EXAMINATION OF NONVERBAL INTELLIGENCE AND RECIDIVISM

AMONG JUVENILE OFFENDERS

by

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(Under the Direction of Brian A. Glaser)

ABSTRACT

The purpose of this study was to determine the predictive potential of nonverbal intelligence scores on future recidivism. Using aspects of intelligence as predictors of juvenile offending would allow for the identification of predictability profiles, implement preventative efforts, and provide services to remove or decrease significant barriers to resilience in children and adolescents. The Reynolds Intellectual Assessment Scales (RIAS; Reynolds & Kamphaus, 2003), a widely used measure of intelligence, was the primary instrument used in this study. A total of 205 juvenile offenders participated. Several hypotheses were formulated, including attempting to better understand the use of nonverbal intelligence scores as predictors of juvenile offending, predictors of more serious juvenile reoffending compared to verbal intelligence, predictors of the types of charges received, and predictors of the number of charges received. Specific statistical analyses were subsequently conducted. Findings suggest that nonverbal intelligence index scores and nonverbal intelligence subtest scores on the RIAS are not significantly correlated with recidivism among juvenile offenders. Further, nonverbal intelligence was not found to be predictive of several aspects of recidivism. However, when specifically examining nonverbal intelligence as a predictor of the number of charges received

both one and two years post-psychological evaluation, nonverbal intelligence subtest scores (What's Missing) emerged as a significant predictor for a juvenile offender receiving two charges both one and two years after the psychological evaluation. Nonverbal memory scores also revealed a significant negative correlation with recidivism. The lower the scores demonstrated on nonverbal memory domains, the greater the chance that a juvenile would be charged with an offense one year post-psychological evaluation. The results of the analyses completed in the study suggest it is imperative for clinicians and those working with the juvenile offending population to conduct a thorough analysis of specific cognitive functioning, as opposed to a limited examination of verbal and nonverbal cognitive functions. Implications for clinical practice and areas of future research are discussed.

INDEX WORDS: Juvenile offender, recidivism, intelligence, adjudicated youth, delinquent youth, RIAS, psychological evaluation

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DEDICATION

This dissertation is dedicated to my incredibly patient, supportive, and loving FAMILY. Chris, my amazing husband and partner in life, been my rock throughout this entire program, pushing and encouraging me not only to complete dissertation, but also to not give up on my dream. So many times I wanted to quit, especially this past year when life became incredibly hard. Thank you for loving me, loving our children, and being an incredible husband and father. I owe this entire degree to you. To my two babies: I am well aware that the first few years (months) of your lives have shared your mommy time with this project. I am confident that the hard work and determination that has gone into this project and this degree will provide you with an example of perseverance. I missed you during so many moments while I was working so much, and my hope is that the time I missed with you will translate into your own success and persistence toward your own goals one day. Thank you for sharing your time with me so that I could pursue my dream.

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CHAPTER 1

INTRODUCTION

Children and adolescents today often experience a multitude of problems that may arise due to a variety of situations, and can lead to risk-taking behaviors, aggression, complex psychopathology, criminal behavior, or other problematic outcomes. The importance of counseling and psychological services for preventative, remedial, and rehabilitation purposes for children and adolescents can be crucial to the effective functioning of society at large. According to the National Center for Juvenile Justice (2014), the juvenile population (those under the age of 18) is increasing and is expected to continue to increase 10% by the year 2035. In 2010, juveniles comprised 24% of the United States population; in other words, one in four U.S. residents were under the age of 18 (National Center for Juvenile Justice, 2014).

Cognitive and intellectual disabilities may also present challenges among this population. Specifically, adolescents who exhibit learning disabilities may experience greater difficulties in relation to risk-taking behaviors. In a longitudinal study by McNamara and Willoughby (2010), the relationship between adolescents with learning disabilities and risk-taking behaviors was shown to be significant. For example, the authors investigated a sample of adolescents diagnosed with a learning disability, compared them to a sample of adolescents without learning disabilities, and then identified changes over time in risk-taking behaviors of each group, including substance use, acts of aggression, gambling, and juvenile delinquent behaviors. The investigation found that in comparison with non-learning disabled peers, the adolescents with

learning disabilities engaged more frequently in risk-taking behaviors (with a large effect size for alcohol use, moderate effect sizes for major and minor delinquency, and small effect sizes for marijuana use, hard drug use, acts of both direct and indirect aggression, and gambling). This study further highlights the importance of preventative efforts and support for adolescents in terms of taking risks and engaging in delinquent behaviors, specifically those with exhibited learning disabilities (McNamara & Willoughby, 2010).

In parallel to emotional, mental, behavioral disorders, and intellectual and cognitive problems, it is important to understand how the child and adolescent brain is continually developing and growing, posing potential challenges in understanding child and adolescent problems in the context of brain-based behaviors. The National Institute of Mental Health (2011) states that brain maturation does not completely occur until late adolescence or early adulthood, with development only approaching what looks like an adult brain when one enters his or her early 20's. The more information we gain on brain development and psychological problems in children and adolescence, the more we can understand the vulnerabilities of this population in how to prevent significant distress and promote mental health. For example, in a review of neurobiological studies on Oppositional Defiant Disorder (ODD) and Conduct Disorder (CD), Matthys, Vanderschuren, Schutter, and Lochman (2012) state that children and adolescents with these disorders have difficulty with the association between their behaviors and positive or negative consequences, as their sensitivity to punishment and reward is reduced. Therefore, it is imperative we begin to understand more clearly the impact of specific cognitive functions on delinquent behavior and recidivism.

Some children and adolescents exhibit oppositional and conduct problems in which engagement in behaviors such as defiance, physical aggression, stealing, or emotional outbursts

are cause for concern and are frequently the reasons for mental health treatment including commitment to residential facilities. Conduct problems that persist in childhood and adolescence can cause a significant amount of impairment and be associated with negative life outcomes (Wolff and Ollendick, 2010). Ollendick and Wolff (2010) state "youth with clinically significant levels of oppositional and conduct problems often face a wide range of individual, family, and community-wide difficulties including interpersonal conflicts, violent behavior, delinquent acts, out-of-home placements, and involvement with the juvenile justice system" (p. 3). The negative life outcomes for this population of children and adolescents can be staggering, and the importance of preventative care is crucial to avoid increased rates of juvenile delinquent acts.

Conduct problems in youth and acts of delinquency often yield involvement in the juvenile justice system. Of those youth who engage in delinquent acts and become involved in the juvenile justice system, the type of offense charged, demographic characteristics, and types of cases that are referred to juvenile court ranges vastly. The most recent data published by the National Center for Juvenile Justice (2014) examined court referred juvenile cases in the United States in 2011. Specifically, these data reveal that in 2011, juvenile courts in the United States handled approximately 1,236,200 delinquency cases, which demonstrated an increase of 7% between 1985 and 2011 (Hockenberry & Puzzanchera, 2014). Of all types of juvenile delinquency cases between 1985 and 2011 in the United States, a demonstrated increase for drug law violations (65%), person offenses (44%), and public order offenses (38%) was revealed, with a decrease in property offenses (47%). In 2011, the processed delinquency cases of involved youth younger than 16 represented 53%, with 28% being female, and 64% being white youth (Hockenberry & Puzzanchera, 2014). Significant conduct problems, acts of delinquency, and criminal behavior are problems that lead to involvement in the juvenile justice system for youth.

Mental illness, conduct problems, and cognitive difficulties may all contribute to the potential risk of children and adolescents entering the juvenile justice system, and the potential for becoming adjudicated delinquent for criminal activity. It is necessary to fully understand the intersection of intelligence, juvenile offending behavior, barriers to resilience, and ultimately factors that contribute to recidivism in order to prevent life-course persistent criminal behavior.

Purpose of the Study

The field of counseling psychology has historically valued and emphasized strength and resilience rather than deficits. Arbona and Coleman (2008) described the philosophical stance and professional emphasis of counseling psychology as promoting strength-based approaches to counseling with a commitment to positive development and facilitating personal and environmental conditions leading to adaptive outcomes. Further, the investigation of resilience provides a framework to guide our understanding of the role of risk and protective factors of human development that contributes to positive development and overall well-being (Gelso & Fretz, 2001). Counseling psychology has valued the provision of services to diverse and underrepresented populations throughout its continued maturation as a psychology specialty. The importance of investigation and delivery of services to a marginalized group such as juvenile offenders parallels the basis of the commitment to social justice, multiculturalism, and prevention that counseling psychology continues to emanate (Ponterotto, Casas, Suzuki, & Alexander, 2011).

In addition to the investigation of studies that are relevant to the field of counseling psychology, it is imperative to understand a theoretical rationale for the present study in order to provide a strong foundational framework for this examination. The examination of cognitive variables among juvenile offenders is best understood through the lens of the Bioecological

Model espoused by Bronfenbrenner, including multi-systemic influences of the bidirectional effects between person and environment, and personal characteristics (e.g. intelligence and specific cognitive processes) that are impacted by the broader environmental dynamics. Brofenbrenner's Ecological Model (1979), an approach that encompasses the lifespan, states that development is best understood in context of the individual in relation to multiple environments, and that the person and the environment impact each other "bidirectionally." A more inclusive, updated Bioecological Model (Brofenbrenner and Morris, 1998) incorporates these multiple environments to include process, person, context, and time (the PPCT model; see Figure 1 below). In the present study, an examination of intelligence encompasses the individual, person environment, and recidivism can be explored through the process, context, and time environments. This study will seek to explore these various person-environment interactions that are impacted by cognitive development.

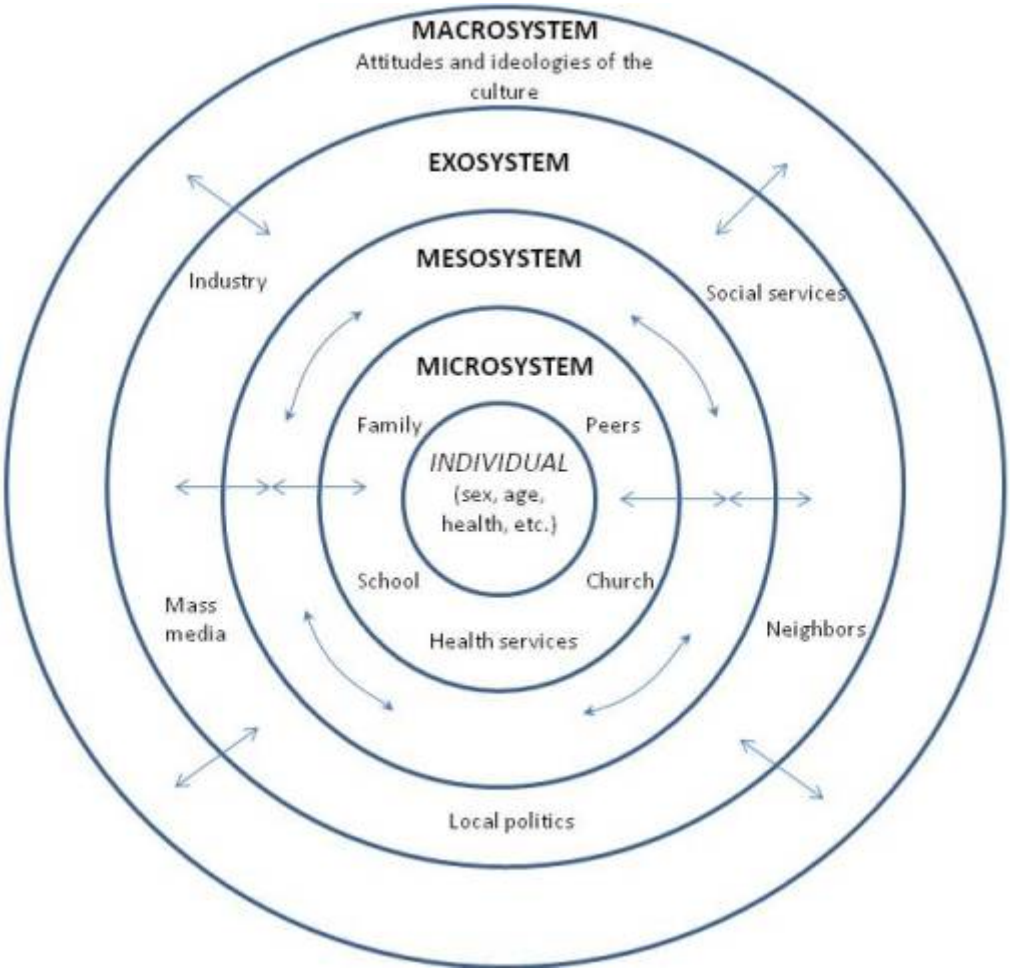

Figure 1: Example of Bronfenbrenner's Model of Development

The present investigation sought to determine if nonverbal intelligence scores predict future recidivism, or repeated juvenile offending behavior, in order to identify predictability profiles, implement preventative efforts, and provide services to remove or decrease significant barriers to resilience in children and adolescents. Specific cognitive profiles for juvenile offenders exist in the literature, but these profiles have focused on deficits in verbal intellectual skills in relation to recidivism (Moffit & Silva, 1988; Hirschi & Hindelang, 1977; Buikhuiscn, 1987). Nonverbal intelligence, which encompasses skills linked to nonverbal reasoning skills, spatial ability, and visual imagery, has been found to be a relative strength for juvenile offenders (e.g., Lynam, Moffitt, & Stouthamer-Loeber, 1993). Research in nonverbal intelligence could help to explain criminal behaviors among youth and contribute to prevention efforts as we seek to understand more about promoting resilience among juvenile offenders. Specifically, the current study sought to examine the utility of the Reynolds Intellectual Assessment Scales (RIAS; Reynolds & Kamphaus, 2003) nonverbal intelligence scales as predictors of the most serious type of recidivism (i.e., felony charges) and future criminal behavior.

Statement of the Problem

Juvenile delinquency's association with cognitive impairment is repeatedly supported in the literature (Farrington, 1995; Lynam, Moffitt, and Stouthamer-Loeber, 1993). For example, Farrington (1995) identified low intelligence as a risk factor for criminal activity. More specifically, this large-scale, longitudinal study of 411 males comparing the predictors of juvenile offending of early (ages 10-23 years) and late onset of offending (ages 14-20 years), as well as examination of persistent offending into adulthood, low verbal IQ (measured before adolescence) was predictive of adult persistence of offending. Similarly, Lynam and colleagues (1993) demonstrated an existing discrepancy on standardized intelligence tests among delinquent

youth compared to non-delinquent youth, with the discrepancy being more severe on tests of verbal intelligence (on average, juvenile offenders scored 8 points lower on tests of verbal intelligence). This relationship between delinquency and intelligence is described as a robust finding in the study of delinquency and has been well-established (Lynam, Moffitt, Stouthamer-Louber, 1993). Further, after ruling out factors of race, socioeconomic status, low test motivation, and risky lifestyle in influencing the relationship between intelligence and delinquency, Lynam et al. (1993) revealed an established relationship between intelligence and delinquency, claiming that lower levels of intelligence leads to delinquency. In a comparative study of delinquent and non-delinquent males examining neurocognitive functioning, Chhabra (2011) also demonstrated significant group differences between 40 delinquent and 40 non-delinquent boys measuring neuropsychological status, including measures of intelligence, visual motor skills, and language abilities. In a similar study of cross-sectional and longitudinal data examining 500 participants consisting of low IQ serious delinquents, high IQ serious delinquents, low IQ non-delinquents, and high IQ nondelinquents, Koolhof, Loeber, Wei, Pardini, and D'Escury (2007) demonstrated that serious delinquent boys with low intelligence scores committed more delinquent acts than serious delinquent boys with higher intelligence scores; additionally, the serious delinquent boys with low intelligence scores also showed higher levels of both cognitive and behavioral impulsivity. In various examinations of delinquency, while intelligence has been studied vastly, its relation to recidivism is more narrowly available. The investigation of juvenile offending and recidivism is an important component to the existing research that continues to demonstrate various gaps in the literature.

In relation to intelligence, the rate of reoffending for adjudicated youth, or recidivism, is also important to examine in order to increase the effectiveness of services provided to this

population and ultimately to reduce the risk of reoffending. Understanding recidivism within the juvenile justice system can have a positive impact on the youth entering the system, including increasing opportunities to reduce risk and improving services based on demonstrated needs. For example, Sickmund and Puzzanchera suggest recidivism data allows systems to determine the impact of new programs, evaluate outcome data, compare variable demographics, risk to delinquency, or assessment data, evaluate programs, enable a cost-benefit analysis of programs for public policy purposes, and to compare data to decrease error in the juvenile justice system at large (Sickmund & Puzzanchera, 2014). Examining recidivism in the juvenile justice system enhances the ability of practitioners to determine groups of particular risk factors that could include the seriousness of offense (i.e., misdemeanor vs. felony), involvement in gangs, and/or prior criminal history (Sickmund & Puzzanchera, 2014). If researchers and mental health professionals working with juvenile offenders are able to identify specific factors that reduce recidivism rates, the goal of reducing the prevalence of reoffending in juveniles will be more attainable. Understanding specific risk factors in relation to levels of intelligence among juvenile offenders may help to inform our practice and increase our effectiveness in working with this population. Resiliency is related to positive outcomes in at-risk youth and is demonstrated through overcoming adversity, developing competency, and persevering despite significant hardship (Efta, Breitbach, and Freeman, 2004). When examining adjudicated adolescents and resiliency factors, it is important to investigate rates of recidivism among this population in relation to the barriers that may weaken factors of resilience.

According to the dual taxonomy hypothesis created by Terrie Moffitt (1993), the theory of life-course persistent anti-social behavior describes the difference between juvenile offenders who continue to offend into adulthood compared to those who only offend in adolescence, with

prediction of the life-course persistent path identified by individual risk characteristics, one of which includes low intellectual ability (Moffitt, 2008). More specifically, much of the existing literature on intelligence and delinquency points to a pattern of cognitive deficits that demonstrate delinquents from non-delinquents, including cognitive impairment in verbal skills (Moffit & Silva, 1988; Hirschi & Hindelang, 1977; Buikhuiscn, 1987). Recent research, however, has sought to explain this discrepancy and understand the implications of impairments in verbal intelligence and verbal skills. For example, in two separate studies, Taylor, Iacono, and McGue (2000) and Raine, Moffitt, Caspi, Loeber, Stouthamer-Loeber, and Lynam (2005) demonstrated low verbal intelligence to be associated with early onset anti-social behavior. Much of what prior research has told us is that early onset antisocial behavior is linked to future anti-social behavior (e.g., Bartusch, Lynam, Moffitt, and Silva, 1997). On the contrary, Parker and Morton (2009) revealed mixed evidence of verbal ability deficits and early onset delinquency. Specifically, in an examination of 826 male delinquents, they found a relationship between black juvenile offenders and verbal intelligence impairment, but the relationship found between white juvenile offenders was significant only for impulsivity. Of interesting note, the black juvenile offenders were only at risk for early onset delinquency when either low income as a risk factor was present or low verbal intelligence as a risk factor was present or both, but the risk for early onset delinquency for black juvenile offenders was not significant when both risk factors were absent. While these results suggest that lower IQ among juvenile delinquents may help further explain risk-taking behaviors and/or delinquent acts, there continues to be a gap in the literature examining specific nonverbal and/or performance intelligence as it relates to recidivism in juvenile offending.

As has been demonstrated, the focus of most research on juvenile delinquency and the relationship between intelligence and recidivism has centered around full scale intelligence and/or verbal abilities and rates of reoffending (Koolhoof et al., 2007; Lynam et al., 1993; Moffitt & Silva, 1988). A limited amount of examination has investigated a relationship between nonverbal intelligence, juvenile delinquency, and recidivism. Additional investigation of nonverbal intelligence among delinquent youth and the relationship to recidivism is certainly warranted. Further, using nonverbal intelligence as a predictor of recidivism among juvenile offenders has yet to be examined.

Research Questions and Hypotheses

Question 1: Is there a significant relationship between Nonverbal IQ Scores Among Juvenile Offenders, as measured by the RIAS, and Recidivism?

Null Hypothesis 1: There will be no significant difference between nonverbal intelligence scores, as measured by the RIAS, and recidivism rates among juvenile offenders.

Question 2: Do nonverbal intelligence test scores, as measured by the RIAS nonverbal index score, predict recidivism rates among juvenile offenders?

Null Hypothesis 2: Nonverbal intelligence scores, as measured by the RIAS, will not predict recidivism rates among juvenile offenders.

Question 3: Do low nonverbal intelligence scores, as measured by the RIAS, more effectively predict serious offending (felony versus misdemeanor or no new charges) and recidivism versus verbal intelligence scores?

Null Hypothesis 3: Nonverbal intelligence scores, as measured by the RIAS, will not predict serious offending among recidivism rates of juvenile offenders.

Question 4: Do nonverbal intelligence scores, as measured by the RIAS, predict the types of previous charges received before completion of psychological evaluation?

Null Hypothesis 4: Nonverbal intelligence scores, as measured by the RIAS, will not predict the types of prior charges received before completion of the psychological evaluation.

Question 5: Do nonverbal intelligence scores, as measured by the RIAS, predict the number of previous charges received both before completion of the psychological evaluation and post-psychological evaluation?

Null Hypothesis 5: Nonverbal intelligence scores, as measured by the RIAS, will not predict the number of charges received both prior to and post-psychological evaluation.

Delimitations

Limitations of the present study exists, and suggest important considerations of the investigation into juvenile delinquency and recidivism. First, a limitation exists in the sampling methods of this research investigation, as a validation (comparison) group will not be used. Second, due to a small population size of female participants among a typical juvenile offending demographic, limited conclusions may be drawn about female juvenile offenders. Further, the use of the RIAS as a measure of intelligence may also be a limitation, as this is not an extensive measure of intelligence. Another limitation includes the historical effects rising from the Department of Juvenile Justice over the changing criteria of felony charges versus misdemeanor charges. Another consideration of a limitation that may need to be examined includes the increasing numbers of adolescents being formally charged with felony crimes. Finally, due to the ending of the juvenile record at age 17, participants over age 17 will not be included in the sample.

Definition of Terms

According to the Juvenile Court Statistics 2011 report published in 2014 (Hockenberry & Puzzanchera, 2014), several terms are defined for purposes of juvenile court:

Adjudication: Judgment that a juvenile is or is not responsible for the delinquency or status offense charged in a petition.

Delinquency: Acts or conduct in violation of criminal law.

Felony Offense: Any criminal offense which would be a felony if committed by an adult.

Juvenile: Youth at or below the upper age of original juvenile court jurisdiction.

Juvenile Court: Any court that has jurisdiction over matters involving juveniles.

Reason for Referral: The most serious offense for which the youth is referred to court intake.

Crimes Against Persons: Includes criminal homicide, forcible rape, robbery, aggravated assault, simple assault, and other offenses defined in the Juvenile Court Statistics 2011 report.

Crimes Against Property: Includes burglary, larceny, motor vehicle theft, arson, vandalism, stolen property offenses, trespassing, and other property offenses as defined in the Juvenile Court Statistics 2011 report.

Drug Law Violations: Includes unlawful sale, purchase, distribution, manufacture, cultivation, transport, possession, or use of a controlled or prohibited substance or drug or drug paraphernalia, or attempt to commit these acts. Sniffing of glue, paint, gasoline, and other inhalants is also included.

Offenses Against Public Order: Includes weapons offenses; nonviolent sex offenses, liquor law violations, not status offenses; disorderly conduct; obstruction of justice; and other offenses against public order as defined in the Juvenile Court Statistics 2011 report.

Recidivism: In the current investigation, recidivism refers to any criminal charge or violation of law that has been committed subsequent to administration of a psychological evaluation.

Status Offenses: Includes acts of types of conduct that are offenses only when committed or engaged in by a juvenile and that can be adjudicated only by a juvenile court (i.e., runaway, truancy, curfew violations, ungovernability, status liquor law violations).

CHAPTER 2

REVIEW OF RELATED LITERATURE AND RESEARCH

Juvenile Offending Population

In 2013, over 1 million delinquency cases of youth between the ages of 12 and 17 were reported in juvenile courts in the United States, including 764,800 males and 293,700 females (Hockenberry & Puzzanchera, 2014). Of this figure, approximately 62% were White and 35% were Black. Furthermore, the total number of delinquency cases in juvenile courts increased by 7% between 1985 and 2011; the percentage of female juvenile arrests specifically have increased by 12% between the years 1980 and 2010. The growth in delinquency cases is accounted for by an increase in person offense cases and public order offense cases (Hockeberry & Puzzanchera, 2014).

The current literature describes factors of juvenile offending and reoffending by attributing behaviors to multiple events that are typical to delinquents, and are further explained through a developmental lens (delinquent behavior is controlled by traits present at birth that are stable over time) or a life course persistent lens (in which delinquent behavior is seen as being influenced by individual characteristics integrated with social experiences (Phillipi & DePrato, 2010). Further, Phillipi and DePrato (2010) explain delinquent behavior being impacted by both risk and protective factors. The authors state that risk factors are evident in many domains, including individual, family, school, peer, and community (Hawkins 1995; Hawkins et al. 1992; Howell 1995), and the presence of a risk factor increases the possibility of offending, and the

presence of multiple risk factors further contributes to offending and reoffending. For example, risk factors associated with delinquent behaviors at the individual level include low intelligence, poor impulse control, and poor social skills, and risk factors at the familial level may include poverty, physical abuse, or parental criminal history. In contrast, protective factors, as defined by Phillipi & DePrato (2010), are those influences that may reduce the probability of delinquent behaviors, and include intelligence, prosocial peers and activities, and family bonding. It is imperative for mental health professionals to understand the risk factors, barriers, and protective factors of adjudicated youth to inform practice and increase the effectiveness in working with this population.

Introduction to Recidivism in the Juvenile Justice System

According to Sickmund, Melissa, and Puzzanchera (2014), the definition of recidivism in the juvenile justice system is "the repetition of criminal behavior" (p. 111). Recidivism rates among juvenile offenders are important to examine in order to increase the effectiveness of services provided to this population, to target risk factors and/or barriers, to implement protective forces in a child's life, and to ultimately reduce the risk of reoffending. If researchers and mental health professionals working with juvenile offenders are able to identify specific factors that reduce recidivism rates, the goal of reducing the prevalence of reoffending in juveniles will be more attainable. Examining specific characteristics of juvenile offenders who re-offend provide opportunities to attempt to understand factors that contribute to recidivism as a whole. For example, Lynam (1998) stated that juvenile offenders demonstrating hyperactivity and impulsivity are at higher risk for recidivism. Additionally, Lynam suggests that chronic offenders typically are more resistant to rehabilitation services, and a more impactful strategy would include early identification and prevention efforts (1998). Similarly, in a meta-analysis of

identification of risk factors that best predict juvenile recidivism, Cottle, Lee, and Heilbrun (2001) revealed eight groups of predictors, including demographics, history of offenses, family/social factors, educational factors, scores on intellectual and achievement tests, history of substance use, clinical factors, and a formal risk assessment. Among these groups, the authors determined the strongest predictors of recidivism included younger age at first offense, history of non-severe pathology, male gender, lower socio-economic status, more arrests/commitments, longer incarcerations, and more serious types of offenses. Additionally, the authors found a history of physical or sexual abuse, single-parent homes, and a higher number of out-of-home placements to be predictors of recidivism. Finally, this meta-analysis revealed that having a history of being in special education classes, having lower standardized achievement, and lower full scale IQ and verbal scale IQ scores to be strong predictors of recidivism (Cottle, Lee, & Heilbrun, 2001). While the meta-analysis revealed a range of strength in prediction, the authors demonstrated the strongest predictors of recidivism to be age at first commitment, age at first contact with the law, and history of nonsevere pathology, after examining the power of all z-scores produced for each predictor. While several of these factors are considered "static" and not likely to be changed with increased services or effective interventions, understanding how to identify the risk of juvenile recidivism can be helpful in planning for and attempting to provide quality programming in juvenile correction settings and program implementation.

More recent studies of recidivism in juvenile offending have revealed similar findings. In a study of 728 juvenile offenders, Mulder, Brand, Bullens, and van Marle (2011) examined risk factors for recidivism among those involved in serious juvenile offending. The authors found prominent risk factors for serious juvenile offending included number of past offenses, a young age at first offense, an unknown victim involvement in past offenses, conduct disorder, poor

parenting skills, criminal involvement of a family member, history of physical and emotional abuse, involvement with delinquent peers, and lack of participation or adherence to treatment. Further, the authors examined these factors in relation to more serious, violent re-offenses, and revealed predictions of serious recidivism to include criminal involvement of family, not adhering to treatment, decreased positive coping strategies, and unknown victim involvement in past offenses (Mulder et al., 2011). Enabling the ability to predict more serious, violent types of juvenile offending allows for a more accurate assessment of the risk to society some juvenile offenders may be.

Some investigators have focused on prediction models of juvenile offenders and recidivism, directing research toward background, psychosocial, and personality variables as contributing factors of recidivism. For example, in a study of 299 incarcerated males, Katsiyannis, Zhang, Barrett, and Flaska (2004) demonstrated increased depression (small effect size, r=-.126) and younger age of commitment (medium effect size, r=-.271) to be significant predicting variables for juvenile re-offending. Further, as measured by the Personality Research Form (PRF: Jackson, 1984), Katsiyannis et al. (2004) also found the subscales of Cognitive Structure, which examines a construct measuring the juvenile offender's attempts to reduce ambiguity or uncertainty in information and Succorance, a construct measuring the juvenile offender's attempts to seek the sympathy, protection, and reassurance of other people, to be useful in distinguishing between recidivists versus nonrecidivists, with both demonstrating small effect sizes *(*r=-.112 and r=-.133, respectively). Specifically, the researchers found recidivists demonstrated less cognitive structuring than nonrecidivists, suggesting recidivists experience more difficulties in inhibition and self-regulation (Katsiyannis et al., 2004). In a similar subsequent study investigating repeat violations for 12,468 adolescent male and female

offenders, Barrett, Katsiyannis, and Zhang (2006) revealed juvenile offenders who were prosecuted for their first offense (deemed adjudicated delinquent) were more likely to re-offend a second time than those who were not prosecuted. Further, similar to other findings, this study found age at first offense was a significant predictor of a repeat offense, and offenders whose first offense was a status offense were more likely to re-offend a second time than offenders whose first offense was more serious.

Previous examination of recidivism demonstrated similar findings. In an investigation of predictors of recidivism among juvenile offenders, Myner, Santman, Cappelletty, and Perlmutter (1998) examined 138 male juvenile delinquents along with variables of demographic, behavioral, familial, school-related, and crime-related predictors. The authors found younger age at first conviction to account for 58% of the variance in prediction of future offending. Alcohol abuse and longer length of first incarceration predicted future offending and accounted for 25% and 21% of the variance, respectively. Additionally, the authors demonstrated status conviction, group home placement, and birth order (first born children) to be predictive of recidivism, accounting for 32%, 47%, and 20% of the variance, respectively.

Measuring Recidivism

Rates of recidivism are measured via a variety of courses, including self-report of repeated offending, arrest, court referral, conviction, correctional commitment, and correctional status changes over a period of time (Sickmund, Melissa, and Puzzanchera, 2014). Variability in consistency, however, exists in the measurement of recidivism and seemingly fluctuates state by state, deeming the measurement of recidivism as a difficult and complex task (Sickmund, Melissa, and Puzzanchera, 2014). Further, the Office of Juvenile Justice and Delinquency Prevention (OJJDP, 2015) report that there is no national recidivism rate for juvenile offenders.

The organization reports, “Each state’s juvenile justice system differs in organization, administration, and data capacity. These differences influence how states define, measure, and report recidivism rates. This also makes it challenging to compare recidivism rates across states” (p.112). Therefore, with no consistent, national recidivism rate, comparing and understanding the recidivism problem on a national scale can prove to be difficult.

While measuring recidivism remains inconsistent and difficult, the purpose of collecting recidivism data is multifaceted. There are many valuable aspects of measuring recidivism that allow practitioners and juvenile justice authorities opportunities for reducing risk and increasing services based on needs. Sickmund et al. (2014) suggest recidivism data allows systems to determine the impact of new programs, evaluate outcome data, compare variable demographics, risk to delinquency, or assessment data, evaluate programs, enable a cost-benefit analysis of programs for public policy purposes, and to ultimately compare data to decrease error in the juvenile justice system at large. Specifically, comparisons of recidivism data may allow practitioners to determine groups of particular risk factors, such as the seriousness of offense (i.e., misdemeanor vs. felony), involvement in gangs, and/or prior history (Sickmund et al., 2014).

While comparison of recidivism data enables public policy and the juvenile correction system the ability to provide accountability for outcomes of services funded by taxpayers, it places juvenile corrections under the mandate to demonstrate effectiveness of programs and then the requirement to provide evidence for the effectiveness of reducing recidivism (Harris, Lockwood, Mengers, & Stoodley, 2011). Therefore, the ability to determine the accurateness of the reporting and reliability of the data is crucial. In 2009, the Council of Juvenile Correctional Administrators’ (CJCA) developed standards for measuring recidivism in order to reduce the

inconsistencies among those collecting and reporting recidivism data. First, CJCA clarified the qualities and questions that must be included in an operational definition of recidivism, including determining the constitution of a commission of an offense (i.e., inclusion of status offenses or probation violations), as well as determining who is considered to have already committed at least on prior offense (i.e., a juvenile found guilty of an offense, or an arrest only). Next, CJCA discussed the importance of identifying appropriate measurement for recidivism, including determining the use of recidivism are re-arrest or re-incarceration (Harris, Lockwood, Mengers, & Stoodley, 2011). When providing specific information and applying appropriate measurement techniques to the recidivism data, the ability to provide comparisons and accurately determine effectiveness will be increased. Finally, CJCA examined a multitude of literature on recent program evaluations of juvenile correctional programs and studies related to this topic to understand the variety of ways researchers were defining and measuring recidivism. Their findings revealed that most juvenile corrections agencies use more than one measure for recidivism, with 5% using arrest only and almost 48% using adjudication data and/or data involving commitment decisions (Harris, Lockwood, Mengers, & Stoodley, 2011). Most of the agencies (60%) report data on juvenile offenders for at least two years after first offense. State correctional agencies are reported to use commitment as a measure of recidivism far more than program evaluations, however, half of program evaluations and half of state correctional agencies measure recidivism as adjudication or conviction. Finally, both state agencies and program evaluations use similar beginning points of tracking recidivism data, including starting the measurement process at the court disposition of the case (Harris, Lockwood, Mengers, & Stoodley, 2011). While there exists several avenues to measure recidivism, seemingly the most important discussion for researchers in the quest to understand recidivism among juvenile

offending is to clearly state what is being measured and how it is consistent with the comparable literature.

RIAS as a Measure of Intelligence

The Reynolds Intellectual Assessment Scales (RIAS; Reynolds & Kamphaus, 2003) is a test of intelligence designed to be administered individually for people ages 3 to 94. The authors developed the measure specifically to be administered in a short period of time, while not compromising the construct validity of intelligence testing. The RIAS was developed though specific theoretical and empirical considerations, including John Carroll's (1993) three-stratum theory of cognitive abilities as well as the prior work of Raymond Cattell and John Horn (1966), endorsing the construct of *g*, as well as the lower order factors that include crystallized and fluid intelligence. The RIAS Composite Intelligence Index (CIX) is reported to measure Carroll's Stratum 3, *g*. The RIAS Verbal Intelligence Index (VIX) is considered to be equivalent to crystalized intelligence and the Nonverbal Intelligence Index (NIX) is considered equivalent to fluid intelligence. The RIAS was constructed, as stated in the professional manual, in light of eight goals: 1) to provide a valid and reliable measure of verbal and nonverbal intelligence, 2) to provide a measure that is practical (i.e., cost-effective, time-efficient, etc.), 3) to allow for measurement across a wide lifespan of development (ages 3 to 94 years), 4) to reduce the need for measurement of visual motor speed and motor coordination in intelligence testing, 5) to provide an intelligence test that reduces the need for reading, 6) to provide an intelligence measure that can predict academic achievement, 7) to allow for ease of administration, scoring, and interpretation, and 8) to reduce differential item functioning among gender and ethnicity constructs in intelligence testing (Reynolds & Kamphaus, 2003).

According to Andrews (2007), the RIAS can be used not only as a measure of verbal and nonverbal intelligence, but also as a measure of memory, including verbal and visual memory, as well as diagnosis purposes for childhood disorders and for researchers who need a measurement of intelligence. The RIAS was normed on a sample of 2,438 participants ages 3 to 94 years old among 41 states. The sample included 16 age groups. In terms of reliability, all of the alpha coefficients for the subtest scores reach .84 or higher for all age groups included in the sample, and the reliability estimates for the RIAS index scores have median values that equal or are greater than .94 (Andrews, 2007). These estimates are considered to have strong support for reliability and accuracy, with a high degree of consistency. When examining the test construction of items on the RIAS, the content validity is well constructed and grounded in theoretical foundations of the measurement of intelligence and memory. Additionally, high levels of internal consistency exist for both the individual subtests as well as the index scores on the RIAS (Andrews, 2007).

Intelligence Testing & Juvenile Offending Population

Evaluation of intelligence among juvenile offenders has a long and rich history. Multiple investigations have revealed correlations of lower levels of intelligence and juvenile offending (Woodward, 1955; Hirschi & Hindelang, 1977; Wilson & Herrnstein, 1985; Lopez-Leon & Rosner, 2009). Wechsler (1958) observed a pattern of higher Performance IQ than Verbal IQ (P>V) in a group of delinquent adolescents, and this pattern has since been repeatedly stated in the literature (Manne, Kandel, & Rosenthal, 1962; Matarazzo, 1972; Andrew, 1974; Hays, Solway, & Schreiner, 1978; Lynam, Moffitt, & Stouthamer-Loeber, 1998; Paulhus & Williams, 2002; Taylor, Elkins, Legrand, Peuschold & Iacono, 2007). More recently, the discrepancy between Verbal IQ and Performance IQ (P>V) was validated by Isen (2010) in a meta-analysis

of 131 research studies citing discrepancies of P>V to be characteristic of antisocial males and females (with a mean correlation and median correlation of 0.56). In further examinations of the relationship between IQ and juvenile offending, a study of over 1700 adolescents, McGloin, Pratt, and Maahs (2004) demonstrated that the effect of IQ on juvenile offending is indirect, specifically citing three indirect pathways for the relationship between IQ and juvenile offending. The authors revealed IQ as a risk factor for criminal behavior only due to the direct effects on school performance (accounting for 45% of the variance), increased probability of being influenced by deviant peers (accounting for 4% of the variance), and inhibiting development of self-control (accounting for 80% of the variance).

Lynam et al. (1993) specifically examined the effect of the inverse relationship between IQ and juvenile offending, investigating the direction of effect. The investigation of 508 high risk 12 and 13-year-old boys demonstrated significant findings, with significant main effects, of both higher Performance IQ than Verbal IQ scale scores for serious delinquents versus non-delinquents, and overall lower IQ scores (approximately 8 points lower) for delinquents versus non-delinquents. Further, the authors revealed this relationship to be valid, stating that lower IQ may lead to delinquency. Due to a lack of previously established knowledge on the reasons for the Performance IQ and Verbal IQ discrepancy among juvenile offenders, several investigations were conducted to determine why such a discrepancy exists.

For example, Wong and Cornell (1999) established a correlation between the Performance IQ and Verbal IQ discrepancy in a study of 95 male juvenile offenders examining IQ and social cognitive functioning. In the sample, the participants scored significantly higher on Performance IQ over Verbal IQ. Further, the authors revealed over 25% of participants in the sample demonstrated Performance IQ scores significantly greater than Verbal IQ scores (12

points or more difference). In addition, the researchers found the discrepancy between Verbal IQ and Performance IQ to be significantly related to the "Hostile Attribution Bias" subscale (on a social problem-solving scale), revealing the participants with higher Performance IQ scores perceived more hostile intent. They further suggest it is hasty to use this discrepancy as a screening tool for diagnostic signs of juvenile offending, and instead offer ideas in considering an assessment of social cognitive and social information-processing factors in a youth when such discrepancy is demonstrated (Wong & Cornell, 1999).

In a large scale, longitudinal study on delinquent development, Farrington (1995) discusses findings of the most important childhood predictors of delinquency. He states the greatest predictors of later delinquency in boys ages 8-10 fell into six categories, including antisocial child behavior, hyperactivity/impulsivity, low intelligence and low levels of academic achievement, family criminality, family poverty, and poor parenting practices. Farrington (1995) states offending can be accurately predicted given a prediction scale of antisocial behavior, financial hardship, low intelligence, convicted parent, and poor parenting practices, based on the results from the longitudinal study. In addition, Farrington demonstrates predictions in antisocial personality at age 14 that includes low nonverbal IQ scores at age 8-10, along with separation from a parent, having few friends at age 8, and low school attainment (1995). Farrington also speculates impulsivity and low intelligence as predictors of delinquency to be related to deficits in manipulating abstract concepts and difficulties in executive functioning (1995).

Among a longitudinal investigation of 508 boys ages 10 to 13 examining IQ, behavioral impulsivity, and inhibition deficits, the researchers demonstrated several important findings (Koolhof, Loeber, Wei, Pardini, & D'escury, 2007). Koolhof et al. found that serious juvenile offenders with low IQ committed more delinquent acts and demonstrated higher levels of

cognitive ($p < 0.001$) and behavioral impulsivity ($p = 0.001$) compared to higher IQ serious offenders (2007). Additionally, Koolhof et al. (2007) demonstrated juvenile offenders with lower IQ were exposed to more risk factors, including low academic achievement [$p = 0.001$; OR (Odds Ratio) = 5.71], depression ($p = 0.017$; OR = 3.12), and poor housing ($p = 0.039$; OR = 2.52). In a more recent investigation of predictor variables of violent and nonviolent juvenile offending, Kennedy, Burnett, and Edmonds (2011) found moderate correlations between offender status and reading percentile (obtained from reading achievement scores on a public school standardized achievement test; $r(93)=-.52$, $P<.01$), and a weak, but significant correlation between offender status and language functioning (measured by the Peabody Picture Vocabulary Test-Third Edition, PPVT-III; $r(93)=-.35$, $P<.01$).

Despite the abundance of studies revealing higher performance IQ abilities over verbal IQ (P>V) among juvenile offenders, several studies have refuted this finding. In an analysis of neuropsychological functioning comparing delinquent and nondelinquent boys (Tung & Chhabra, 2011), investigators found significant group differences on measures of cognitive functioning between the delinquent and nondelinquent boys. These group differences were found to specifically reveal lower nonverbal intelligence, lower visual motor performance, and more deficits in language function (e.g., Word Test). Another study conducted an examination of the relationship between violence exposure and ethnicity to intelligence, and revealed higher rates of deficits in performance IQ compared to verbal disabilities (Perkins, Smith-Darden, and Graham-Bermann, 2011). This study examined 115 incarcerated male adolescents and measured cognitive abilities and exposure to violence, hypothesizing that violence exposure would predict a higher prevalence of cognitive disabilities. These researchers also revealed greater rates of verbal disabilities when there was a presence of child maltreatment and violence exposure

(Perkins, Smith-Darden, and Graham-Bermann, 2011). While older research points to the verbal-performance IQ discrepancy (with higher performance scores), more recent updated research has shown to disprove this evidence. Raine, Moffitt, Caspi, Loeber, Stouthamer-Loeber, and Lynam (2005) suggest that several studies have shown that spatial deficits (nonverbal intelligence) is a characteristic of antisocial children, both with or without verbal deficits. Specifically, the authors indicate that spatial deficits, because they are related to right hemisphere brain dysfunction, is related to "social-information processing deficits that predispose an individual to antisocial behavior" (Raine et al. 2005). Overall, the literature is generally inconsistent and unclear with understanding the relationship between juvenile offending and deficits in either verbal or nonverbal intelligence.

Intelligence & Recidivism with Juvenile Offenders

Previous research on recidivism in particular and intelligence among juvenile delinquency focused on the discrepancy between Performance IQ and Verbal IQ, with multiple studies citing either greater abilities on Performance IQ over Verbal IQ or trends of lower intelligence in general among juvenile offenders (Andrew, 1977; Maskin, 1974; Ganzer & Sarason, 1973; Laulicht, 1963; Haynes & Bensch, 1981). An analysis of the varying literature on recidivism reveals a common theme of investigating intelligence among juvenile offenders. For example, a study by Lueger and Cadman (1982) examined variables related to recidivism and treatment termination. The investigators demonstrated that nonrecidivists had higher full scale IQs than recidivists, as measured by the Wechsler Intelligence Scale for Children (WISC). Further, these authors revealed that recidivists had higher Performance IQ scores exceeding Verbal IQ scores, contributing to the verbal-performance discrepancy that has been well-documented in the literature for juvenile offending overall (Lueger & Cadman, 1982). The

verbal-performance discrepancies were demonstrated by a significantly higher number of recidivists (50%). This discrepancy was defined by 12 or more points higher on performance measures versus verbal measures. Additionally, Haynes and Bensch (1981) examined the Performance-Verbal discrepancy on the WISC-R as a predictor of recidivism. The investigation examined 90 white male juvenile offenders, and revealed significant cognitive differences between recidivists and nonrecidivists; specifically, recidivists demonstrated more frequently the Performance-Verbal discrepancy when compared to nonrecidivists. In a more recent examination of IQ and recidivism, Vermeiren, De Clippele, Schwab-Stone, Ruchkin, and Deboutte (2002) demonstrated that juvenile offenders who re-offended had lower overall IQ, verbal IQ, and performance IQ scores, and had more deficits in memory and self-control when compared to nonrecidivists, with large effect sizes (0.21, 0.19, and 0.12, respectively). The same authors also revealed a statistical model of future offending that includes diagnosis of conduct disorder, absence of major depression, and low verbal IQ scores (Vermeiren et al., 2002).

Moffit's Developmental Taxonomy for Juvenile Offenders (1993). Moffit (1993) developed a useful model when discussing juvenile offenders and the developmental course of offending. The taxonomy provides information on intelligence among juvenile offenders and the developmental course of subsequent offending. This model represents two distinct courses of development among the population of juvenile offenders. A "delinquency trajectory" or prediction of future delinquency can be defined in two developmental courses, including life-course persistence and adolescent-limited offenders, established primarily by age of first offense and presence of conduct problems. Life-course persistence offenders are characterized by the presence of childhood onset conduct disorder, as well as aggression, lying, hurting animals, biting/hitting by age 4, peer rejection, lower cognitive abilities, slower language development,

and neurological problems, including ADHD. Moffitt (1993) describes the life-course persistence offender trajectory as engaging in some sort of anti-social behavior at every stage of life. Adolescent-limited offenders are characterized by those that halt offending by age 18, and is represented by adolescent onset conduct disorder, aggression, stealing, running away, truancy, and breaking and entering (Moffitt, 1993). Moffitt (1993) hypothesized that life-course persistent juvenile offenders demonstrate more neuropsychological deficits, specifically in verbal skills and executive functioning, and adolescent-limited juvenile offenders have an increased engagement in anti-social behaviors in relation to their social group.

Donnellan, Ge, and Wenk (2000) were the first investigators to examine this theory and found modest support for Moffitt's proposal. For example, among white participants, the adolescent-limited juvenile offenders had higher cognitive abilities scores than the life-course persistent juvenile offenders, with small effect sizes (d values ranging from .17 to .26) according to Cohen's d values. Hispanic adolescent-limited juvenile offenders demonstrated modest significant differences from life-course persistent offenders on cognitive abilities tests, again with small effect sizes. By way of contrast, the African-American adolescent-limited juvenile offenders and life-course persistent offenders demonstrated no significant differences on tests of cognitive ability, with weak and negative effect sizes noted. Despite small effect sizes, the researchers determined these results to be substantial at that time in contributing to the literature on juvenile offending and recidivism. Several subsequent studies testing Moffit's (1993) hypothesis exits, however, fewer studies exists focusing on intelligence as an impacting factor on recidivism among juvenile offenders. Parker and Morton (2009) investigated early onset (first arrest before age 12) and late onset (first arrest after age 14) juvenile offenders and the influence of race, income, verbal IQ, and impulsivity. The authors found low family income to be a risk

factor of early onset juvenile offending for all adolescents in the sample. Further, they demonstrated mixed results with modest support of Moffit's theory when examining deficits in verbal ability and impulsivity. The researchers stated that low verbal intelligence was found as a risk factor for Black early onset juvenile offenders, with medium effect size, and impulsivity was a risk factor for White early onset juvenile offenders (Parker & Morton, 2009). Moffitt and Caspi (2001) examined risk factors in childhood among males and females demonstrating childhood-onset and adolescent-onset antisocial behavior. Results revealed childhood-onset delinquents had childhoods that were impacted by poor parenting, neurocognitive problems, and temperament and behavior problems, whereas adolescent-onset offenders did not have the same backgrounds.

Moffit (1993) further describes a hypothetical plan for life-course persistent antisocial behavior as deficits in neuropsychological functioning pose risk for behavioral problems. This original hypothesis has been investigated in several studies, demonstrating that the life-course persistence path is differentiated by individual risk characteristics as predictors, including neurological deficits, delayed motor development at age 3, low intelligence, reading difficulties, and deficits on neuropsychological tests of memory (Jeglum-Bartusch, Lynam, Moffitt, & Silva, 1997; Moffitt, 1990; Moffitt & Caspi, 2001; Moffitt, Lynam, & Silva, 1994). While several examinations have been conducted revealing a relationship between neuropsychological deficits and the life-course persistence juvenile offending trajectory, additional findings on adults exhibiting anti-social personality disorder demonstrate two important brain dysfunctions attributed to early development difficulties, including enlargement of the corpus callosum and abnormal corpus callosum connective function (Raine, Brennan, Mednick, & Mednick, 2003). Subsequent studies of juvenile offenders and neuropsychological deficits have attempted to understand similar brain dysfunctions on juveniles exhibiting anti-social behaviors. Raine et al.

revealed juvenile offenders both in the childhood-limited and life-course persistent groups had demonstrated impairments on tests examining spatial and memory functions. The researchers stated these results overall support the life-course persistent theory of antisocial behavior (Raine, Brennan, Mednick, & Mednick, 2003).

Contrastingly, one longitudinal study by Aguilar, Sroufe, Egeland, and Carlson (2000) demonstrated that different groups of childhood-onset offenders and adolescent-onset offenders were not significant for neurocognitive impairments at age 3. The authors did find neurocognitive impairments to emerge later in childhood and suggested that antisocial behavior is thought to be directly related to a negative social environment, which may fully account for negative behavior. Aguilar et al. suggested the deficits shown in verbal functioning among early-onset juvenile offenders may be suggestive of a progressive relationship occurring throughout adolescence, and due in large part to negative environmental experiences. However, several other studies have refuted this finding, including studies reporting relationships between life-course persistence juvenile offending and problems associated with neurocognitive difficulties in infancy (Moffitt, 2008).

While some variability in empirical grounding exists among literature surrounding neurocognitive functioning and intelligence in relation to a developmental trajectory of juvenile offending, Moffitt's Developmental Taxonomy for Juvenile Offenders offers an important theoretical understanding of the trajectory and risk factors of juvenile offending and re-offending, specifically in terms of life-course persistence versus adolescent-limited offending. More research is warranted to determine specific aspects of intelligence that may predict recidivism during adolescence.

Summary

Juvenile offending creates significant financial costs for federal and state agencies, and the community as well. Formerly stated, the total number of delinquency cases in juvenile courts increased between 1985 and 2011, and the percentage of female arrests have also increased (Hockenberry & Puzzanchera, 2014). Additionally, approximately 70% of juvenile delinquents meet one or more criteria for a mental health disorder (Barbot & Hunter, 2012). Factors of juvenile offending and reoffending have been described in the literature as being attributed to multiple events typical to delinquents and are thought to be impacted by both risk and protective factors (Philipi & DePrato, 2010). Several previous studies have revealed correlations of lower levels of intelligence and juvenile offending (Woodward, 1955; Hirschi & Hindelang, 1977; Wilson & Herrnstein, 1985; Lopez-Leon & Rosner, 2009). A significant discrepancy between Verbal IQ and Performance IQ (P>V) was revealed by Wechsler (1958) and validated by Isen (2010) in a meta-analysis citing discrepancies of P>V to be characteristic of juvenile offending males and females. Further, low IQ has been revealed as a risk factor for criminal behavior (McGloin, Pratt, & Maahs, 2004), with the direction of the effect running from IQ to delinquency (Lynam et al., 1993). Serious juvenile offenders with low IQ were found to commit more delinquent acts and exhibited higher levels of cognitive and behavioral impulsivity (Koolhof et al., 2007). While most of the past research on intelligence and juvenile offending has focused on higher verbal abilities compared to nonverbal abilities, there is very little examination of non-verbal intelligence alone as it relates to recidivism.

Moffitt's (1993) hypothesis of the developmental trajectory of juvenile offending offers strong theoretical grounding in attempting to understand recidivism. For example, his account of life-course persistence and adolescent-limited offending, as well as early onset and late onset

juvenile offending provides hypotheses from which several empirical investigations have been applied. Moffitt (1993) stated that life-course persistent juvenile offenders demonstrated more neuropsychological deficits, including verbal impairments, and adolescent-limited offenders engage in anti-social behaviors in relation to their peer group. Adolescent-limited juvenile offenders have been found to demonstrate higher cognitive abilities than life-course persistence offenders in previous studies (i.e., Donnellan, Ge, & Wenk, 2000), as well as neurocognitive problems (Moffitt & Caspi, 2001), and low verbal intelligence for early onset juvenile offending in Black offenders (Parker & Morton, 2009). Several studies have further identified deficits in neuropsychological functioning as a risk factor for behavior problems, including low intelligence, reading difficulties, motor development delay, and neuropsychological memory impairment (Jeglum-Bartusch, Lynam, Moffitt, & Silva, 1997; Moffitt, 1990; Moffitt & Caspi, 2001; Moffitt, Lynam, & Silva, 1994). One inconsistency has been found in the literature stating differences in childhood onset and adolescent onset offenders were not significant for neurocognitive impairments (Aguilar et al., 2000); however, several other studies have refuted this finding (Moffitt, 2008).

Therefore, the purpose of the current study was to continue previous research exploring the relationship between intelligence and rates of offending and re-offending among juveniles, as measured by the RIAS (Reynolds & Kamphaus, 2003). Specifically, there is a need for more recent research to focus on the particulars of intelligence in correlation to recidivism, such as nonverbal abilities. With a well-documented history of a discrepancy between Performance and Verbal abilities (P>V; Isen, 2010), it is important to understand if nonverbal abilities or deficits impact offending and/or re-offending, in relation to serious versus non-serious types of offending (i.e., felony charges). With a more thorough understanding of the impact cognitive abilities may

have on recidivism among juvenile offenders, specifically nonverbal abilities, professionals working among juvenile corrections agencies and community agencies will be better able to assess and determine risk for future offending.

CHAPTER 3

RESEARCH METHODOLOGY

The research question of the present study sought to determine if nonverbal intelligence can be used to predict recidivism with juvenile offenders. The study utilized and applied correlations and regression analyses (logistic and multinomial) to determine if nonverbal IQ scores may effectively predict group membership of recidivists and nonrecidivists. The results from this research sought to further enhance the knowledge of the effectiveness of intelligence as a way to predict recidivism among juvenile offenders for juvenile justice and court officials.

Participants

The present study consisted of participants that included court-referred juvenile offenders who completed a psychological evaluation through JCAP between the years of 2003 and 2013. The participants resided in a southeastern city of approximately 120,000 people, and participants were charged with a range of offenses including person (i.e., robbery), property (i.e., vandalism), drugs and/or alcohol (i.e., possession), public order, and/or status (i.e., truancy).

Demographics

For data collection procedures, descriptive data considered to be relevant to the juvenile offender population for purposes of this study were collected. As a result, exploratory analyses were conducted on variables of race, gender, age, age of first arrest, number of offenses both prior to and post psychological evaluation administration, nonverbal intelligence scores, and recidivism (one year and two years post psychological evaluation). The total number of

participants consisted of 220 youth ages 11 to 18 with a mean age of 14.79 (*SD* = 1.23). Age of first offense for participants varied from 11 years to 18 years old (M=14.8, SD=1.26). As shown in Table 3.1, the majority of the juveniles in the sample were male (76.1%). About half were African American (50.7%). Of the total number, participants included 156 males and 49 females, with 104 identifying as African American (50.7%), 76 participants identifying as Caucasian (37.1%), and 25 (12.2%) identifying as other. Prior to evaluation, the largest percentage of juveniles had committed a single offense (40%). More than half were documented as committing at least one type of offense (57.6%). To assess the extent of recidivism throughout the juvenile age range, only data for participants who remained in juvenile jurisdiction until the age of 18 were included in analyses. Table 3.1 contains demographic data for all included participants in the current study.

Table 3.1

Demographic Information for all Participants (N = 205)

Variables	*N*	%
Gender		
Male	156	76.1
Female	49	23.9
Race		
African American	104	50.7
Caucasian	76	37.1
Hispanic	19	9.3
Biracial	4	2.0
Asian American	1	0.5
Native American	1	0.5
Number of offenses		
One	82	40.0
Two	54	26.3
Three or more	69	33.7
Number of types of offenses		
One type	118	57.6
Two or more	87	42.4

Note. Type of offenses were personal, property, drugs and/or alcohol, public order, and status.

Descriptive Statistics for the RIAS Measures

The range, mean, and standard deviation for the RIAS measures are presented in Table 3.2. Figures 3.1 – 3.6 represent histograms of the RIAS variables.

Table 3.2

Descriptive Statistics for RIAS Measures (N = 205)

RIAS Measures	Range	*M*	*SD*
Nonverbal Index	71 to 128	99.18	10.59
Odd-item Out	30 to 67	49.85	6.74
What's Missing	19 to 78	47.96	8.69
RIAS Nonverbal Memory	9 to 85	47.07	14.62
Verbal Index	54 to 125	87.63	13.39
Guess What	16 to 65	40.55	9.48
Verbal Reasoning	14 to 73	40.63	9.94
RIAS Verbal Memory	19 to 69	42.49	10.83

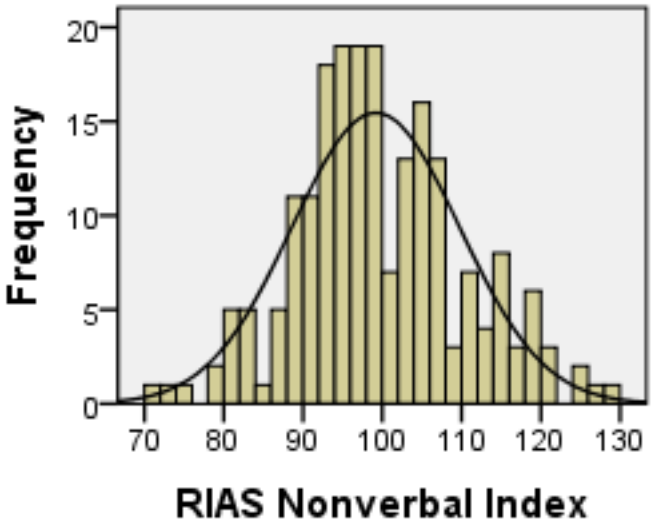
Frequency
20
15
10
5
0
70
80
90
100
110
120
130
RIAS Nonverbal Index

Figure 3.1

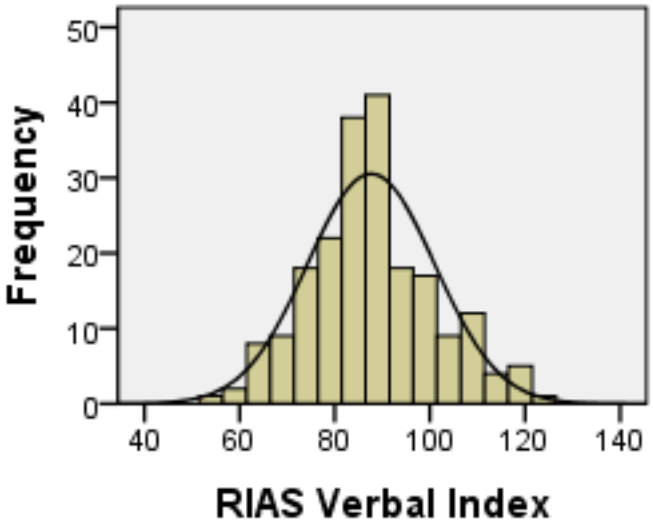
Frequency
50
40
30
20
10
0
40
60
80
100
120
140
RIAS Verbal Index

Figure 3.2

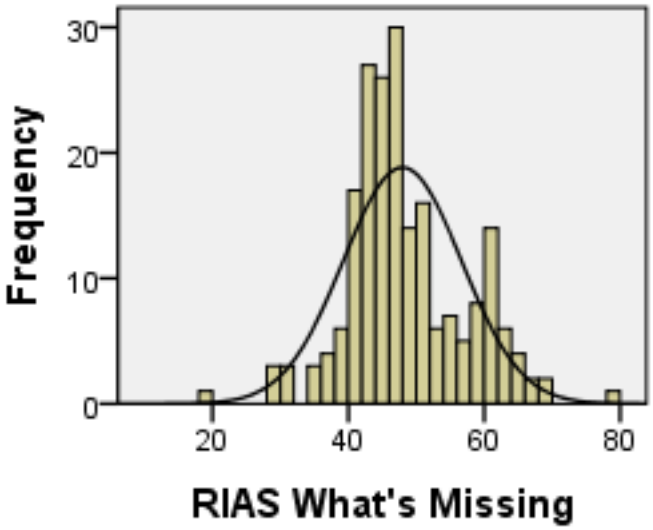

Figure 3.3

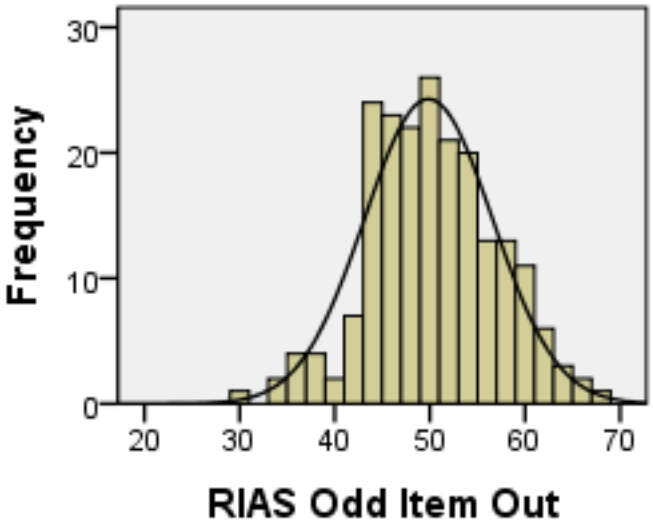

Figure 3.4

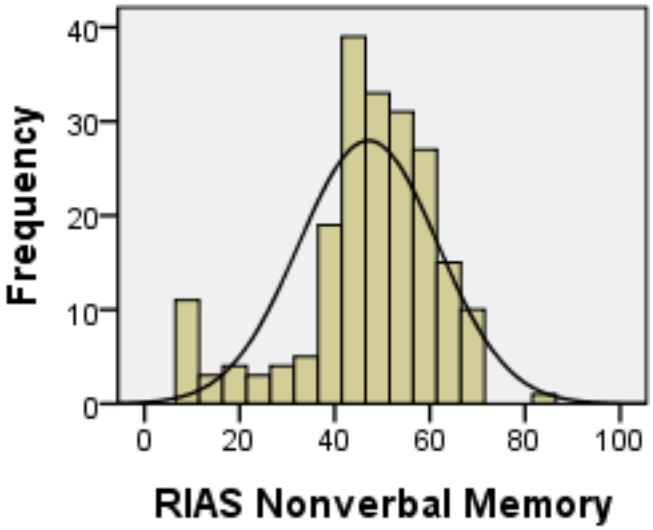

Figure 3.5

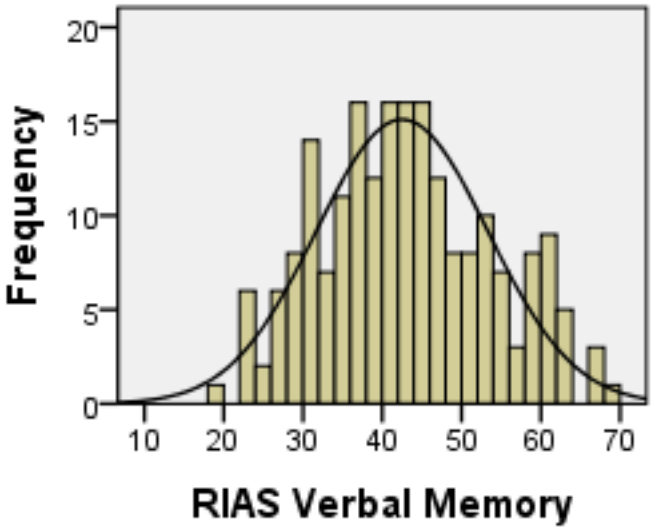

Figure 3.6

Operational Definition of Recidivism

For purposes of this study and measuring recidivism consistently, recidivism is determined by all re-arrests starting after the date of the psychological evaluation. These re-arrests include all charges, with the date and type of the offense committed. Recidivism was coded for any offenses received both one and two years post-psychological evaluation and then placed into three groups, one with no charges, one with minor charges (i.e., misdemeanor charges), and the other group with more serious offenses (i.e., felony charges). Recidivism rates were collected for juveniles who re-offended after one year and two years post-psychological evaluation. Recidivism data, including both one-year and two-year recidivists post-psychological evaluation, was collected from the Georgia Department of Juvenile Justice and the Juvenile Tracking System.

Demographic Statistics for Recidivism

Table 3.3 represents demographic data for participants demonstrating recidivism alone. As shown, the majority of the juveniles were not charged for any crime one year after evaluation (77.6%). Less than a fifth (18.5%) were charged for at least one misdemeanor and 3.9% were charged for committing at least one felony. Two years after evaluation, the majority still did not commit a crime (74.1%). More than a fifth (21.5%) committed at least one misdemeanor and 4.4% committed at least one felony.

Table 3.3

Frequencies and Percentages for Charges after Evaluation (N = 205)

	One Year		Two Years	
Number of Charges	*n*	%	*n*	%
No charge	159	77.6	152	74.1
At least one misdemeanor	38	18.5	44	21.5
At least one felony	8	3.9	9	4.4

Procedure

The data for the present study was received from a larger data set obtained by the Juvenile Counseling and Assessment Program (JCAP; Calhoun, Glaser, and Bartolomucci, 2001). JCAP is a project at the University of Georgia through the Department of Counseling and Human Development Services that is comprised of licensed psychologists and faculty members, doctoral-level psychology students, and masters-level counseling students. JCAP provides clinical services primarily with court referred youth, often mandated by the court, including individual counseling, group counseling, family counseling, and psychological evaluations. The youth served by JCAP include juvenile offenders between the ages of 9 to 18 and include a range of diverse racial and ethnic backgrounds and socioeconomic status. The overall goal, mission, and purpose of JCAP, created in 1994, is to study and address specific needs of the juvenile offender population, including psychological, emotional, and educational, through a model that takes on the challenges of juvenile delinquency, provides additional literature for delinquency research, and gives a solid training program for graduate students to learn research and clinical skills (Calhoun, Glaser, and Bartolomucci, 2001).

Wolff and Ollendick (2010) suggest that due to the high cost that conduct problems have on children, families, schools, and communities, it is essential to complete a comprehensive assessment to determine specific factors that may worsen symptoms of conduct problems, and should include a clinical interview, behavioral observations, behavior rating scales, situational analyses, and cognitive or neuropsychological testing. They also suggest behavior scales should be completed by multiple informants, such as the child, parent, teacher, and others of importance in the life of the child. Further, Wolff and Ollendick suggest considering aspects of the child's life, such as the social environment, peers involved in delinquent behavior, parental

characteristics, and parental stress to name a few (2010). The participants of the current study were referred for a psychological evaluation by the Department of Juvenile Justice for purposes of providing information about levels of functioning, mental illness, and to assist with recommendations for placement decisions and treatment. The psychological evaluation consisted of a standard battery of assessments that included a clinical interview with the youth, a measure of intelligence, a measure of behavioral and emotional symptoms, and a personality inventory. The evaluation often also included other assessments that contributed to appropriately evaluating the youth based on the presence of behavioral, emotional, or situational issues (i.e., trauma inventory, substance abuse screener, etc.). Measures of intelligence included the Reynolds Intellectual Assessment Scale (RIAS) that yielded a verbal and nonverbal score of intelligence, verbal and nonverbal scores of memory, and an overall Composite Intelligence Index (CIX) and Composite Memory Index (CMX). All psychological evaluations were administered individually to a juvenile offender in a private, confidential room in either a Regional Youth Detention Center (RYDC) or in the community, such as an office at the Department of Juvenile Justice in Athens-Clarke County.

Legal history provided by the Department of Juvenile Justice and the Juvenile Tracking System facilitated the ability to determine recidivism for participants. To qualify for a recidivism code in the data, participants were charged with an offense after appearing in juvenile court within either one or two years from the date the psychological evaluation was completed. Charges included both misdemeanors and felonies received within the first twelve and twenty-four months prior to administration of the psychological evaluation.

Measures

RIAS

The Reynolds Intellectual Assessment Scale (RIAS; Reynolds & Kamphaus, 2003) is a measure of intelligence designed to be individually administered for ages 3 to 94 and is constructed for the ability to administer in a shorter time period compared to traditional measures of intelligence. In addition to quick administration, the RIAS was chosen for other qualities including the low cost and culturally fair instrumentation. Administration of the four intelligence subtests, as well as the two memory subtests, takes approximately 30 to 40 minutes. The RIAS was normed on 2,438 individuals from 41 different states, and demonstrates high internal reliability estimates ranging from .94 to .95 for RIAS Indexes (VIX, NIX, CIX, and CMX; Reynolds & Kamphaus, 2003). Studies investigating the concurrent validity of the RIAS and the Wechsler Intelligence Scale for Children, 3rd Edition (WISC-III) and the Wechsler Adult Intelligence Scale, 3rd Edition (WAIS-III) demonstrated overall strong positive correlations.

The RIAS creates three intelligence scores that include a Verbal Intelligence Index (VIX), a Nonverbal Intelligence Index (NIX), and a global Composite Intelligence Index (CIX) that is comprised of both the VIX and the NIX. In addition, the RIAS consists of two co-normed memory subtests, the Verbal Memory (VRM) subtests and the Nonverbal Memory (NVM) subtest, that together produce the Composite Memory Index (CMX). The VIX consists of the Guess What (GWH) subtest and the Verbal Reasoning (VRZ) subtest. The GWH subtest measures an individual's vocabulary knowledge, language development, and general information. Examinees are asked to provide a response after being given two to three clues about a concept that is described. The VRZ measures verbal-analytical reasoning ability; in this subtest, examinees are given an analogy and asked to provide a response orally. The NIX is

comprised of the Odd-Item Out (OIO) and What's Missing (WHM) subtest. OIO measures nonverbal reasoning skills, including visual imagery and spatial ability. Examinees are given pictures on cards and are asked to identify the picture that does not belong. WHM measures nonverbal reasoning as well, including analyzing part-to-whole relationships. Examinees are required to point a part of a picture that has been omitted. (See Figure 3.7, RIAS Model for Verbal and Nonverbal Factors of Intelligence [g] with Four Subtests; From Reynolds and Kamphaus, 2003). The CMX consists of the Verbal Memory (VRM), which measures the ability to store and recall verbal material, and the Nonverbal Memory (NVM), which measures the ability to store and recall nonverbal material. For purposes of this particular research study, the Nonverbal Intelligence Index (NIX) and related subtests (Odd-Item Out and What's Missing) were reviewed specifically and maintained the area of focus; however, the Nonverbal Memory subtests will also be examined. Figure 3.7 demonstrates the RIAS model for verbal and nonverbal factors of intelligence (g) with four subtests (Reynolds and Kamphaus, 2003).

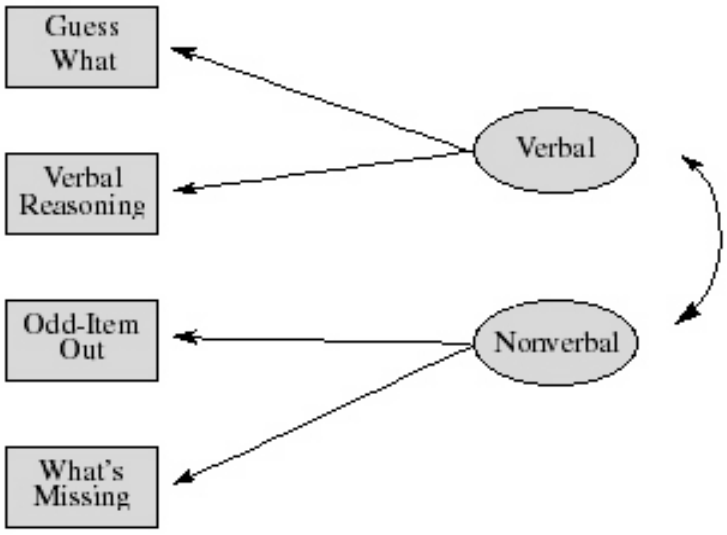

Figure 3.7

RIAS Model for Verbal and Nonverbal Factors of Intelligence (g) with Four Subtests (From Reynolds and Kamphaus, 2003)

Research Design

In the present study, data was examined from a total of 220 juvenile offenders who were referred for JCAP services from the years 2003 to 2012, and for whom recidivism data was available at time of data collection. Participants were administered a psychological evaluation that included assessments of intelligence (RIAS), behavioral and emotional functioning, personality, and other assessments as needed depending upon the referral information provided per individual participant. The data of the participants in turn were placed in three categories: participants who did not reoffend (no subsequent charges one or two years after the date of psychological evaluation), participants who received misdemeanor charges only both one and two years after the date of psychological evaluation, and participants who received felony charges both one and two years after the date of psychological evaluation. The standard scores from the intelligence testing (RIAS) were also entered into the database. Additionally, participants were coded for the number and types of offenses charged prior to the administration of the psychological evaluation, as well as the number and types of offenses charged (if applicable) both one and two years post-psychological evaluation completion.

Statistical Analyses

Upon examining the descriptive data, a correlational analysis was conducted to reveal those variables that demonstrated the strongest association with nonverbal intelligence test scores. Next, the variables were entered into a series of regression procedures (multinomial, logistic, and nominal). The initial statistical analysis was conducted utilizing Kendall's Tau correlation to assess the relationship between nonverbal intelligence scores and recidivism. Because the dependent variable was measured using an ordinal scale, Kendall's Tau correlation analysis was chosen, and correlations were evaluated using a two-tailed alpha of .05. Again,

because the dependent variable was measured using an ordinal scale, multinomial regression procedures were conducted for research questions 2 and 3. A logistic regression was used for research question 4, rather than a linear regression, because the relationship between the independent and dependent variables was assumed to be nonlinear. According to Peng, Lee, and Ingersol (2002), logistic regression is best utilized for testing hypotheses about the relationships between a categorical dependent variable and one or more continuous predictor variables. This statistical analysis was utilized to determine the effect of nonverbal test scores, and covariates including gender and race, on recidivism. While there are several other variables and factors of recidivism that could have been included for interpretation (e.g., academic achievement, familial factors, etc.), it is important to maintain parsimony in the model by including as few predictors as possible. It is rather important, however, to examine particular covariates in the model to control for observed, continuous variables and reduce unexplained variance in the model (Cohen, Cohen, West, and Aiken, 2015). Through this statistical analysis, the probability outcome (odds ratio) for a categorical, dependent variable (recidivism) could be demonstrated. It was the hope that this analysis would more accurately express the nature or behavior of the probability for a juvenile offender to reoffend given low nonverbal intelligence test scores, enabling juvenile court officials and mental health professionals increased accessibility to identify those youth who are more likely to recidivate. This prediction would potentially lead to more intensive services for specific youth identified to likely recidivate in the future.

Methodological Assumptions

Assumptions of Normality

The findings in Table 3.4 indicate that the number of crimes committed (i.e., offenses, charges, felonies, and misdemeanors) were not distributed normally. A variable is not distributed

normally if its skewness statistic is above the absolute value of three and its kurtosis statistic is above 20 (Kline, 2011). As the findings in Table 3.4 reveal, the skewness and kurtosis of these variables were above acceptable levels. Efforts to normalize the variables via a natural log function (Tabachnick & Fidell, 2007) failed. Because most of the crimes committed ranged from zero to one, categorical variables were created to continue the analysis. For the number of offenses committed, a three-category variable was created: juveniles that committed only a single offense were categorized into the single offense category, juveniles that committed two offenses were categorized into the two offenses category, and juveniles that committed three or more offenses were categorized into the last category. For the number of felonies and misdemeanors committed, a three-category variable was created for each time period: no charges, committed a misdemeanor, and committed a felony. These categorical variables were used in the subsequent procedures.

Table 3.4

Skewness and Kurtosis Statistics for the Study Variables

Variables	*N*	Skewness	Kurtosis
Age at evaluation	220	-.83	1.01
Number of offenses prior to evaluation	218	1.70	3.77
Number of charges one year after evaluation	220	2.83	11.62
Number of charges two years after evaluation	220	2.80	9.39
Number of felonies one year after evaluation	220	3.14	11.06
Number of felonies two years after evaluation	219	8.57	96.49
Number of misdemeanors one year after evaluation	220	3.52	16.67
Number of misdemeanors two years after evaluation	220	2.96	10.36
RIAS Nonverbal Index	220	-.62	2.47
Odd-item Out	220	-.23	1.52
What's Missing	220	-.64	2.72
RIAS Nonverbal Memory	220	-.88	.97
RIAS Verbal Index	220	.21	-.01
Guess What	220	-.12	.11
Verbal Reasoning	220	.53	.21
RIAS Verbal Memory	218	-.00	.01

Note. *SE* for skewness statistic = .16. *SE* for kurtosis statistic = .33.

Univariate Outliers

To detect univariate outliers (data points that consist of an extreme value on one variable), the continuously-measured variables were standardized. Cases whose standardized values fell above the absolute value of 3.29 were deemed to be univariate outliers (Tabachnick & Fidell, 2007). Eight cases met this criterion and were deleted from the data set. Seven more cases were deleted from the data set due to insufficient data necessary to perform the statistical analyses. A total of 205 participants were included in the final statistical analyses of the present study.

Limitations

The sample for this study was taken from participants of juvenile offenders referred from the Department of Juvenile Justice in a limited, Southeastern region of the United States. The Department of Juvenile Justice may have had criteria for the clinical referral, which affected the type of participant referred specifically to JCAP. This sample of juvenile offenders was taken from a longitudinal study of JCAP participants. Due to the reliance on historical, archival data (court records) from a longitudinal design, there are several limitations for the present study. Recidivism rates were observed in a narrow time period (one year and two year post psychological evaluation) and juvenile offenders involved in the study may recidivate outside of the two-year period. Finally, the research design used for this study, including the use of no control group nor randomized sampling procedures, poses limitations. However, the study methods were effective in accessing a population of 205 juvenile offenders that were of interest, specifically in variations of ages, gender, offense severity and total number of offenses.

Research Questions & Hypotheses

The present study focused on the relationship between nonverbal intelligence and recidivism for juvenile offenders, and whether nonverbal intelligence scores could be used to predict group membership in recidivism or no recidivism categories for juvenile offenders. Five research questions resulted from the study. First, is there a significant relationship between Nonverbal IQ Scores Among Juvenile Offenders, as measured by the RIAS, and Recidivism? Second, do nonverbal intelligence test scores, as measured by the RIAS nonverbal index score, predict recidivism rates among juvenile offenders? Third, do low nonverbal intelligence scores, as measured by the RIAS, more effectively predict serious offending (felony versus misdemeanor or no new charges) and recidivism versus verbal intelligence scores? Fourth, do

nonverbal intelligence scores, as measured by the RIAS, predict the types of previous charges received before completion of psychological evaluation? Fifth, do nonverbal intelligence scores, as measured by the RIAS, predict the number of previous charges received both before completion of the psychological evaluation and post-psychological evaluation?

Null Hypothesis 1: There will be no significant difference between nonverbal intelligence scores, as measured by the RIAS, and recidivism rates among juvenile offenders.

Null Hypothesis 2: Nonverbal intelligence scores, as measured by the RIAS, will not predict recidivism rates among juvenile offenders.

Null Hypothesis 3: Nonverbal intelligence scores, as measured by the RIAS, will not predict serious offending among recidivism rates of juvenile offenders.

Null Hypothesis 4: Nonverbal intelligence scores, as measured by the RIAS, will not predict the types of prior charges received before completion of the psychological evaluation.

Null Hypothesis 5: Nonverbal intelligence scores, as measured by the RIAS, will not predict the number of charges received both prior to and post-psychological evaluation.

CHAPTER 4

RESULTS

The present study examined verbal and nonverbal intelligence test scores of juvenile offenders who reoffended within two years post-psychological evaluation (post-referral) to better understand the predictive nature of recidivism. The Department of Juvenile Justice records were analyzed for both one and two-year periods post-psychological evaluation for the participants and subsequent adjudicated offenses were recorded. A simple correlation was conducted to examine the relationships among the variables, and then a regression analysis was implemented to determine the predictive power of nonverbal intelligence scores on recidivism (i.e., felonies). A multinomial regression analysis was conducted to examine various contributing predictors, including gender, age, and race. Another multinomial regression was utilized to examine the differences and predictive power between verbal and nonverbal intelligence scores in predicting recidivism. Logistic regression analyses were conducted to determine if nonverbal intelligence scores and the type of offense received prior to psychological evaluation is predictive of recidivism. Nominal regression was conducted to determine if nonverbal intelligence scores and the number of offenses received both prior to and following the psychological evaluation is predictive of recidivism. The range, mean, and standard deviation for the RIAS measures are presented in Table 4.1.

Table 4.1

Range, Mean and Standard Deviation for RIAS Scores (N = 205)

RIAS Measures	Range	*M*	*SD*
Nonverbal Index	71 to 128	99.18	10.59
Odd-item Out	30 to 67	49.85	6.74
What's Missing	19 to 78	47.96	8.69
RIAS Nonverbal Memory	9 to 85	47.07	14.62
Verbal Index	54 to 125	87.63	13.39
Guess What	16 to 65	40.55	9.48
Verbal Reasoning	14 to 73	40.63	9.94
RIAS Verbal Memory	19 to 69	42.49	10.83

Correlation: Research Question 1

Is there a significant relationship between Nonverbal IQ Scores Among Juvenile Offenders, as measured by the RIAS, and Recidivism?

Null Hypothesis 1: There will be no significant difference between nonverbal intelligence scores, as measured by the RIAS, and recidivism rates among juvenile offenders.

The first research question sought to determine whether there would be a significant relationship between nonverbal IQ among juvenile offenders and recidivism. Nonverbal IQ was measured using the four nonverbal subscales of the RIAS. Recidivism was defined in terms of occurrence (or non-occurrence) of a misdemeanor or felony both one and two years after the evaluation. Because the dependent variable was measured using an ordinal scale, Kendall Tau correlations were conducted; correlations were evaluated using a two-tailed alpha of .05.

The findings in Table 4.2 reveal that none of the RIAS nonverbal IQ measures were significantly associated with recidivism after one or two years. Only the RIAS Nonverbal Memory scores were negatively associated with recidivism after one year, $\tau = -.12$, $p = .042$. The lower the Nonverbal Memory scores, the greater the chance that a juvenile would commit a crime one year post psychological evaluation. As such, the first hypothesis was only partly supported, as the RIAS Nonverbal Memory scores do not factor into nonverbal intelligence.

Table 4.2

Correlations between the RIAS IQ Scores and Recidivism Rates (N = 205)

Variables	1	2	3	4	5
1 Recidivism after one year					
2 Recidivism after two years	.52 ***				
3 RIAS Guess What subscale	-.07	-.02			
4 RIAS Odd-item Out subscale	-.07	.05	.29 ***		
5 RIAS What's Missing subscale	-.04	.01	.40 ***	.23 ***	
6 RIAS Nonverbal Memory subscale	-.12 *	-.02	.26 ***	.29 ***	.26***

* $p < .05$. ** $p < .01$. *** $p < .001$.

Multinomial Regression: Research Question 2

Do nonverbal intelligence test scores, as measured by the RIAS nonverbal index score, predict recidivism rates among juvenile offenders?

Null Hypothesis 2: Nonverbal intelligence scores, as measured by the RIAS, will not predict recidivism rates among juvenile offenders.

The second research question sought to determine whether nonverbal IQ would significantly predict recidivism rates among juvenile offenders. Nonverbal IQ was measured using the two nonverbal subscales of the RIAS, as well as the nonverbal memory scale. Recidivism was defined in terms of occurrence (or non-occurrence) of a misdemeanor or felony both one and two years after the evaluation. Because the dependent variable was measured using an ordinal scale, multinomial regression procedures were conducted. For both procedures, the reference group was the group that had no charges received.

Recidivism after One Year. The findings in Table 4.3 indicate that, after controlling for gender and race, none of the RIAS nonverbal subscales significantly predicted recidivism rates one year after the evaluation was conducted. This finding fails to reject the null hypothesis. Only gender significantly predicted recidivism after one year, $B = -2.14$, $p = .019$. In comparison to males, the likelihood that a female would be charged with a felony decreased by .12.

Table 4.3

Regression Results for Recidivism after One Year (N = 205)

Variables	*B*	*SE*	*OR*	95% CI Lower	95% CI Upper
No charge vs. misdemeanor					
Age	-.00	.15	1.00	.74	1.34
Male vs. Female	.21	.47	1.05	.56	2.65
African American vs. other	.05	.41	1.23	.42	2.72
RIAS Odd-item Out subscale	-.01	.03	.99	.93	1.06
RIAS What's Missing subscale	-.01	.03	.99	.94	1.05
RIAS Nonverbal Memory subscale	-.01	.01	.99	.96	1.01
No charge vs. felony					
Age	-.28	.30	.76	.42	1.35
Male vs. female	-2.14 *	.91	.12	.02	.70
African American vs. other	.73	.83	2.07	.38	11.16
RIAS Odd-item Out subscale	-.10	.07	.91	.79	1.05
RIAS What's Missing subscale	.10	.05	1.10	.99	1.23
RIAS Nonverbal Memory subscale	-.02	.03	.98	.93	1.03

Note. OR = odds ratio. CI = confidence interval.

$^{*}p < .05$. $^{**}p < .01$. $^{***}p < .001$.

Recidivism after Two Years. The findings in Table 4.4 reveal that, after controlling for gender and race, none of the RIAS nonverbal subscales significantly predicted recidivism rates two years after the evaluation was conducted. This finding also fails to reject the null hypothesis. However, age significantly predicted recidivism after two years, $B = -.42$, $p = .003$. The likelihood that a juvenile offender would be charged for a misdemeanor increased by .66 for every one unit increase in age.

Table 4.4

Regression Results for Recidivism after Two Years (N = 205)

Variables	*B*	*SE*	*OR*	95% CI Lower	95% CI Upper
No charge vs. misdemeanor					
Age	-.42 **	.14	.66	.50	.87
Male vs. Female	.14	.45	1.15	.48	2.78
African American vs. other	-.05	.39	.95	.44	2.03
RIAS Odd-item Out subscale	.03	.03	1.03	.97	1.09
RIAS What's Missing subscale	.01	.03	1.01	.96	1.06
RIAS Nonverbal Memory subscale	-.01	.01	.99	.96	1.02
No charge vs. felony					
Age	-.25	.28	.78	.45	1.36
Male vs. female	.13	.89	1.14	.20	6.60
African American vs. other	-.90	.79	.41	.09	1.92
RIAS Odd-item Out subscale	.00	.06	1.00	.89	1.13
RIAS What's Missing subscale	.01	.05	1.01	.91	1.12
RIAS Nonverbal Memory subscale	-.01	.03	.99	.94	1.04

Note. OR = odds ratio. CI = confidence interval.

* $p < .05$. ** $p < .01$. *** $p < .001$.

Multinomial Regression: Research Question 3

Do low nonverbal intelligence scores, as measured by the RIAS, more effectively predict serious offending (felony versus misdemeanor or no new charges) and recidivism versus verbal intelligence scores?

Null Hypothesis 3: Nonverbal intelligence scores, as measured by the RIAS, will not predict serious offending among recidivism rates of juvenile offenders.

The third research question sought to determine whether nonverbal intelligence scores would more effectively predict serious offending than would verbal intelligence scores. Nonverbal intelligence was measured using the nonverbal index of the RIAS while verbal intelligence was measured using the verbal index of the RIAS. Recidivism was defined in terms of occurrence (or non-occurrence) of a misdemeanor or felony one and two years after the evaluation. Multinomial regression procedures were conducted; for both procedures, the reference group was the group that had no charges received.

Recidivism after One Year. As shown in Table 4.5, after controlling for gender and race, neither the nonverbal nor verbal indices significantly predicted serious offending one year after the evaluation was conducted. This finding fails to reject the null hypothesis.

Table 4.5

Regression Results for Intelligence and Recidivism after One Year (N = 205)

				95% CI	
Variables	*B*	*SE*	*OR*	Lower	Upper
No charge vs. misdemeanor					
Age	-.00	.15	1.00	.74	1.34
Male vs. Female	.05	.44	1.05	.45	2.47
African American vs. other	.20	.41	1.22	.55	2.70
RIAS Nonverbal index	-.02	.02	.98	.94	1.02
RIAS Verbal index	-.00	.02	1.00	.96	1.03
No charge vs. felony					
Age	-.23	.27	.80	.47	1.36
Male vs. Female	-1.31	.76	.27	.06	1.21
African American vs. other	.72	.85	2.05	.39	10.74
RIAS Nonverbal index	.01	.05	1.01	.92	1.10
RIAS Verbal index	.01	.04	1.01	.94	1.09

Note. OR = odds ratio. CI = confidence interval.

* $p < .05$. ** $p < .01$. *** $p < .001$.

Recidivism after Two Years. The findings in Table 4.6 indicate that, after controlling for gender and race, neither the nonverbal nor the verbal indices significantly predicted serious offending two years after the evaluation was conducted. This finding fails to reject the null hypothesis.

Table 4.6

Regression Results for Intelligence and Recidivism after Two Years (N = 205)

				95% CI	
Variables	*B*	*SE*	*OR*	Lower	Upper
No charge vs. misdemeanor					
Age	-.42 **	.14	.66	.50	.87
Male vs. female	.05	.42	1.05	.46	2.42
African American vs. other	-.01	.39	.99	.46	2.14
RIAS Nonverbal index	.02	.02	1.02	.98	1.06
RIAS Verbal index	-.01	.02	.99	.95	1.02
No charge vs. felony					
Age	-.25	.29	.78	.44	1.36
Male vs. female	.14	.84	1.15	.22	5.98
African American vs. other	-.91	.80	.40	.08	1.93
RIAS Nonverbal index	.00	.05	1.00	.92	1.10
RIAS Verbal index	-.02	.04	.98	.92	1.06

Note. OR = odds ratio. CI = confidence interval.

$^{*}p < .05$. $^{**}p < .01$. $^{***}p < .001$.

Logistic Regression: Research Question 4

Do nonverbal intelligence scores, as measured by the RIAS, predict the types of previous charges received before completion of psychological evaluation?

Null Hypothesis 4: Nonverbal intelligence scores, as measured by the RIAS, will not predict the types of prior charges received before completion of the psychological evaluation.

The fourth research question sought to determine whether nonverbal intelligence scores would predict the types of previous charges received before completion of the psychological evaluation. Nonverbal IQ was measured using the two nonverbal subscales of the RIAS. Nonverbal memory was also examined. Because many of the juvenile offenders were charged with more than one type of crime prior to evaluation, the dependent variable was defined in terms of two categories: one type vs. two or more types of charges. Because the dependent variable was measured using a binary scale, a logistic regression procedure was conducted.

The findings in Table 4.7 indicate that, after controlling for gender and race, none of the nonverbal IQ subscales or nonverbal memory subscales significantly predicted the number of types of crimes juveniles were charged with prior to evaluation. This finding fails to reject the null hypothesis.

Table 4.7

Logistic Regression Results for Number of Crimes Charged with Prior to Evaluation (N = 205)

				95% CI	
Variables	*B*	*SE*	*OR*	Lower	Upper
Age	-.12	.12	.89	.70	1.11
Male vs. female	.46	.36	1.58	.78	3.20
African American vs. other	-.30	.32	.74	.40	1.38
RIAS Odd-item Out subscale	.01	.03	1.01	.96	1.07
RIAS What's Missing subscale	-.01	.02	.99	.95	1.04
RIAS Nonverbal Memory subscale	.00	.01	1.00	.98	1.02

Note. OR = odds ratio. CI = confidence interval.

* $p < .05$. ** $p < .01$. *** $p < .001$.

Nominal Regression: Research Question 5

Do nonverbal intelligence scores, as measured by the RIAS, predict the *number* of previous charges received both before completion of the psychological evaluation and post-psychological evaluation?

Null Hypothesis 5: Nonverbal intelligence scores, as measured by the RIAS, will not predict the number of charges received both prior to and post-psychological evaluation.

The fifth research question sought to determine whether nonverbal intelligence scores would predict the number of charges received prior to completion and post completion of the psychological evaluation. Nonverbal intelligence was measured using the nonverbal index score of the RIAS while verbal intelligence was measured using the verbal index score of the RIAS. The number of charges received prior to completion of the evaluation was defined in terms of a three-category variable: 1) one offense, 2) two offenses, and 3) three or more offenses. The reference category was the single offense group.

Charges Prior to Evaluation. The findings in Table 4.8 show that, after controlling for gender and race, none of the RIAS nonverbal subscales significantly predicted the number of offenses juveniles were charged with prior to evaluation. This finding fails to reject the null hypothesis.

Table 4.8

Regression Results for Charges Prior to Evaluation (N = 205)

Variables	*B*	*SE*	*OR*	95% CI Lower	95% CI Upper
One offense vs. two offenses					
Age	-.05	.15	.95	.71	1.27
Male vs. Female	-.23	.47	.80	.32	1.99
African American vs. other	-.30	.39	.74	.35	1.61
RIAS Odd-item Out subscale	-.02	.03	.98	.92	1.04
RIAS What's Missing subscale	-.02	.03	.98	.93	1.03
RIAS Nonverbal Memory subscale	.02	.01	.98	.99	1.04
One offense vs. three or more offenses					
Age	-.13	.14	.88	.67	1.14
Male vs. female	-.78	.43	.46	.20	1.05
African American vs. other	.25	.37	1.29	.62	2.66
RIAS Odd-item Out subscale	.00	.03	1.00	.95	1.06
RIAS What's Missing subscale	.01	.03	1.01	.96	1.06
RIAS Nonverbal Memory subscale	.02	.01	1.02	.99	1.04

Note. OR = odds ratio. CI = confidence interval.

$^{*}p < .05$. $^{**}p < .01$. $^{***}p < .001$.

Recidivism After One Year. The findings in Table 4.9 show that, after controlling for age, gender, and race, the What's Missing RIAS nonverbal subscale emerged as a significant predictor for the number of offenses juveniles were charged with (two offenses) one year post psychological evaluation, B = -.12, p = .032. The likelihood that juveniles would commit two offenses rather than a single offense decreased by .89 for every unit increase in the What's Missing score. Higher nonverbal intelligence scores are a predictor of the number of charges received (one offense vs two offenses) one year post psychological. As such, the null hypothesis is accepted for number of charges received one year post-psychological evaluation. The Odd Item Out subtest and nonverbal memory scores were not statistically predictive of the number of charges received one year post-psychological evaluation.

Table 4.9

Regression Results for Charges One Year Post Evaluation (N = 205)

Variables	*B*	*SE*	*OR*	95% CI Lower	95% CI Upper
One offense vs. two offenses					
Age	-.30	.25	.74	.45	1.20
Male vs. Female	.55	.75	1.73	.40	7.43
African American vs. other	-.38	.68	.58	.18	2.58
RIAS Odd-item Out subscale	.03	.06	.06	.92	1.15
RIAS What's Missing subscale	-.12 *	.05	.89	.80	1.00
RIAS Nonverbal Memory subscale	-.00	.03	1.00	.95	1.05
One offense vs. three or more offenses					
Age	-.24	.21	.79	.52	1.19
Male vs. female	1.10	.68	3.00	.80	11.25
African American vs. other	.26	.57	.77	.25	2.38
RIAS Odd-item Out subscale	.03	.05	1.03	.94	1.14
RIAS What's Missing subscale	-.08	.04	.92	.85	1.01
RIAS Nonverbal Memory subscale	-.01	.02	.99	.95	1.03

Note. OR = odds ratio. CI = confidence interval.

$^{*}p < .05$. $^{**}p < .01$. $^{***}p < .001$.

Recidivism after Two Years. The findings in Table 4.10 show that, after controlling for age, gender, and race, the What's Missing RIAS nonverbal subscale emerged as a significant predictor for the number of offenses juveniles were charged with (two offenses) two years post psychological evaluation, $B = -.14$, $p = .025$. The likelihood that juveniles would commit two offenses rather than a single offense decreased by .87 for every unit increase in the What's Missing score. Higher nonverbal intelligence scores are a predictor of the number of charges received (one offense vs two offenses) two years post psychological. As such, the null hypothesis is accepted for number of charges received two years post-psychological evaluation. The Odd Item Out subtest and nonverbal memory scores were not statistically predictive of the number of charges received one year post-psychological evaluation.

Table 4.10

Regression Results for Charges Two Years Post Evaluation (N = 205)

Variables	*B*	*SE*	*OR*	95% CI Lower	95% CI Upper
One offense vs. two offenses					
Age	-.33	.30	.72	.40	1.30
Male vs. Female	.79	.93	2.21	.36	13.65
African American vs. other	-.30	.73	.74	.18	3.14
RIAS Odd-item Out subscale	.03	.07	1.03	.91	1.17
RIAS What's Missing subscale	-.14 *	.06	.87	.77	.98
RIAS Nonverbal Memory subscale	-.01	.03	.99	.95	1.04
One offense vs. three or more offenses					
Age	-.56	.24	.57	.36	.91
Male vs. female	.76	.73	2.13	.51	8.86
African American vs. other	.51	.56	1.66	.58	4.95
RIAS Odd-item Out subscale	-.07	.05	.93	.85	1.03
RIAS What's Missing subscale	-.07	.04	.94	.86	1.01
RIAS Nonverbal Memory subscale	.01	.02	1.01	.97	1.05

Note. OR = odds ratio. CI = confidence interval.

$^{*}p < .05$. $^{**}p < .01$. $^{***}p < .001$.

CHAPTER 5

DISCUSSION AND SUMMARY

Summary of the Study

Statement of the problem. Cognitive impairment and juvenile delinquency is a well-documented, and highly supported phenomenon (e.g., Farrington, 1995; Lynam, Moffitt, and Stouthamer-Loeber, 1993). Many researchers have identified low levels of intelligence as risk factors for criminal activity (e.g., Farrington, 1995; Lynam et al., 1993). Throughout a review of the various examinations of delinquency, while intelligence has been studied vastly, its relation to recidivism is more narrowly available. The investigation of juvenile offending and recidivism is an important component to the existing research on juvenile delinquency that continues to demonstrate various gaps in the literature. In relation to intelligence, recidivism is also important to examine in order to increase the effectiveness of services provided to this population and to ultimately reduce the risk of reoffending. Understanding recidivism within the juvenile justice system can have a positive impact on the youth entering the system, including increasing opportunities to reduce risk and improving services based on demonstrated needs. Sickmund and Puzzanchera (2014) state that examining recidivism in the juvenile justice system enhances the ability of practitioners to determine groups of particular risk factors that could include the seriousness of offense (i.e., misdemeanor vs. felony), involvement in gangs, and/or prior criminal history. Researchers and mental health professionals working with juvenile offenders and identifying specific factors to reduce recidivism may actually reduce the prevalence of

reoffending in juveniles. Understanding specific risk factors in relation to levels of intelligence among juvenile offenders may help to inform our practice and increase our effectiveness in working with this population. Terrie Moffitt's dual taxonomy hypothesis (1993) describes the difference between juvenile offenders who continue to offend into adulthood (life-course persistent path) compared to those who only offend in adolescence (adolescent-limited path). This hypothesis predicts the life-course persistent path to be identified by individual risk characteristics, one of which includes low intellectual ability (Moffitt, 2008). More specifically, the existing literature on intelligence and delinquency points to a pattern of cognitive impairment in verbal skills (e.g., Moffit & Silva, 1988; Hirschi & Hindelang, 1977; Buikhuiscn, 1987). The focus of most research on juvenile delinquency and the relationship between intelligence and recidivism has focused solely on the domains of either full-scale intelligence or specific verbal abilities in relation to the rates of reoffending (Koolhoof et al., 2007; Lynam et al., 1993; Moffitt & Silva, 1988). A limited amount of examination has investigated a relationship between all three variables of nonverbal intelligence, juvenile offending, and recidivism. Using nonverbal intelligence as a predictor of recidivism among juvenile offenders has yet to be examined in current research, and has been the purpose of the present study.

Statement of the procedures. The present study included a longitudinal research design examining the association and predictive nature of nonverbal intelligence and recidivism among juvenile offenders as a part of the Juvenile Counseling and Assessment Program (JCAP; Calhoun, Glaser, & Bartolomucci, 2001). The 205 participants of the current study were referred for a psychological evaluation by the Department of Juvenile Justice for purposes of providing information about levels of functioning, mental illness, and to assist with recommendations for placement decisions and treatment. The psychological evaluation consisted of a standard battery

of assessments that included a clinical interview with the youth and a measure of intelligence, among others. Measures of intelligence included the Reynolds Intellectual Assessment Scale (RIAS) that yielded a verbal and nonverbal score of intelligence, verbal and nonverbal scores of memory, and an overall Composite Intelligence Index (CIX) and Composite Memory Index (CMX). All psychological evaluations were administered individually to a juvenile offender in a private, confidential room. Legal history provided by the Department of Juvenile Justice and the Juvenile Tracking System facilitated the ability to determine recidivism for participants. To qualify for a recidivism code in the data, participants were charged with an offense after appearing in juvenile court within either one or two years from the date of the psychological evaluation. Charges included both misdemeanors and felonies received within the first twelve and twenty-four months prior to administration of the psychological evaluation.

The data of the 205 participants were placed in three categories: participants who did not reoffend (no subsequent charges one or two years after the date of psychological evaluation), participants who received misdemeanor charges only (both one and two years after the date of psychological evaluation), and participants who received felony charges both one and two years after the date of psychological evaluation. The standard scores from the intelligence testing (RIAS) were also entered into the database. Additionally, participants were coded for the number and types of offenses charged prior to the administration of the psychological evaluation, as well as the number and types of offenses charged (if applicable) both one and two years post psychological evaluation completion.

A correlational analysis was conducted to reveal those variables that demonstrated the strongest association with nonverbal intelligence test scores. This initial statistical analysis was conducted utilizing Kendall's Tau correlation to assess the relationship between nonverbal

intelligence scores and recidivism. Next, the variables were entered into a series of regressions. Regression procedures (nominal, multinomial and logistic) were conducted for research questions 2 through 5. According to Peng, Lee, and Ingersol (2002), logistic regression is best utilized for testing hypotheses about the relationships between a categorical dependent variable and one or more continuous predictor variables. Through this statistical analysis, the probability outcome for a categorical, dependent variable (recidivism) was attempted to be demonstrated. These correlation and regression procedures were conducted to answer the following research questions.

Discussion of the Findings

Research question 1: Is there a significant relationship between Nonverbal IQ Scores Among Juvenile Offenders, as measured by the RIAS, and Recidivism?

To examine question one, a two-tailed, bivariate correlation revealed no significant correlations between the nonverbal IQ index scores or nonverbal IQ subtest scores and recidivism both one and two years post psychological evaluation. This finding is somewhat congruent with older established demonstrations of P>V among juvenile offending populations. However, this finding is inconsistent with some of the conflicting research that has suggested that higher rates of nonverbal intelligence deficits exist among juvenile offending boys (Tung and Chhabra, 2011; Perkins, Smith-Darden, and Graham-Bermann, 2011).

Notably, this study also revealed no significant correlations between the verbal IQ index scores and verbal IQ subtest scores and recidivism both one and two years post psychological evaluation. This finding is incongruent with the previously well-established Performance IQ>Verbal IQ theory with juvenile offenders, both in first-time offending as well as examining recidivism. Specifically when examining recidivism, studies have previously shown that

nonrecidivists had significantly higher Performance IQ scores that exceeded Verbal IQ scores (Lueger & Cadman, 1982; Haynes and Bensch, 1981). Overall, the present study was unable to demonstrate significant differences when examining cognitive asymmetry (either in verbal and nonverbal performances) in relation to recidivism.

At the same time, while the present findings did not demonstrate correlations between nonverbal or verbal functioning and recidivism, results did conclude that the RIAS Nonverbal Memory scores were negatively associated with recidivism after one year with small effect size, $\tau = -.12$, $p = .042$. The lower the Nonverbal Memory scores, the greater the chance that a juvenile would commit a crime one year post-psychological evaluation. While the null hypothesis cannot be rejected even with these results (nonverbal memory is not a factor of intelligence on the RIAS), it is still important to note this finding via the relationship between recidivism and other nonverbal cognitive processes (memory). Previous research has made some clear links to memory and juvenile offending. For example, Moffit's hypothesis is one that has previously demonstrated that the life-course persistence path is differentiated by several individual risk characteristics as predictors, one of which includes deficits on neuropsychological tests of memory (Jeglum-Bartusch, Lynam, Moffitt, & Silva, 1997; Moffitt, 1990; Moffitt & Caspi, 2001; Moffitt, Lynam, & Silva, 1994). Other researchers have also shown that juvenile offenders who re-offended had more deficits in memory (Vermeiren et al., 2002). Raine et al. revealed adolescent limited and life-course persistent juvenile offenders have shown impairments with spatial awareness and memory functions (2003). While the current study was unable to demonstrate direct prediction of juvenile reoffending (recidivism) with intelligence (either verbal or nonverbal strengths or weaknesses), it is clear that juvenile offending is determined by multiple factors and several areas of cognition should be examined, including aspects of memory

functions.

Research question 2: Do nonverbal intelligence test scores, as measured by the RIAS nonverbal index score, predict recidivism rates among juvenile offenders?

To examine question 2, a multinomial regression procedure was conducted, and Nonverbal IQ was measured using the two nonverbal subscales of the RIAS. Recidivism was defined in terms of occurrence (or non-occurrence) of a misdemeanor or felony both one and two years after the evaluation. After controlling for gender and race, none of the RIAS nonverbal subscales significantly predicted recidivism rates one year after the evaluation was conducted. This finding fails to reject the null hypothesis. Only gender significantly predicted recidivism after one year. In comparison to males, the likelihood that a female would be charged with a felony decreased by 12 percent. After controlling for gender and race, none of the RIAS nonverbal subscales significantly predicted recidivism rates two years after the evaluation was conducted. This finding also fails to reject the null hypothesis. However, age did significantly predict recidivism after two years. The likelihood that a juvenile offender would be charged with a misdemeanor increased by 66 percent for every one unit increase in age. These findings suggest that intelligence (i.e., nonverbal) as a predictor of rates of juvenile re-offending is inconclusive. Further, these findings are congruent with the lack of research examining nonverbal intelligence as a predictor of recidivism among juvenile offenders. As is noted in the literature, predictors of recidivism are multi-faceted and must include multiple factors (various factors of intelligence, family/community factors, school, SES, etc.). For example, while Wong and Cornell (1999) established a correlation between the Performance IQ and Verbal IQ discrepancy among juvenile offenders, the researchers also found this discrepancy between Verbal IQ and Performance IQ to be significantly related to participants' perceptions of more

hostile intent. They further suggest not to use intelligence as a screening tool for signs of juvenile offending, and instead suggest considering an assessment of social cognitive and social information-processing factors in a youth when such discrepancy is demonstrated. Additionally, McGloin, Pratt, and Maahs (2004) demonstrated that the effect of IQ on juvenile offending is indirect, and state that there are at least three indirect pathways contributing to IQ and juvenile offending. The authors revealed IQ as a risk factor for criminal behavior only due to the direct effects on 1) school performance, 2) increased probability of being influenced by deviant peers, and 3) inhibiting development of self-control. Therefore, examining verbal and nonverbal domains of intelligence may not accurately help us to understand juvenile reoffending, but analyzing a multifactorial model of contributions to juvenile reoffending may be more useful.

Research question 3: Do low nonverbal intelligence scores, as measured by the RIAS, more effectively predict serious offending (felony versus misdemeanor or no new charges) and recidivism versus verbal intelligence scores?

To examine question 3, multinomial regression procedures were also conducted. Recidivism was defined in terms of occurrence (or non-occurrence) of a misdemeanor or felony one and two years after the evaluation. After controlling for gender and race, neither the nonverbal nor verbal indices significantly predicted serious offending one year after the evaluation was conducted. This finding fails to reject the null hypothesis. After controlling for gender and race, neither the nonverbal nor the verbal indices significantly predicted serious offending two years after the evaluation was conducted. This finding also fails to reject the null hypothesis, and is incongruent with previous research demonstrating lower verbal intelligence scores related to juvenile offending. Wechsler (1958) and several others (Manne, Kandel, & Rosenthal, 1962; Matarazzo, 1972; Andrew, 1974; Hays, Solway, & Schreiner, 1978; Lynam,

Moffitt, & Stouthamer-Loeber, 1998; Paulhus & Williams, 2002; Taylor, Elkins, Legrand, Peuschold & Iacono, 2007) demonstrated a pattern of higher Performance IQ (P) than Verbal IQ (V) in a group of delinquent adolescents (P>V). More recently, the discrepancy between Verbal IQ and Performance IQ (P>V) was validated by Isen (2010) in a meta-analysis of 131 research studies citing discrepancies of P>V to be characteristic of antisocial males and females (with a mean correlation and median correlation of 0.56). The present study is unable to demonstrate a P>V pattern in the sample of juvenile offenders, and therefore is not congruent with the current research.

Research question 4: Do nonverbal intelligence scores, as measured by the RIAS, predict the number of types of previous charges received before completion of psychological evaluation?

To examine research question 4, a logistic regression procedure was conducted. After controlling for gender and race, none of the nonverbal IQ subscales, nor the nonverbal memory subscale, significantly predicted the number of different types of crimes juveniles were charged with prior to evaluation. This finding fails to reject the null hypothesis. Therefore, the present study was unable to demonstrate nonverbal intelligence predictive of the number of types of criminal activity. Previous research has in fact demonstrated the predictive power of the types of juvenile offenses on recidivism (Cottle, Lee, and Heilbrun, 2001), specifically revealing the types of juvenile offenses to be a strong predictor of recidivism. However, there is a significant lack of research examining the concept of IQ and its predictive power on the number of types of crime committed. Future research on the relationship between intelligence and the number of offenses, types of offenses, and severity of offenses is warranted when examining recidivism and juvenile offenders, as this is an area that needs to be further examined and better understood.

Research question 5: Do nonverbal intelligence scores, as measured by the RIAS, predict the *number* of charges received both before completion of the psychological evaluation and post-psychological evaluation?

To examine question 5, a nominal regression procedure was conducted. After controlling for gender and race, none of the RIAS nonverbal subscales significantly predicted the number of offenses juveniles were charged with prior to psychological evaluation. This finding fails to reject the null hypothesis, and reveals that nonverbal intelligence is not predictive of the number of charges at the initial offense (prior to psychological evaluation). This finding is not congruent with the current research that clearly demonstrates the relationship between the number of offenses and intelligence. For example, in a study on IQ and delinquency, Koolhof et al. found that serious juvenile offenders with low overall IQ committed more delinquent acts than serious juvenile offenders with higher IQ (2007). Notably, the serious juvenile offenders also demonstrated higher levels of behavioral inhibition and cognitive impulsivity. The authors suggest that these findings were more indicative of exposure to higher rates of risk factors, including poor academic achievement, depressed mood, poor housing, and older age for the grade assigned (Koolhof et al., 2007). While the present study did not reveal significant findings of nonverbal intelligence predicting the number of offenses at first offense, prior research clearly suggests that when intelligence is significantly related to offending, alternative contributions must be considered (e.g., other risk factors). Upon examination of recidivism at one year, nonverbal subtest scores (What's Missing) emerged as a significant predictor of receiving two charges. In comparison to receiving one charge, the likelihood that a juvenile offender would be charged with two offenses decreased with every .89 unit increase in What's Missing score. Additionally, upon examination of recidivism at two years post-psychological evaluation,

nonverbal subtest scores (What's Missing) emerged as a significant predictor of receiving two charges. In comparison to receiving one charge, the likelihood that a juvenile offender would be charged with two offenses decreased with every .87 unit increase in What's Missing score. Therefore, these findings suggest that nonverbal intelligence, as measured by the Nonverbal What's Missing subtest, served as a protective factor for the number of offenses post-psychological evaluation. Higher nonverbal subtest scores predicted a decrease in the likelihood a juvenile offender would re-offend with two charges compared to one, and reveals that nonverbal intelligence may be protective over recidivism in terms of the number of charges.

Clinical Implications

While a verbal-performance discrepancy was unable to be demonstrated as a predictor in this sample of juvenile offenders, nonverbal intelligence (What's Missing subtest scores) did emerge as a predictor for the number of charges received when juveniles offended one year and two years after their initial offense (prior to psychological evaluation). These mixed findings point to several clinical implications that are important to discuss. While significance was not found between correlations of verbal or nonverbal cognitive functioning and recidivism, a significant correlation was found between nonverbal memory and recidivism one-year post psychological evaluation. The lower the scores demonstrated on nonverbal memory domains, the greater the chance that a juvenile would be charged with an offense one year post-psychological evaluation. Additionally, the nonverbal subtest scores emerged as a predictor for recidivism one and two years post psychological evaluation, specifically predicting the number of charges received. The examination of cognitive patterns can be complex, and using broad cognitive patterns to predict a behavior (juvenile reoffending) that is likely impacted by multiple factors may not be the most effective way to understand the juvenile offending population.

Several researchers have pointed out that juvenile offending could be accounted for by negative environmental experiences (e.g., Aguilar et al., 2000) and examining broad cognitive functioning could be misleading and inaccurate. Looking at cognitive deficits within the juvenile offending population and attempting to make broad generalizations regarding the ability to understand offending behavior can be imprecise, as each individual person has his or her own pattern of cognitive strengths and weaknesses. Attempting to understand juvenile offending behavior in relation to verbal and nonverbal cognition may be too general, as the behavioral dynamics within the juvenile offending population are vast and multifaceted. At the same time, understanding more *specific* cognitive processes that could impact emotional or behavioral functioning (e.g., executive functioning and cognitive flexibility, emotional regulation, impulse control, and even memory functioning) could be helpful. Clinically, when working with this population, it is helpful to understand that while previous research has been well established in demonstrating the verbal-performance discrepancy, the current study and several other more recent studies have refuted this discrepancy with juvenile offenders. In fact, understanding cognitive deficits and cognitive asymmetry with juvenile offenders may be more difficult than what previous research has demonstrated, and examining more specific cognitive processes and patterns of functioning may be more helpful. For example, juvenile offenders often show difficulties with behavioral and emotional functioning, leading to poor decision-making. Emotional or behavioral dysregulation due to particular cognitive deficits could be a contributing factor to poor decision-making, and may help to further explain the complexity of juvenile offending and re-offending. It is important that clinicians working with juvenile offenders refrain from making generalizations about cognitive functioning and the likelihood of future offending, but instead attempt to understand cognitive deficits related to behavioral and emotional regulation. In

addition, having a better understanding of cognitive deficits related to behaviors and emotions with juvenile offenders would allow clinicians the ability to create programs and implement interventions specifically related to improving these functions. Providing additional testing of cognitive functioning, or implementing neuropsychological testing with juvenile offenders, could offer a more accurate examination of cognitive deficits and its impact on offending behavior.

In addition to the present study's findings of nonverbal memory and the negative correlation with recidivism, Raine et al. (2011) also found juvenile offenders to be particularly impaired in memory and visual-spatial functions. Some research exists on memory deficits in the juvenile offending population (e.g., Jeglum-Bartusch, Lynam, Moffitt, & Silva, 1997; Moffitt, 1990; Moffitt & Caspi, 2001; Moffitt, Lynam, & Silva, 1994, Vermeiren et al., 2002). Even fewer studies have focused on the examination of the verbal-performance discrepancy among memory functions (Raine et al., 2003), but this particular phenomenon is not well understood. The present study revealed a discrepancy in verbal and nonverbal memory domains, specifically demonstrating nonverbal memory to be negatively related to recidivism. Nonverbal memory (or visual memory) represents a cognitive processing domain that could allow for more precise examination of cognitive strengths and weaknesses compared to solely examining intellectual functioning. This finding suggests that spatial impairments (particularly in memory) could be a contributing factor of juvenile offending and presents further evidence of the need to examine specific cognitive functions and processing as they relate to juvenile offending.

Recommendations for Future Research

As has been clearly demonstrated, the domain of nonverbal, or spatial, memory should be a future examination of particular study due to the current findings of nonverbal memory impairment being negatively correlated with recidivism. More specifically, spatial functions

(e.g., visual-spatial awareness, fluid reasoning, visual-motor integration, visual memory) should be more closely evaluated and better understood among juvenile offending populations.

In addition, this finding suggests that it could also be beneficial to take a closer look at specific neuropsychological functioning, including cognitive processes related to executive skills. Some researchers have indicated that impulsivity and low intelligence as predictors of delinquency may, in reality, be related to deficits in manipulating abstract concepts and difficulties in executive functioning (e.g., Farrington, 1995). Baddeley and Hitch (1974) first coined executive functioning as a "central executive" (Beatriz & Rosselli, 2007), linked to a system that controls and determines what information enters the short-term memory (Bruning, Schraw, & Norby, 2011). Early theorists (Lezak, 1983) also described executive functioning as the aspect of behavioral functioning that determines "how" behavior is expressed (Anderson, 1998). More contemporary definitions of the construct have emerged, including one by Lezak, Howieson, and Loring (2004) that explains executive functioning as "the set of processes needed for engaging in independent, purposeful, goal-directed behaviors." Further, according to Anderson and colleagues (2010), executive functioning skills identified in children fall into three categories, including attention control, goal setting (planning, initiating, and problem-solving, and cognitive flexibility (working memory, shifting and transferring of concepts). Executive dysfunction can also be demonstrated through poor performance in perseverative errors, rigidity of thought processes, poor self-control, and/or impulsive behavior (Anderson, 1998). Previous research on executive functioning and criminality has largely focused on the adult offending population, and has also demonstrated contradicting results. In a meta-analysis of adults with anti-social behaviors, executive functions were found as deficits significantly worse than comparison groups, with a medium to large effect size (Morgan and Lilienfeld, 2000).

Examination of executive functions among the juvenile offending population is certainly warranted, and could help to explain emotional or behavioral dysregulation in terms of cognitive dysfunction.

Conclusions

The present study sought to utilize nonverbal intelligence scores as a predictor of recidivism among juvenile offenders. While unable to yield clinically significant findings for nonverbal intelligence in relation to recidivism, this study was able to offer evidence that establishing cognitive asymmetry (performance greater than verbal cognitive patterns) among the juvenile offending population is convoluted. This study was also unable to demonstrate a clinically significant relationship with verbal intelligence scores and juvenile reoffending (a pattern that has previously been well-established in the literature). Given the complexity of this population, this study is a strong reminder that individual differences exist, revealing specific cognitive patterns within one particular population is difficult, and a further examination of other cognitive processes and neuropsychological functions is warranted when attempting to understand cognition among juvenile offenders.

REFERENCES

Aguilar, B., Sroufe, A., Egeland, B., and Carlson E. (2000). Distinguishing the early onset/persistent and adolescence-onset antisocial behavior types: From birth to 16 years. *Development and Psychopathology*, 12, pp. 109-132.

Anderson, V. (1998). Assessing executive functions in children: Biological, psychological, and developmental considerations. *Neuropsychological Rehabilitation,* 8(3), 319-349.

Anderson, V., Anderson, P., Jacobs, R., & Smith, M. (2010). Development and assessment of executive function: From preschool to adolescence. In V. Anderson, R. Jacobs, and P. Anderson (Eds.), *Executive functions and the frontal lobes: A lifetime perspective.* New York: Taylor & Francis.

Andrew, J. (1974). Delinquents, the Wechsler P-V sign, and the I-lvel system. *Journal of Clinical Psychology*, 30, 331-335.

Andrew, J. (1977). Delinquency: Intellectual imbalance? *Criminal Justice and Behavior*, 4, 99-104.

Andrews, J. (2007). Test reviews. *Journal of Psychoeducational Assessment*, 25(4), 402-408.

Arbona C., and Coleman, N. (2008). Risk and resilience. In Brown, S. D., and R. W. Lent, (Eds.). *Handbook of Counseling Psychology* (4th Ed.) Hoboken, NJ: Wiley.

Baddeley, A. and Hitch, G. (1974). Working memory. In G.H. Bower (Ed.) *Recent advances in learning and motivation* (vol. 8). New York: Academic.

Barbot, B. & Hunter, S. (2012). Developmental Changes in Adolescence and Risks for

Delinquency. In E.L. Grigorenko (ed.), Handbook of Juvenile Forensic Psychology and Psychiatry (pp. 28). New York: Spring+Science Business Media.

Barrett, D., Katsiyannis, A., Zhang, D. (2006). Predictors of offense severity, prosecution, incarceration, and repeat violations for adolescent male and female offenders. *Journal of Child and Family Studies*, 15(6), 708-718.

Bartusch, D.R., Lynam, D.R., Moffitt, T.E., and Silva, P.A. (1997). Is age important? Testing a general versus a developmental theory of antisocial behavior. *Criminology*, 35: 13-48.

Beatriz, M. & Rosselli, M. (2007). The elusive nature of executive functions: A review of our current understanding. *Neuropsychological Review*, 17(3), 213-233.

Bronfenbrenner, U. (1979). *The Ecology of Human Development: Experiments by Nature and Design*. Cambridge, MA: Harvard University Press.

Bronfenbrenner U. and Ceci, S.J. (1994). "Nature-nurture reconceptualized in developmental perspective: A bioecological model". *Psychological Review* 101 (4): 568–586.

Bruning, R.H., Schraw, G.J., & Norby, M.M. (2011). Cognitive Psychology and Instruction. (5th. ed.). Upper Saddle River, NJ: Pearson.

Buikhuisen, W. (1987), Cerebral dysfunctions and persistent juvenile delinquency. In A. Mednick & T. E. Moffitt (Eds.), *The Causes of Crime: New Biological Approaches* (pp. 168-184). New York: Cambridge University Press.

Calhoun, G., Glaser, B., and Bartolomucci, C., 2001. The Juvenile counseling and assessment model and program: A conceptualization and intervention for juvenile delinquency. *Journal of Counseling & Development*, 79, 131-141.

Carroll, J. (1993). *Human cognivite abilities: A survey of factor analytic studies.* New York: Cambridge University Press.

Center for Disease Control and Prevention. 2013. Mental health surveillance among children in the United States, 2005-2011. *Morbidity and Mortality Weekly Report (MMWR)*, 62(2), 1-35.

Cohen, J. (1988). *Statistical power analysis for the behavioral sciences.* (2nd ed.). Hillsdale, NJ: Lawrence Earlbaum Associates.

Donnellan, M., Ge, X., Wenk, E. (2000). Cognitive abilities in adolescent-limited and life-course persistent criminal offenders. *Journal of Abnormal Psychology*, 109(3), 396-402.

Efta-Breitbach, J., & Freeman, K. (2004). Treatment of juveniles who sexually offend: An overview. *Journal of Child Sexual Abuse,* 13(3/4), 125-138.

Farrington, D.P. (1995). The twelfth Jack Tizard memorial lecture: The development of offending and antisocial behavior from childhood: Key findings from the Cambridge Study in Delinquent Development. *Journal of Child Psychology and Psychiatry,* 360, 929-964.

Ganzer, V. and Sarason, I. (1973). Variables associated with recidivism among juvenile delinquents. *Journal of Consulting and Clinical Psychology,* 4, 1-5.

Gelso & Fretz. (2001). Counseling Psychology (2nd ed.). Belmont, CA: Wadsworth.

Harris, P. W., Lockwood, B., Mengers, L., & Stoodley, B. H. (2011). Measuring recidivism in juvenile corrections. *Journal of Juvenile Justice*, *1*(1), 1-16.

Haynes, J., and Bensch, M. (1981). The P>V sign on the WISC-R and recidivism in delinquents. *Journal of Consulting and Clinical Psychology,* 49(3), 480-481.

Hays, J., Solway, J. and Schreiner, D. (1978). Intellectual characteristics of juvenile murders versus status offenders. *Psychological Reports*, 43, 80-82.

Health Care Cost Institute. 2012. Children's health care spending report: 2007-2010.

Washington, DC: Health Care Cost Institute.

Hirschi, T. & Hindelang, M. J. (1977). Intelligence and delinquency: a revisionist review. American Sociological Review, 42, 571-587.

Hockenberry, S. & Puzzanchera, C. 2014. Juvenile court statistics 2011. Pittburgh, PA: National Center for Juvenile Justice.

Horn, J. and Cattell, R. (1966). Refinement and test of the theory of fluid and crystallized general intelligences. *Journal of Educational Psychology*, 57(5), 243-270.

Isen, J. (2010). A meta-analytic assessment of Wechsler's P>V sign in antisocial populations. *Clin Psychol Rev,* 30, 423-435.

Jackson, D. (1984). Manual for the Personality Research Form (3rd Ed.). Port Huron, MI: Research Psychologists Press.

Jeglum-Bartusch, D., Lynam, D., Moffitt, T., & Silva, P. (1997). Is age important? Testing general versus developmental theories of antisocial behavior. *Criminology,* 35, 13-47.

Lezak M, Howieson M, Loring D. 2004. *Neuropsychological Assessment. Fourth Edition.* New York: Oxford University Press.

Kennedy, T., Burnett, K., and Edmonds, W. (2011). Intellectual, behavioral, and personality correlates of violent vs. non-violent juvenile offenders. *Aggressive Behavior*, 37(4), 315-325.

Kline, R.B. (2011). *Principles and practice of structural equation modeling, 3rd edition*. New York: The Guilford Press.

Koolhof, R., Loeber, R., Wei, E., Pardini, D., and D'Escury, A. (2007). Inhibition deficits of serious delinquent boys of low intelligence. *Criminal Behavior and Mental Health*, 17(5), 274-292.

Laulicht, L. (1963). Problems of statistical research: Recidivism and its correlates. *Journal of Criminal Law, Criminology, and Police Science,* 54, 163-174.

Lueger, R. and Cadman, W. (1982). Variables associated with recidivism and program termination of delinquent adolescents. *Journal of Clinical Psychology*, 38(4), 861-863.

Lynam, D. (1998). Early identification of the fledgling psychopath: Locating the psychopathic child in the current nomenclature. *Journal of Abnormal Psychology*, 102(2), 187-196.

Lynam, D., Moffitt, T., & Stouthamer-Loeber, M. (1993). Explaining the relation between IQ and delinquency: Class, race, test motivation, school failure, or self-control? *Journal of Abnormal Psychology,* 102(2), 187-196.

Manne, S., Kandel, A., and Rosenthal, D., (1962). Differences between performance IQ and verbal IQ in a severely sociopathic population. *Journal of Clinical Psychology,* 18(1), 73-77.

Manskin, M. (1974). A comparison of graduate and recidivist WISC IQ scores in a delinquency treatment program for girls. *Journal of Clinical Psychology*, 30, 319-320.

Matarazzo, J. (1972). *Wechsler's measurement and approaisal of adult intelligence*. Baltimore, MD: Williams & Wilkins.

McGloin, J., Pratt, T., and Maahs, J. (2004). Rethinking the IQ-delinquency relationship: A longitudinal analysis of multiple theoretical models. *Justice Quarterly,* 21(3), 603-631.

McNamara J. & Willoughby, T. 2010. A longitudinal study of risk-taking behavior in adolescents with learning disabilities. *Learning Disabilities Research & Practice*, 25(1), 11-24.

Moffitt, T. (1990). Juvenile delinquency and attention-deficit disorder: Developmental trajectories from age three to fifteen. *Child Development,* 61, 893-910.

Moffitt, T. (2008). A review of research on the taxonomy of life-course persistent versus adolescence-limited antisocial behavior. In F. Cullen, J. Wright, & K. Blevins (Eds.), *Taking stock: The status of criminological theory* (pp. 279-280). New Brunswick, NJ: Transaction Publishers.

Moffitt, T. & Caspi, N. (2001). Childhood predictors differentiate life-course persistent and adolescence-limited pathways among males and females. *Development and Psychopathology,* 13, 355-375.

Moffitt, T., Lynam, D., and Silva, P. (1994). Neuropsychological test predict persistent male delinquency. *Criminology*, 33, 111-139.

Moffitt, T. & Silva, P. (1988). Neuropsychological deficit and self-reported delinquency in an unselected birth cohort. *American Academy of Child & Adolescent Psychiatry*, 27(2), 233-240.

Morgan, A. & Lilienfeld, S. (2000). A Meta-analytic review of the relation between antisocial behavior and neuropsychological measures of executive function. *Clinical Psychology Review*, 20(1), 113-136.

Mulder, E., Vermunt, J., Brand, E., Bullens, R., and van Marle, H. (2012). Recidivism in subgroups of serious juvenile offenders: Different profiles, different risks? *Crim Behav Ment Health,* 22(2) 122-135.

Myner, J., Santman, J., Cappelletty, G., & Perlmutter, B., (1998). Variables related to recidivism among juvenile offenders. International Journal of Offender Therapy and Comparative Criminology, 42(1), 65-80.

National Institute of Mental Health (NIMH). 2011. The teen brain: Still under construction. NIH Publication No. 11-4929

Parker, J., and Morton, T. (2009). Distinguishing between early and late onset delinquents: Race, income, verbal intelligence, and impulsivity. *North American Journal of Psychology*, 11(2), 273-284.

Paulhus, D. and Williams, K. (2002). The dark triad of personality: Narcissism, Machiavellianism and psychopathy. *Journal of Research in Personality,* 36(6), 556-563.

Perkins, S., Smith-Darden, J., and Graham-Bermann, S. (2011). The relation of violence exposure and ethnicity to intelligence and verbal-performance discrepancies in incarcerated male adolescents. *Violence and Victims*, 26(4), 496-512.

Phillippi, S. & DePrato, D. 2010. Assessment and treatment of juvenile offenders. In Benedek, E., Ash, P., Scott, C. (Eds.), *Principles and Practice of Child and Adolescent Forensic Mental Health* (pp.363). Arlington,VA: American Psychiatric Publishing, Inc.

Ponterotto, J.G., Casas, M., Suzuki, L., & Alexander, C.M. (Eds.) (2001). *Handbook of multicultural counseling*. (2 ed.) San Francisco, CA: Sage.

Raine, A., Brennan, P., Mednick, B., & Mednick, S. (2003). High rates of violence, crime, academic problems, and behavioral problems in males with both early neuromotor deficits and unstable family environments. *Archives of General Psychiatry*, 53, 544-549.

Raine, A., Moffitt, T., Caspi, A. Loeber, R., Stouthamer-Loeber, M., & Lynam, D. (2005). Neurocognitive impairments in boys on the life-course persistent antisocial path. *Journal of Abnormal Psychology*, 114, 38-49.

Reynolds, C.R., & Kamphaus, R.W. (2003). Reynolds intellectual assessment scales. Psychological Assessment Resources Inc.: Lutz, Florida.

Sickmund, M., and Puzzanchera, C. (eds.). 2014. Juvenile Offenders and Victims: 2014 National Report. Pittsburgh, PA: National Center for Juvenile Justice.

Tabachnick, B.G. & Fidell, L.S. (2007). *Using multivariate statistics, 5th edition*. San Francisco: Pearson, Inc.

Taylor, J., Elkins, I., Legrand, L., Peuschold, D., and Iacono, W. (2007). Construct validity of adolescent antisocial personality disorder. *Journal of Youth and Adolescence,* 36(8), 1048-1057.

Taylor, J., Iacono, W., & McGue, M. (2000). Evidence for a genetic etiology of early-onset delinquency. *Journal of Abnormal Psychology*, 109(4), 634-643.

Teichner, G. & Golden, C. (2000). The relationship of neuropsychological impairment to conduct disorder in adolescence: A conceptual review. *Aggression and Violent Behavior,* 5(6), 509-528.

Tung, S., and Chhabra, N., (2011). A comparative study of the neuropsychological status of delinquent and non-delinquent boys. *International Journal of Culture and Mental Health*, 4(2), 121-127.

Vermeiren, R., De Clippele, A., Schwab-Stone, M., Ruchkin, V., and Deboutte, D. (2002). Neuropsychological characteristics of three subgroups of Flemish delinquent adolescents. *Neuropsychology*, 16(1), 49-55.

Vermeiren, R., De Clippele, A., Schwab-Stone, M., Ruchkin, V., and Deboutte, D. (2002). Predicting recidivism in delinquent adolescents from psychological and psychiatric assessment. *Comprehensive Psychiatry,* 43(2), 142-149.

Wechsler, D. (1958). *The measurement and appraisal of adult intelligence* (4th ed.). Baltimore, MD: Williams & Wilkins.

Wolff, J. and Ollendick, T. 2010. Conduct problems in youth: Phenomenology, classification, and epidemiology. In R. Murrihy, A. Kidman, & T. Ollendick, *Clinical Handbook of*

Assessing and Treating Conduct Problems in Youth. Springer, NY: Springer Science+Business Media.

Wong, W., and Cornell, D., (1999). PIQ>VIQ discrepancy as a correlate of social problem solving and aggression in delinquent adolescent males. *Journal of Psychoeducational Assessment,* 17(2), 104-112.