18 years of age?
    - Yes
    - No
2. Gender
    - Male
    - Female
    - Other
3. Current age
    - 18-28
    - 29-39
    - 40-50
    - 51-65
4. Have you been incarcerated?
    - No
    - Yes (1-2 times)
    - Yes (3-5 times)
    - Yes (6+ times)
5. Have you been diagnosed with ADHD?
    - No
    - Yes (under the age of 18)
    - Yes (over the age of 18)

Appendix B: PICTS-L Instrument and Permission for Use

Walters, Glenn, D.
Sun 5/30/2021 11:21 AM
To: Amanda George

The PICTS is a clinical instrument that should only be used under proper clinical supervision. I would need to hear from Dr. Price-Sharps that she is a licensed psychologist before I could give you my permission to use the PICTS.

Glenn Walters

Walters, Glenn D.
Sun 5/30/2021 12:13 PM
To: Amanda George

I have heard back from Dr. Price-Sharps. Attached is a copy of the PICTS along with the PICTS manual.

Glenn Walters

Walters, Glenn D.
Thur 6/24/2021 7:38 AM
To: Amanda George

I wouldn't recommend doing that. You might be better off instead using the layperson version of the PICTS which does not assume a prior criminal history (see attached). The scoring is the same, the items have just been slightly reworded so that people who have never engaged in crime can answer the questions. I have used this before with success in studies conducted, for instance, with college students.

Glenn Walters

Appendix C: Permissions and The BADDS

To protect the integrity of our assessments, we require that our customers attest to qualifications at a level appropriate for our respective assessments.

We no longer permit the association of Qualified Users outside of an organization. In order to use someone else's qualifications to purchase products you will need to associate this account to their organization via the Add Organization feature in My Account.

BYou are approved to buy Level A & B products.

Pearson supports professional test use by stating qualification levels for products and selling to individuals who provide credentials that meet those qualification levels.

A central principle of professional test use is that individuals should use only those tests for which they have the appropriate training and expertise. Pearson supports this principle by stating qualifications for the use of particular tests and selling tests to individuals who provide credentials that meet those qualifications.

Qualified User: Amanda George

- **Brown ADD Scales Adult Scoring Assistant Self-Report Forms/Answer Documents Qty 25 (Print)**0158029615 Qualification Level**B**