ASSESSING THE IMPACT OF TRAUMA EXPOSURE IN JUVENILE OFFENDERS USING THE RIAS AND TSCC

by

ZOE RAY

(Under the Direction of Brian A. Glaser)

ABSTRACT

Adolescents involved with the juvenile justice system are significantly more likely to endorse history of childhood maltreatment and other forms of complex trauma. Trauma exposure is associated with a variety of detrimental symptoms, including higher mental health disorder, cognitive deficit, and learning and memory problems than the general population. Adolescence represents a critical period in cognitive development, which is negatively impacted by trauma exposure. Experience of trauma is associated with neurological changes as well as deficits in learning and memory, verbal ability, and executive function. This study investigated the impact of trauma exposure and trauma symptomology on cognitive functioning in juvenile offenders. Participants included adolescents referred by the juvenile court for psychological evaluation. Results of the statistical analyses revealed no relationship between self-report of trauma and endorsement of trauma symptoms on the TSCC. Adolescents who reported history of sexual abuse/rape scored significantly lower on the RIAS Composite Memory Index. Significant correlations were identified between performance on the RIAS and scores on the TSCC. Elevated score on the TSCC Overt Dissociation scale predicted higher performance on the RIAS Verbal Intelligence Index, while elevated score on the TSCC Depression scale predicted higher
performance on both the RIAS Nonverbal Intelligence Index and Composite Intelligence Index. In contrast, adolescents with higher TSCC Hyperresponse scale performed significantly worse on the RIAS Composite Memory Index. Overall, 52% of participants reported history of trauma, with females significantly more likely to endorse trauma experience than male offenders. These findings highlight unique challenges that trauma-exposed youth experience related to cognitive functioning and trauma symptomology.

INDEX WORDS: Juvenile Offenders, Delinquency, Trauma, Cognitive functioning, Reynolds Intelligence Assessment Scales (RIAS), Trauma Symptom Checklist for Children (TSCC)
ASSESSING THE IMPACT OF TRAUMA EXPOSURE IN JUVENILE OFFENDERS USING
THE RIAS AND TSCC

by

ZOE RAY
B.A., Colby College, 2009
M.A., Adler School of Professional Psychology, 2012

A Dissertation Submitted to the Graduate Faculty of The University of Georgia in Partial
Fulfillment of the Requirements for the Degree

DOCTOR OF PHILOSOPHY

ATHENS, GEORGIA
2017
ASSESSING THE IMPACT OF TRAUMA EXPOSURE IN JUVENILE OFFENDERS USING
THE RIAS AND TSCC

by

ZOE RAY

Major Professor:  Brian A. Glaser
Committee:       Georgia B. Calhoun
                  Bernadette D. Heckman

Electronic Version Approved:

Suzanne Barbour
Dean of the Graduate School
The University of Georgia
August 2017
DEDICATION

This work is dedicated to my parents for all their love and support throughout my graduate school journey.
ACKNOWLEDGEMENTS

I would like to acknowledge my chair, Dr. Brian Glaser, and committee members, Dr. Georgia Calhoun and Dr. Bernadette Heckman, for their guidance and encouragement throughout my doctoral training and their assistance with the dissertation process. I would also like to thank the rest of the faculty in the Counseling Psychology program. I have learned and grown so much from each of them. Finally, I would like to thank the JCAP team for their support throughout my time at UGA and their assistance with data collection and entry.
# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACKNOWLEDGEMENTS</td>
</tr>
<tr>
<td>LIST OF TABLES</td>
</tr>
<tr>
<td>LIST OF FIGURES</td>
</tr>
</tbody>
</table>

## CHAPTER

1. INTRODUCTION
   - Statement of the Problem | 1
   - Purpose of the Study | 3
   - Research Questions and Hypotheses | 5
   - Operational Terms and Definitions | 6

2. REVIEW OF RELATED LITERATURE
   - Juvenile Delinquency | 10
   - Cognitive Processing in the Juvenile Offender Population | 11
   - Trauma Exposure and Delinquency | 15
   - Childhood Trauma and Cognitive Functioning | 20
   - Psychological Assessment in Juvenile Offenders | 25
   - Summary | 26

3. RESEARCH METHODOLOGY | 28
   - Participants | 28
   - Procedure | 30
Research Instruments...........................................................................................................30
Statistical Analysis ...........................................................................................................32

4 RESULTS.......................................................................................................................35
Descriptive Statistics ........................................................................................................35
Research Question 1 .........................................................................................................36
Research Question 2 .........................................................................................................38
Research Question 3 .........................................................................................................41
Research Question 4 .........................................................................................................42
Research Question 5 .........................................................................................................43
Research Question 6 .........................................................................................................48
Summary of Findings .......................................................................................................50

5 DISCUSSION..................................................................................................................52
Summary of Study .............................................................................................................52
Conclusions ......................................................................................................................57
Limitations ........................................................................................................................60
Implications .......................................................................................................................61
Recommendations for Future Research ..............................................................................62
REFERENCES ..................................................................................................................64
<table>
<thead>
<tr>
<th>Table</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Description of Trauma Experiences Endorsed by Adolescents</td>
<td>35</td>
</tr>
<tr>
<td>2</td>
<td>Mean TSCC Scores for Adolescents Who Reported Trauma or No Trauma History</td>
<td>35</td>
</tr>
<tr>
<td>3</td>
<td>Mean RIAS Scores for Adolescents Who Reported Trauma or No Trauma History</td>
<td>36</td>
</tr>
<tr>
<td>4</td>
<td>Correlations Between Self-Reported History of Trauma and TSCC Scores</td>
<td>37</td>
</tr>
<tr>
<td>5</td>
<td>Correlations Between Self-Reported History of Trauma and RIAS Scores</td>
<td>38</td>
</tr>
<tr>
<td>6</td>
<td>Correlations Between Type of Trauma Reported and RIAS Scores</td>
<td>39</td>
</tr>
<tr>
<td>7</td>
<td>Summary of Binary Logistic Regression Analyses for RIAS Scores Predicting Trauma Endorsement</td>
<td>41</td>
</tr>
<tr>
<td>8</td>
<td>Summary of Binary Logistic Regression Analysis for RIAS Scores Predicting Endorsement of Sexual Abuse/Rape</td>
<td>42</td>
</tr>
<tr>
<td>9</td>
<td>Correlations Between TSCC and RIAS Scores</td>
<td>43</td>
</tr>
<tr>
<td>10</td>
<td>Summary of Simple Regression Analysis for TSCC Scales Predicting Performance on the RIAS Verbal Intelligence Index</td>
<td>44</td>
</tr>
<tr>
<td>11</td>
<td>Summary of Simple Regression Analysis for TSCC Scales Predicting Performance on the RIAS Nonverbal Intelligence Index</td>
<td>45</td>
</tr>
<tr>
<td>12</td>
<td>Summary of Simple Regression Analysis for TSCC Scales Predicting Performance on the RIAS Composite Memory Index</td>
<td>46</td>
</tr>
<tr>
<td>13</td>
<td>Summary of Simple Regression Analysis for TSCC Scales Predicting Performance on the RIAS Composite Intelligence Index</td>
<td>47</td>
</tr>
<tr>
<td>14</td>
<td>Summary of Chi Square Tests for Endorsement of Trauma History by Gender</td>
<td>49</td>
</tr>
<tr>
<td>15</td>
<td>Summary of Independent-Sample T-Test for Scores on the TSCC and RIAS Based on Gender of Adolescent Offender</td>
<td>49</td>
</tr>
</tbody>
</table>
LIST OF FIGURES

Page

Figure 1: TSCC profile for juvenile offenders who endorsed trauma or no trauma history ..........37

Figure 2: TSCC profile for juvenile offenders based on type of trauma endorsed ....................38

Figure 3: RIAS profiles for juvenile offenders who reported trauma or no trauma history ........40

Figure 4: RIAS profiles for juvenile offenders based on type of trauma endorsed .................40
CHAPTER 1
INTRODUCTION

Statement of the Problem

Juvenile delinquency is a significant concern within society and reduction of adolescent crime and recidivism rate remains a prominent challenge for communities, families, and schools (Contreras, Molina, & Cano, 2011). Investigation of risk and protective factors for juvenile delinquency is thus an important area of research (Contreras, Molina, & Cano, 2011). Delinquency is defined as offenses committed by adolescents under 18, including serious criminal activity (e.g. assault, drug offenses, robbery), as well as status offenses (e.g. running away from home, truancy from school) (Shoemaker, 2008). In 2012, approximately 1.3 million adolescents were arrested, an amount which consisted of approximately 15% of total arrests within the United States (Puzzanchera, 2014). In recent years, the juvenile justice community has moved to study causes and risk factors of delinquent behavior for the purpose of implementing programs focused on prevention (Shader, 2001). Known risk factors for juvenile delinquency include attention problems and impulsivity, low verbal functioning, history of maltreatment, low socioeconomic status, family characteristics (e.g. low parental supervision, domestic violence, etc.), and community violence (Shader, 2011). Delinquency is more common in male than female adolescents (Simoes, Matos, & Batista-Foguet, 2008) and male and female juvenile offenders differ in reason for court involvement as well as rate of mental health disorders. (Gavazzi, Yarcheck, & Chesney-Lind, 2006).
Furthermore, both adolescent mental health and trauma history are growing areas of concern in the juvenile offender population. Research indicates that 60-70 percent of males and 66-82 percent of females in juvenile detention facilities meet criteria for a mental health diagnosis (Cauffman, 2004; Teplin, Abram, McClelland, Dulcan, & Mericle, 2002). Rates of self-reported trauma exposure in the juvenile offender population range from 80-92.5 percent, with the majority of youth reporting experience of more than one traumatic incident; this is significantly higher than in the general adolescent population mean (Wasserman & McReynolds, 2011; Abram et al, 2004; Wilson et al, 2013; Silvern & Griese, 2012). Trauma history is associated with increased risk for conduct problems, oppositional behavior, anxiety, mood disorder, learning problems, and substance use (Wilson et al, 2013; Stouthamer-Loeber, Loeber, Homish, & Wei, 2001; Silvern, & Griese, 2012).

A cycle of crime is indicated within adolescent delinquent behavior, such that individuals who experience childhood trauma are commonly future perpetrators (Kingree, Phan, & Thompson, 2003). This reinforcing cycle further indicates the need for increased knowledge about process of criminal behavior. Although information is known on the different pathways that lead towards the development of juvenile delinquency (e.g. trauma history), limited research is available on the ways in which these pathways interact. In particular, the possible interactive effect that trauma history/symptomology and cognitive functioning has on delinquency remains unclear. In order to predict and prevent delinquent behavior and limit recidivism, further exploration is needed as to the relationship between these variables in respect to delinquency development and mental health.

As such, the current study will investigate cognitive functioning and trauma symptomology in adolescents involved in the juvenile justice system with an aim to increase our
understanding of the ways that trauma history and related trauma symptomology impact cognitive functioning, including verbal ability, nonverbal ability, executive functioning, and working memory. This is important in helping to detect youth in need of services as more information is needed as to the trauma profiles endorsed by juvenile offenders and the way these profiles relate to functioning. This is of benefit in understanding the specific needs of different groups of adolescent offenders and increasing insight into characteristics associated with court involvement. It is also essential in understanding the ways in which trauma impacts working memory and other aspects of cognitive functioning, factors which correspond to learning, academic performance, attention, and decision-making ability. In addition, this study will add to the research on use of the Trauma Symptom Checklist for Children (TSCC) and the Reynolds Intellectual Assessment System (RIAS) within the juvenile offender population.

**Purpose of the Study**

The purpose of this study is to increase the knowledge of risk factors associated with juvenile delinquency and to better identify cognitive and trauma profiles of adolescent offenders in order to increase appropriate service recommendations. It will also serve to advance the knowledge of ways in which trauma history and trauma symptomology contribute to delinquent behavior. It is necessary to understand the different factors associated with delinquent behavior in order to decrease risk for juvenile court involvement, decrease rates of offending behavior, and improve treatment and service options. Treatment of underlying trauma and other risk factors for delinquency is a necessary component of both intervention and prevention. Understanding factors associated with delinquency and the ways in which these factors interact is further essential in obtaining a holistic picture of court-referred adolescents in order to allow for diagnosis and treatment that is comprehensive rather than driven by individual symptoms.
This study will contribute to the knowledge base of an underserved population at-risk for further court involvement and continued mental health difficulties. High rates of trauma exposure in the juvenile offender population and the detrimental impact of trauma on future cognitive, socioemotional, academic, and vocational functioning is a significant public health concern. In addition, youth of minority status, adolescents from low-income, high-violence neighborhoods, and those who meet criteria for mental health disorders are differentially referred to the juvenile justice system; this is a strong social justice concern. The field of Counseling Psychology has a long history of advocacy for underserved populations and promotion of social justice, with engagement in counseling, advocacy, prevention, and outreach with at-risk, oppressed, and disadvantaged groups, such as juvenile offenders, seen as critical steps towards societal change (Vera & Speight, 2003).

The current study will be conducted using archival data from adolescents who were referred for psychological evaluation through the Juvenile Counseling and Assessment Project (JCAP). Coming from a counseling psychology, social justice-informed perspective, JCAP was created in 1994 for the purpose of addressing issues associated with delinquency from a holistic context (Calhoun, Glaser, & Bartolomucci, 2001). Understanding the ways in which individual, peer, family, and community factors interact to create risk for juvenile court involvement, the program seeks to provide psychological evaluation and counseling services (individual, family, group, and career) to address the unique mental health needs of this population and to engage in research to better inform treatment (Calhoun et al, 2001).

This study will explore relationships between self-reported trauma history, symptoms of trauma as measured by the Trauma Symptom Checklist for Children (TSCC), and cognitive ability as measured by the Reynolds Intellectual Assessment System (RIAS). Adolescent
participants were referred for assessment by the Department of Juvenile Justice for the purpose of determining psychological functioning and treatment recommendations. Evaluation included assessment of trauma history during a clinical interview and administration of psychological instruments including the RIAS and TSCC.

**Research Questions and Hypotheses**

**Research Question 1:** Is there a significant relationship between self-reported trauma history, including type of trauma endorsed, and scores on the TSCC in juvenile offenders?

*Hypothesis 1:* There is a significant relationship between self-report of trauma history and scores on the TSCC scales in juvenile offenders. There is also significant relationship between type of trauma experience endorsed and TSCC profile.

**Research Question 2:** Is there a significant relationship between self-reported trauma history and RIAS scores in juvenile offenders?

*Hypothesis 2:* There is a significant relationship between whether juvenile offenders’ self-report history of trauma and how they score on the RIAS composite scales.

**Research Question 3:** Does cognitive functioning as measured by the RIAS predict endorsement of trauma exposure in juvenile offenders?

*Hypothesis 3:* RIAS scores are a significant predictor of trauma exposure in the juvenile offender population. Adolescents who score higher on the RIAS indices are significantly less likely to report history of trauma.

**Research Question 4:** Is there a significant relationship between TSCC scores and RIAS scores in juvenile offenders?

*Hypothesis 4:* There is a significant relationship between scores on the TSCC scales and scores on the RIAS indices in juvenile offenders.
Research Question 5: Do TSCC subscale scores predict cognitive functioning in juvenile offenders as measured by the RIAS?

Hypothesis 5: Scale elevations on the TSCC are associated with lower performance on the RIAS measure of cognitive ability. Adolescent offenders with a clinical profile on the TSCC are likely to demonstrate lower ability across areas of cognitive functioning.

Research Question 6: Are there gender differences in endorsement of trauma history, TSCC scores, and/or performance on the RIAS in the juvenile offender population?

Hypothesis 6: There are gender differences in endorsement of trauma history; consistent with the literature on trauma exposure in juvenile offenders, females involved with the juvenile justice system are significantly more likely to report history of trauma than males. There are also gender differences in TSCC profile, with female offenders endorsing a higher level of symptomology than males. There are no gender differences in RIAS performances, with females performing comparable to males across areas of cognitive ability.

Operational Terms and Definitions

Juvenile Offender: In the current study, the term juvenile offender refers to adolescents under 18 who have been charged with offenses including serious criminal activity (e.g. assault, drug offenses, robbery) as well as status offenses (e.g. running away from home, truancy from school) (Shoemaker, 2008). Juvenile offender, adolescent offender, and juvenile delinquent are used interchangeably in this report.

Delinquent Behavior: Actions committed by juveniles that are under the jurisdiction of the juvenile court. These include drug offenses, crimes against property, crimes against property, and crimes against public order (US Department of Justice, 2013).
**Trauma:** Trauma is defined as the experience or witness of incidents that cause serious injury or death or which involve threat of serious injury or death to self or others. This includes exposure to physical abuse, sexual abuse, emotional abuse, neglect, grief/loss, witnessed or experienced community violence, or witnessed or experienced domestic violence, serious accidents, and natural disaster. Trauma can include both single-incident trauma and prolonged, repeated, and multiple (complex) trauma (National Child Traumatic Stress Network).

**Complex Trauma:** Complex trauma is defined as exposure to chronic, repeated interpersonal trauma in childhood (Gabowitz, Zucker, & Cook, 2008). This includes sexual, physical, and emotional abuse, neglect, loss, and witnessed domestic and community violence. Symptoms of complex trauma, as described by Cook et al (2005), include impairment in the following domains:

A. Attachment: problems with boundaries, distrust and suspiciousness, interpersonal difficulties, social isolation, difficulty with perspective-taking

B. Biology: somatization, sensorimotor development problems, problems with coordination, balance, and body tone, analgesia, increased medical problems

C. Affect regulation: problems with emotional self-regulation, difficulty identifying and expressing emotions and defining internal states, difficulty communicating needs and wishes

D. Dissociation: amnesia, alterations in states of consciousness, depersonalization and derealization, impaired memory for state-based events

E. Behavioral Control: poor impulse control, interpersonal aggression, sleep problems, substance abuse, oppositional behavior, difficulty understanding and following
rules, reenactments of trauma in play, engagement in self-destructive behavior, unhealthy methods of self-soothing

F. Cognition: problems with attention regulation and executive functioning, poor language development, learning problems, difficulty planning and completing tasks, difficulty processing new information, problems with object consistency and orientation in time and place

G. Self-Concept: low self-esteem, feelings of guilt and shame, lack of continuous sense of self, disturbances in body image, poor sense of separateness

Posttraumatic Stress Disorder (PTSD): The Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (American Psychiatric Association, 2013) defines PTSD to include exposure to actual or threatened death, serious injury, or sexual violence. Symptoms of PTSD include:

A. Intrusive thoughts (e.g. recurrent memories, distressing dreams, flashbacks)

B. Avoidance of things associated with the traumatic event(s) (e.g. avoiding memories, feelings, people, places)

C. Negative changes in mood and thinking (e.g. negative self-perception, feelings of hopelessness, emotional numbing, memory problems, problems maintaining close relationships)

D. Alterations in emotional reactivity (e.g. problems concentrating, difficulty sleeping, hypervigilance, engagement in risky behavior, feelings of anger, irritability, shame, or guilt)

Cognitive Functioning: The process by which individuals learn, remember, and apply knowledge. Areas of cognitive functioning commonly measured in intelligence tests include
verbal ability, visual/spatial ability, working memory, and processing speed (Reynolds & Kamphaus, 2009).

**Verbal Ability:** Vocabulary knowledge and skill in verbal problem-solving and verbal reasoning

**Visual/Spatial Ability:** Spatial ability, non-verbal reasoning, visual imagery, and knowledge of part-to-whole relationships.

**Working Memory:** Ability to encode, briefly store, and then recall both verbal and nonverbal material.

**Executive Functioning:** The ability to regulate cognitive processes and engage in independent, goal-directed activities. Executive functioning includes planning and organization, initiation of tasks, problem-solving, cognitive flexibility, response inhibition, selective attention, decision-making, and working memory. The brain area associated with executive function is the prefrontal cortex (Blakemore & Choudhury, 2006; Gabowitz, Zucker, & Cook, 2008)
Juvenile Delinquency

Juvenile delinquency is a significant concern within society, with approximately 1.3 million adolescents arrested within a given year (Puzzanchera, 2014). Although adolescent crime rates have fallen greatly in the past fifteen years, with juvenile arrests decreasing by 37 percent since 2003 (Puzzanchera, 2014), certain youth demographics remain at significantly higher risk for involvement in the juvenile justice system. This includes adolescents of minority status (Puzzanchera, 2014) and those with mental health diagnoses (Teplin, Abram, McClelland, Dulcan, & Mericle, 2002). Other risk factors include residing in low-income and high-violence neighborhoods and history of maltreatment and complex trauma (Becker & Kerig, 2011). These statistics indicate a great need for continued research into the ways in which these factors increase likelihood of offending behavior in order to properly implement prevention and treatment programs.

Psychological functioning is an area of particular concern within the juvenile offender population. Looking at mental health of youth in the juvenile justice system, Teplin and associates (2002) assessed 1829 adolescents at the Cook County Juvenile Detention Center. Based on information provided at intake, they found that 66 percent of inmates met criteria for a psychological diagnosis (Teplin et al, 2002; Cauffman, 2004), an amount congruent with findings of other studies (Kerig, Vanderzee, Becker, & Ward, 2012). Most common mental health diagnoses included substance use (50 percent), disruptive behavior disorders (41 percent),
anxiety disorders (21 percent), mood disorders (18 percent), and attention-deficit/hyperactivity disorder (16 percent) (Teplin, 2002). Similarly, Becker, Kerig, Lim, & Ezechukwu (2012) reviewed records from 587 adolescent offenders at a Midwest juvenile detention facility at time of first detention. They found elevated rates of mental illness in compared to the general adolescent population, including increased somatic complaints, anxiety, and depression, as well as elevated substance use for boys and anger and irritability for girls (Becker et al, 2012). One-third of male offenders and one-half of female offenders met criteria for PTSD (Becker et al, 2012). High rates of mental illness pose a significant challenge for the juvenile justice system; there is a greater need for services than available service providers, with a large number of adolescent offenders who meet mental health criteria not receiving appropriate treatment (Cauffman, 2004). It is also of great concern that youth with mental health needs are often labeled as having behavior problems rather than identified according to underlying etiology of externalizing behavior, such as trauma history, depressive symptoms, or family dysfunction (Cauffman, 2004).

Cognitive Processing in the Juvenile Offender Population

Adolescence is a critical period for brain development, characterized by cognitive, physiological, and behavior changes (Blakemore & Choudhury, 2006; Yurgelun-Todd, 2007). This includes the maturation of higher cognitive functions, including executive functioning. For instance, improvements in cognitive flexibility, response inhibition, selective attention, decision-making, working memory, planning ability, and skill in multitasking are seen during adolescence and into young adulthood (Blakemore & Choudhury, 2006; Yurgelun-Todd, 2007; Mothes et al, 2015). Adolescence is further marked by an increase in abstract and complex style of thinking (Lee & Hoaken, 2007).
Cognitive maturation during adolescence is further associated with changes in emotional and social understanding, including increases in social awareness and perspective taking ability (Blakemore & Choudhury, 2006). During this time period, adolescents grow in their ability to understand emotional cues, regulate their emotions, and take on the point of view of someone else.

These cognitive and behavioral changes can be explained by continued development and maturation of the prefrontal cortex of the brain—the area of the brain responsible for higher order processes such as executive function, reasoning, and behavioral control (Blakemore & Choudhury, 2006; Yurgelun-Todd, 2007). This includes both an increase in axonal myelination, as evidenced by an increase in white matter in the prefrontal cortex, and a decrease in synaptic density and reorganization of synaptic connections in the prefrontal cortex throughout adolescence (Blakemore & Choudhury, 2006). Both synaptic pruning and increased myelination are positively associated with increased efficiency and executive functioning skills (Blakemore & Choudhury, 2006).

However, while adolescence is marked by increase in executive function, studies indicate that this ability develops less rapidly than the subcortical motivation system; this leads adolescents to seek out novelty and sensation within their environment as a means of increasing dopaminergic reward access (Casey, Jones, & Somerville, 2011). As such, adolescents’ strong motivational drive for new, adult experiences, combined with an immature inhibitory control system, leads to an increase in risk-taking behavior (Romer et al, 2011). Adolescents are commonly characterized as impulsive and apt make risky decisions, factors associated with a higher rate of substance use, criminal behavior, accidents, and engaging in unsafe sexual behavior (Casey, Jones, & Somerville, 2011; Steinberg, 2008). Risk evaluation and cost-benefit
analysis, however, does not differ between adolescents and adults; while adolescents are capable of sound decision-making, able to accurately evaluate risky behavior, and able to understand future consequences of actions, they are more influenced by the reward "approach" system of the subcortical region (specifically the ventral striatum) than by the regulatory, cognitive control system controlled by the prefrontal cortex (Casey, Jones, & Somerville, 2011; Steinberg, 2008).

Impulsivity and risk-taking behavior vary across adolescents (Casey, Jones, & Somerville, 2011). Research suggests individual differences in engagement in risky, sensation-seeking behavior are related to differences in neurotransmitter circuitry, specifically dopamine circuitry, which regulates reward processing (Casey, Jones, & Somerville, 2011). Environmental factors including peer influence and parenting style also contribute to individual differences in participation in risky activities (Casey, Jones, & Somerville, 2011). Developmental age, genetic predisposition, and environmental influence all collaborate to impact propensity for risk-taking (Casey, Jones, & Somerville, 2011).

Looking specifically at the association between regulatory behavior and degree of high-risk activity, Romer and colleagues (2011) examined executive functioning and factors associated with risk-taking (sensation-seeking, acting without thinking, externalizing behavior) in a community sample of adolescents. They found that acting without thinking was positively associated with poor executive functioning; however, no difference in executive functioning was indicated in respect to the other measured factors of risk-taking. Similarly, they found that higher working memory ability was negatively associated with engaging in risky behavior.

As such, research indicates an association between neurocognitive impairments, antisocial behavior, and some aspects of risk-taking behavior in adolescents. For instance, Narhi, Lehto-Salo, Ahonen, & Marttunen (2010) investigated cognitive functioning in adolescents with
conduct disorder diagnoses in comparison to community controls. They found neuropsychological deficits including lower verbal ability and executive function in youth with conduct disorder presentation (Narhi et al, 2010). The researchers emphasized a connection between deficits in verbal ability and poor self-regulatory capability/high engagement in impulsive actions, indicating that individuals with such deficits have a lower ability to internalize verbally based instruction and verbal mechanisms of self-control (Narhi et al, 2010). These findings are consistent with the research describing discrepancy between performance and verbal intelligence in adolescent and adult offenders (Seguin, Pinsonneault, & Parent, 2015).

Neurological differences in juvenile offenders in comparison to non-offending youth are described consistently across the literature. Raine et al (2005) found verbal, spatial, and memory impairments in adolescent community offenders and life-course persistent antisocial adolescents. These findings were independent of history of external experiences that impact cognitive functioning, such as head injury, abuse history, and experience of psychosocial adversity. One theory postulated by Raine et al (2005) is that early right hemisphere impairment negatively impacts attachment, social information processing, and emotion regulation ability by interfering with ability to orient to, recognize, and respond to parental facial expression. Poor attachment and deficits in social information processing and emotion regulation ability, in turn, may increase risk for antisocial behavior (Raine et al, 2005).

This research demonstrating neurological differences in adolescent offenders is consistent with findings from Cauffman et al (2005) showing that juvenile offenders score lower on tasks involving the prefrontal cortex, including spatial working memory. Research indicates that executive function deficits and frontal lobe abnormalities are most evident in violent offenders (Zou et al, 2013). For instance, Zou et al (2013) measured executive functioning in male juvenile
offenders incarcerated for violent versus nonviolent crimes and found that compared to nonviolent youth, those with a history of violent offenses performed worse of measures of working memory, attention set-shifting, and planning.

It is necessary to consider factors that impact juvenile cognitive performance and executive functioning. As a period of brain maturation and cognitive development, adolescence is sensitive to external experiences, including engagement in risky behavior (e.g. substance use) and experience of trauma and chronic stress (Lowenthal, 2000; Romer et al, 2011). Such factors can disrupt the typical development of brain functions including executive functioning (Romer et al, 2011). It is important for service providers to understand adolescent cognitive strengths and weaknesses, as well as behavioral and symptom profiles of youth at risk for delinquency in order to develop effective intervention and prevention programs.

**Trauma Exposure and Delinquency**

Approximately 4 million children and adolescents are exposed to traumatic events every year (Lowenthal, 2000), with 1 in 8 children in the United States endorsing history of childhood maltreatment (Lee & Hoaken, 2007). According the National Child Traumatic Stress Network, childhood trauma is defined as the experience or witness of incidents that cause serious injury or death or which involve threat of serious injury or death to self or others. This can include physical abuse, sexual abuse, emotional abuse, neglect, grief/loss, witnessed or experienced community or domestic violence, serious accidents, and natural disasters. It can be divided into single-incident traumas, which often short-lived and unexpected (e.g. car accident), and repeated or multiple trauma, also known as complex trauma. Trauma exposure can significantly impact development and is associated with long-term impairment in functioning (National Child Traumatic Stress Network).
Complex trauma is defined as repeated or prolonged trauma exposure; this form of chronic trauma often occurs in early childhood or adolescence, involves interpersonal maltreatment by caregivers (e.g. physical abuse, sexual abuse, emotional abuse, or neglect), and results in symptomology in the domains of attachment, biology (e.g. increased medical and sensorimotor problems), affect regulation, dissociation, behavioral control, cognition, and self-concept (Cook et al, 2005). It has a lifespan impact on development and functioning, greatly altering psychobiological and socioemotional development (Gabowitz, Zucker, & Cook, 2008). Research indicates that complex trauma history is associated with lower cognitive functioning, poorer academic performance and lower achievement scores in reading and mathematics, memory deficits, and decreased self-regulation ability (Cook et al, 2005; Gould et al, 2012; Jaffee & Maikovich-Fong, 2011; Majer, Nater, Lin, Capuron, & Reeves, 2010; Mills et al, 2010; Gabowitz, Zucker, & Cook, 2008). More specifically, early experience of abuse and neglect is associated with deficits in overall cognitive ability and verbal ability, deficits in long-term and working memory, delays in language development, decreased problem-solving ability, deficits in executive functioning, lower grades and standardized test scores, and increased presence in special education classes (Cook et al, 2005; Gabowitz et al, 2008). Increased trauma exposure is further associated with higher rate of mental health concerns, including mood disorder, anxiety disorder, conduct problems, and substance use (Wilson et al, 2013), as well as symptoms such as dissociation, aggression, affect dysregulation, inattention, and interpersonal problems (Silvern & Griese, 2012). Adolescents exposed to complex trauma are more likely to display acting-out behavior, depression, and risk-taking behavior, such as substance use and engagement in delinquent activity (Gabowitz et al, 2008).
Trauma history is significantly correlated with juvenile delinquency (Maschi, 2006), with both violent and nonviolent offenders more likely to have experienced childhood trauma than their peers (Zou et al, 2013; Becker & Kerig, 2011). Developmental theory states that childhood trauma experience can have a long-term negative impact on social, psychological, and behavioral functioning (Maschi, 2006). Research indicates that childhood maltreatment, defined as the experience of physical abuse, sexual abuse, or neglect prior to age twelve, is positively associated with the development of externalizing behavior problems and criminal behavior in adolescence and adulthood (Maschi, 2006; Trickett, Negriff, Ji, & Peckins, 2011). Of the indicated types of maltreatment, physical abuse is most strongly associated with delinquency (Maschi, 2006). Multiple or repeated trauma experience, including complex trauma history, increases likelihood of involvement with the juvenile court system (Becker & Kerig, 2011), with higher number of trauma incidents/stressors associated with poorer functioning (Silvern & Griese, 2012). Maschi (2006) posited that between 50 and 79 percent of males who have experienced child maltreatment will present with delinquent behavior in adolescence. Experience of trauma plus adverse emotional response/negative affect contributes to later delinquent behavior (Maschi, 2006).

Research confirms that a strong majority of adolescents in juvenile detention settings have been exposed to a high level of trauma, with studies averaging between 84-95 percent of youth endorsing a history of trauma; juvenile offenders reported experiencing an average of 6 to 14 traumas across the course of their life (Abrams et al, 2004; Becker & Kerig, 2011). Becker and Kerig (2011) found that the most common forms of trauma experienced include community violence and domestic violence. Juvenile offenders are more likely to reside in communities with higher rates of poverty and violence, increasing likelihood for witnessing and experiencing

Moreover, findings suggest that female juvenile offenders have a higher incidence of trauma history, particularly sexual trauma history, than do males (Brosky & Lally, 2004, Abram et al, 2004; Foy et al, 2012); a study completed by Brosky & Lally (2004) found that 75 percent of females assessed reported a history of trauma, whereas 51.3 percent of the males reported history of trauma. This is consistent with research indicating that girls may experience more and different types of trauma (e.g. interpersonal traumas) than boys (Kerig & Becker, 2010). Females also demonstrate higher rates of PTSD (Kerig et al, 2012); gender differences are observed in type of trauma exposure, susceptibility to posttraumatic symptoms, symptom presentation, and incidence of reporting (Kerig et al, 2012).

In addition to trauma history, posttraumatic symptomology further impacts delinquency, with 32 percent of males and 52 percent of females in detention centers meeting the criteria for a lifetime diagnosis of posttraumatic stress disorder (PTSD) as defined in the DSM-IV (Kerig & Becker, 2010) and 11-12 percent meeting criteria for PTSD within the past year (Abram et al, 2004; Wilson et al, 2013). Rates of PTSD are significantly greater in the juvenile offender population than in non-delinquent community samples (Silvern & Griese, 2012; Abram et al, 2004). Kerig & Becker (2010) suggest a mediating effect of PTSD symptoms on offending behavior, such that specific symptoms manifest as behavior associated with delinquency. Specifically, reexperiencing, avoidance, and arousal may present as dysregulation of affect, oppositional behavior, and irritability, respectively (Kerig & Becker, 2010). The symptom of dissociation is further linked to risk-taking behaviors including substance use and self-harm.
Posttraumatic stress symptoms are further associated with frequency and severity of male delinquent behavior (Becker & Kerig, 2011). It is suggested that there is an association between severity of PTSD symptoms and seriousness of offense pattern (Becker & Kerig, 2011).

Both type of offense and history of aggressive behavior are also associated with trauma experience. Looking at complex trauma, Silvern & Griese (2012) studied 123 male youth on probation. They found that the majority had been exposed to multiple forms of childhood abuse and that complex maltreatment history significantly predicted not only symptoms of PTSD, but also reactive aggression (Silvern & Griese, 2012). Youth that had experienced more than one abuse displayed greater impulsivity, anger expression, and reactivity to perceived slight (Silvern & Griese, 2012). Zou et al (2013) likewise found a greater history of physical abuse and other forms of childhood trauma in violent offenders than non-violent offenders. Exposure to family and community violence is similarly related to higher rates of aggressive behavior. Kirk & Hardy (2014) studied adolescent behavior patterns and found a direct relationship between experience of violence or witnessing of violent actions and aggression in adolescence and into adulthood. The authors hypothesized that violence exposure changes perception of the world and other people and decreases feelings of perceived control over the environment; engagement in aggressive actions can be interpreted as a form of self-protection (Kirk & Hardy, 2014).

Moreover, adolescents who have experienced child maltreatment are also more likely to engage in delinquent behaviors associated with defiance and problems with authority. Stouthamer-Loeber, Loeber, Homish, & Wei (2001) completed a longitudinal study of the relationship between type of delinquency, involvement with child protective services, and experience of child abuse/neglect. They found that adolescents with maltreatment history were
more likely to demonstrate oppositional defiance and engage in actions associated with avoidance of authority (e.g. parents, teacher), such as staying out late, running way, and skipping school (Stouthamer-Loeber et al, 2001)

Investigating trauma exposure and traits of emotional detachment in juvenile offenders, Kerig, Bennett, Thompson, & Becker (2012) measured emotional numbing and callous unemotional traits in youth in juvenile detention centers. Findings suggested higher emotional disengagement as evidenced by emotional numbing (e.g. numbing of feelings of fear and sadness) and callousness in adolescents with a history of trauma. No gender differences were observed (Kerig et al, 2012). While this may be a protective trait in dealing with trauma exposure and associated feelings of distress, it can negatively impact relationship development and empathy expression in the long-term and increase the likelihood of engagement in interpersonal violence (Kerig et al, 2011).

**Childhood Trauma and Cognitive Functioning**

Research indicates a relationship between cognitive functioning and trauma history; cognitive ability is influenced not only by genetics, but also by environmental factors (Raine et al, 2005). Disruption of neurodevelopment can occur in response to experience of chronic stress, such as continued childhood maltreatment. Chronic trauma results in abnormal neuronal activation, which in turn impacts cognitive development and future functioning (Lowenthal, 2000). In addition, neurodevelopment is also negatively impacted by deprivation of environmental sensory experiences (such as due to neglect) during critical periods of development (Lowenthal, 2000).

Research indicates that trauma in early childhood strongly impacts neurodevelopment and is associated with functional and structural changes in the brain (Gabowitz, Zucker, & Cook,
Experience of childhood maltreatment negatively impacts normal brain development, resulting in deficits with concentration, memory, organization, language, executive function, and emotional regulation (Romano et al, 2014; Lowenthal, 2000; Davis, Moss, Nogin, & Webb 2015). The impact of childhood trauma exposure extends into adulthood, with lower cognitive performance (poorer scores on measures of memory, executive functioning, attention, and language) measured in adults with a maltreatment history (Mothes et al, 2015).

The neurological impact of trauma can be attributed to atypical neuronal activation in response to chronic childhood stress and to lack of sensory stimulation during early brain development (Lowenthal, 2000). More specifically, long-term and ongoing stress experiences, such as childhood maltreatment, are associated with continued activation of the hypothalamic-pituitary-adrenal (HPA) stress-response system and production of the stress hormone cortisol (Davis, Moss, Nogin, & Webb, 2015; Lowenthal, 2000). Chronic stress results in chronic exposure to glucocorticoids (the adrenal steroids that are released during periods of stress) due to dysregulation in the stress response system (Watts-English et al, 2006). Glucocorticoids receptors are present throughout regions of the brain and regulate gene expression; glucocorticoids can have a long-lasting impact on brain functioning in the areas of the brain that regulate their release (Lupien, McEwen, Gunnar, & Heim, 2009).

Stress experienced early in life can significantly influence the brain’s developmental trajectory, as well as modify its structure and function for the long-term (Lupien et al, 2009; Bremner, 2009). Brain structures are differently impacted by chronic exposure to stress hormones at different points in the lifespan. The impact of chronic stress on cognition and behavior depends on the time in development that it occurs, the length of exposure, and genetic
factors that impact stress response and resiliency (Lupien, McEwen, Gunnar, & Heim, 2009). Brain structures under development at time of exposure are most strongly impacted. For instance, chronic stress during the prenatal period is linked to changes in the hippocampus, frontal cortex, and amygdala, childhood chronic stress is associated with hippocampus alteration, and chronic stress in adolescence most strongly impacts the frontal cortex (Lupien et al, 2009). Demonstrating this differential impact of chronic stress based on period of development, Teicher, Tomoda, & Andersen (2006) found that history of sexual abuse in early childhood was associated with a reduction in hippocampus volume, while experience of sexual abuse during adolescence was related to reduced prefrontal cortex volume.

Increased exposure to glucocorticoids negatively impacts brain and cognitive development as well as emotion and behavior regulation ability (Watts-English et al, 2006). While physical hyperarousal and the presence of cortisol are adaptive in the short-term, over long periods these physical manifestations of stress result in brain cell death, synapse reduction, and reduction in volume of specific areas of the brain that account for learning, memory, and emotional regulation and expression. (Lowenthal, 2000).

For instance, research points to differences in volume of the hippocampus, which is associated with learning and memory, in individuals who experienced childhood maltreatment in comparison to those who did not (Davis, Moss, Nogin, & Webb, 2015; Bremner, 1999). Brain differences are also found in the prefrontal cortex (executive control), amygdala (emotional processing and regulation), and corpus callosum (Gabowitz, Zucker, & Cook, 2008; Davis et al, 2015; Mothes et al, 2015; Teicher, Tomoda, & Andersen, 2006; Gabowitz et al, 2008). Specifically, Teicher and colleagues (2006) examined neuropsychological correlates of history of maltreatment in children hospitalized for mental health reasons. They found that the midsagittal
area of the corpus callosum was smaller in children who were previously exposed to trauma; girls were more strongly impacted by experience of sexual abuse, whereas boys were more impacted by neglect (Teicher et al, 2006). Similarly, DeBellis et al (1999) found that intracranial and cerebral volume was 7 to 8 percent smaller in children and adolescents who met criteria for PTSD in comparison to matched control subjects. Intracranial and cerebral volume were negatively correlated with length of maltreatment, indicating a more detrimental impact of repeated and prolonged trauma exposure (DeBellis et al, 1999).

Further exploring the impact of trauma and brain development, DeGregorio & McLean (2013) investigated cognitive deficits in children and adolescents with maltreatment history. Findings indicated problems with executive functioning, signifying challenges in the academic setting with planning, regulating behavior, problem-solving, multitasking, and task-switching (DeGregorio & McLean, 2013). Similarly, Majer and associates (2010) completed a study looking at cognitive function in adult survivors of childhood trauma. They found deficits in working and long-term memory in individuals who endorsed childhood physical abuse, emotional abuse, and/or physical neglect. This was evidenced by higher error rate on measures of pattern recognition and spatial working memory (Majer et al, 2010).

Differences in executive functioning are observed in adolescents who have experienced multiple/chronic childhood maltreatment versus who have experienced a single instance of maltreatment (Mothes et al, 2015). Looking at executive functioning performance in youth with no history of maltreatment, single-type maltreatment, and multiple maltreatment, Mothes and colleagues (2015) found that history of childhood maltreatment significantly impacts adolescent executive functioning. Adolescents who endorsed single instance maltreatment scored lower on
measures of cognitive flexibility and visual processing speed, while those who experienced multiple types of maltreatment demonstrated lower verbal processing speed and initiation scores.

Also explaining neurological impact of chronic trauma, critical periods of brain development are present during early childhood and brain changes during development are impacted by environmental input; the brain is impacted by outside enrichment factors to grow and develop in specific areas and capabilities (Lowenthal, 2000; DeGregorio & McLean, 2013; Wilson, Hansen, & Li, 2011). Lack of sensory input and stimulus during these time periods negatively impacts the structure of the brain, affecting memory, attention, executive functioning, and other important cognitive processes (Lowenthal, 2000; DeGregorio & McLean, 2013).

In addition to structural brain changes, exposure to trauma and chronic stress during childhood is associated with learning and memory impairments, increased risk for anxiety and depression, ADHD symptomology, and externalizing behavior (Lupien, McEwen, Gunnar, & Heim, 2009). For instance, diagnosis of posttraumatic stress disorder (PTSD) is also associated with memory problems, including impairment in declarative memory (e.g. memory for facts), trauma-related memory, and autobiographical memory (Bremner, 1999). Impaired learning and memory in this population has a significant educational impact and is thus a particular public health concern in low income and high crime communities in which children live in conditions of chronic stress associated with neighborhood violence (Bremner, 1999).

In terms of cognitive functioning in the juvenile offender population, Zou et al (2013) demonstrated impaired executive functioning and spatial working memory in juvenile violent offenders with a history of childhood trauma. This finding highlights a need for further research into specific cognitive and symptom profiles of trauma-exposed adolescent offenders.
Psychological Assessment in Juvenile Offenders

Psychological evaluations are one method commonly used to assess adolescent cognitive functioning and psychological concerns. Consisting of a clinical interview, cognitive and achievement assessment, and self-report measures of socioemotional functioning and personality, evaluations serve to capture a holistic picture of individual functioning for the purpose of identifying mental health concerns and determining appropriate treatment recommendations.

The Reynolds Intellectual Assessment System (RIAS) is an intelligence test designed to measure cognitive functioning in individuals ages 3-94 (Reynolds & Kamphaus, 2009). It was normed on 2,439 individuals residing in the United States with sample demographics comparable to age, gender, education, ethnicity, and location characteristics identified in the 2001 U.S. census (Reynolds & Kamphaus, 2009). The RIAS takes approximately 20-25 minutes to complete and does not include measures which require reading skill, visual-motor coordination, or visual-motor speed (Reynolds & Kamphaus, 2009); considering previously described research that indicates inattention and poor academic performance within the juvenile justice population, these unique characteristics of the RIAS in comparison to other intelligence measures makes it a viable choice for use in assessment with juvenile offenders. Research indicates strong statistical properties for the RIAS, with reliability and validity comparable to or stronger than other measures of intellectual functioning; this further identifies it as a strong choice for cognitive evaluation (Reynolds & Kamphaus, 2009). The RIAS is designed to measure four different aspects of intelligence: general intelligence, verbal ability, nonverbal ability, and working memory. It consists of six subtests which make up three composite indices. The composites include the Verbal Intelligence Index (VIX), Nonverbal Intelligence Index (NIX), and
Composite Memory Index (CMX); it also provides an overall score of cognitive functioning (CIX) (Reynolds & Kamphaus, 2009).

The Trauma Symptom Checklist for Children (TSCC) is a self-report measure of posttraumatic distress and related mental health symptomology (Briere, 1996). It is designed to assess trauma-related symptoms in children aged 8-16 who have been exposed to trauma, including child maltreatment, loss, witnessed violence, and natural disasters (Briere, 1996). The instrument consists of Hyperresponse and Underresponse validity scales. It also includes six clinical scales: Anxiety, Depression, Anger, Posttraumatic Stress, Dissociation and Sexual Concerns (Briere, 1996). Due to high rate of trauma in the juvenile offender population, the TSCC is a particularly important evaluative tool to increase understanding of adolescent behavior and symptom presentation and its relation to trauma exposure. Youth are less likely to endorse trauma history within the context of a psychological evaluation than they are within a longer-term, trusting therapeutic relationship. As such, this instrument serves to identify youth with possible trauma history. As behaviors identified as delinquent are often symptoms of trauma, it is important that the different pathways that lead to offending behavior are understood to allow for appropriate treatment (Ford, 2002).

Summary

As the research demonstrates, juvenile offenders are an underserved population with unique mental health and treatment needs. Adolescence represents a critical period in cognitive development, which is negatively impacted by environmental factors such as trauma exposure. Research suggests that cognitive profiles of delinquent youth differ from their non-offending peers. Adolescent offenders also differ in rate of trauma exposure; they are significantly more likely to endorse history of childhood maltreatment and other forms of complex trauma than the
general population. This is of great concern as trauma exposure is associated with a variety of detrimental symptoms, including elevated mental health disorder, areas of cognitive deficit, and learning and memory problems. Based on this review of the literature, this study proposes to identify trauma and cognitive profiles of juvenile offenders in order to increase understanding of factors that are associated with juvenile court involvement and the ways that these factors interact. A complete picture of juvenile offender functioning and related risk factors for re-offending behavior is necessary to improve treatment and service options.
CHAPTER 3
RESEARCH METHODOLOGY

Participants

This study included adolescents referred for psychological evaluation through the Juvenile Counseling and Assessment Program (JCAP) following involvement in the juvenile justice system. JCAP is a program developed at the University of Georgia for the purpose of providing clinical services, research, and training with the juvenile offender population. It serves court-referred youth of diverse racial/ethnic backgrounds and socioeconomic status. According to most recent Department of Juvenile Justice statistics, the primary referring county served 617 youth in 2013. Approximately 61 percent of court-involved youth in this county were male. Demographic data indicates that approximately 73 percent of youth serviced in the county identified as Black, 14 percent as White, and 9 percent as Hispanic. The majority of the adolescents fell in the 13-15 (55 percent) or 16 and up (40 percent) age ranges. The most common charges identified by the juvenile court in this county include property (33 percent) and status offenses (27 percent). These are followed by lower numbers of violent (21 percent), drug (8 percent), and public order offenses (9 percent) (Georgia Department of Juvenile Justice, 2013).

Adolescent included in this study were either on probation or in a detention center at the time of evaluation. Their reason for referral was to determine appropriate treatment and placement recommendations. Three groups of participants were identified for the purpose of this study, as only a subtest of adolescents completed all study measures, including the Trauma
Symptom Checklist for Children (TSCC), the Reynolds Intellectual Assessment Scales (RIAS), and a trauma-informed interview. As such, participants included in the different groups presented with slightly different demographic make-ups.

Group 1, composed of adolescents who completed both the RIAS and a trauma-informed interview, included 108 participants. 70.4% were male (N = 76) and 27.8% were female (N = 30). The mean age of the participants was 15.0 with an age range from 10.1 to 18.1 years old at the time of the evaluation. 63.9% of the adolescents identified as African American/Black (N = 69), 20.4% identified as White (N = 22), 8.3% identified as Hispanic (N = 9), 4.6% identified as Biracial (N = 5), and 0.9% identified as Native American (N = 1). 58.3% of adolescents self-reported history of trauma. Demographic information was not provided for two participants.

Group 2, composed of adolescents who completed both the TSCC and a trauma-informed interview, included 43 participants. 58.1% were male (N = 25) and 37.2% were female (N = 16). The mean age of participants was 15.0 with an age range from 11.0 to 17.4 years old at the time of the evaluation. 65.1% of the adolescents identified as African American/Black (N = 28), 18.6% identified as White (N = 8), 11.6% identified as Hispanic (N = 5), and 2.3% identified as Biracial (N = 1). 74.4% of adolescents self-reported history of trauma. Demographic information was not provided for one of the participants.

Group 3, composed of adolescents who completed both the TSCC and the RIAS, included 37 participants. 62.2% were male (N = 23) and 35.1% were female (N = 13). The mean age of participants was 15.1 with an age range from 11.0 to 17.4 years old at the time of the evaluation. 62.2% of the adolescents identified as African American/Black (N = 23), 18.9% identified as White (N = 7), 13.5% identified as Hispanic (N = 5), and 5.4% identified as Biracial
(N = 2). 70.3% of adolescents self-reported history of trauma. Demographic information was not provided for one of the participants.

**Procedure**

This study used archival data of psychological evaluations obtained as part of the Juvenile Counseling and Assessment Program (JCAP). The psychological evaluations were conducted by doctoral students at the University of Georgia; all students were trained in test administration and supervised by licensed psychologists. 108 psychological evaluations were included in the study. Evaluations were chosen for inclusion based on completion of the Reynolds Intellectual Assessment Scales (RIAS) and assessment of trauma history during clinical interview.

Psychological evaluations included a thorough clinical interview, review of juvenile court records, and assessment of cognitive ability (RIAS), academic achievement, and personality. A subset of 43 participants were also administered the Trauma Symptom Checklist for Children (TSCC). Following completion of evaluation, trauma history was coded based on number and type of traumatic experiences endorsed. Trauma categories included in the study were as follows: physical abuse/assault, sexual abuse/rape, neglect, witnessed domestic violence, and grief/loss.

**Research Instruments**

The Reynolds Intellectual Assessment Scales (RIAS) is an intelligence test designed to measure cognitive functioning in individuals aged 3-94 (Reynolds & Kamphaus, 2009). It was normed on 2,439 individuals residing in the United States with sample demographics comparable to age, gender, education, ethnicity, and location characteristics identified in the 2001 U.S. census (Reynolds & Kamphaus, 2009). The RIAS takes approximately 20-25 minutes to complete and does not include measures which require reading skill, visual-motor coordination,
or visual-motor speed (Reynolds & Kamphaus, 2009). Research indicates strong statistical properties for the RIAS, with reliability and validity comparable to or stronger than other measures of intellectual functioning. (Reynolds & Kamphaus, 2009). The RIAS is designed to measure four different aspects of intelligence: general intelligence, verbal ability, nonverbal ability, and working memory. The composites include the Verbal Intelligence Index (VIX), Nonverbal Intelligence Index (NIX), and Composite Memory Index (CMX); it also provides an overall score of cognitive functioning (CIX) (Reynolds & Kamphaus, 2009). Composite scale descriptions are listed below (Reynolds & Kamphaus, 2009):

*Verbal Intelligence Index (VIX):* verbal reasoning and verbally acquired knowledge

*Nonverbal Intelligence Index (NIX):* nonverbal reasoning and spatial ability

*Composite Memory Index (CMX):* ability to encode, briefly store, and then recall verbal and nonverbal information

*Composite Intelligence Index (CIX):* composite score of general intelligence as measured by verbal ability and nonverbal ability

The Trauma Symptom Checklist for Children (TSCC) is a self-report measure of posttraumatic distress and related mental health symptomology (Briere, 1996). It is designed to assess trauma-related symptoms in children aged 8-16 who have been exposed to trauma, including child maltreatment, loss, witnessed violence, and natural disasters (Briere, 1996). The instrument consists of Hyperresponse and Underresponse validity scales. It also includes six clinical scales: Anxiety, Depression, Anger, Posttraumatic Stress, Dissociation and Sexual Concerns (Briere, 1996). Clinical Scale descriptions are listed below (Briere, 1996):

- *Anxiety (ANX):* generalized worry, specific fears, hyperarousal, sense of impending doom
• **Depression (DEP):** feelings of sadness and loneliness, crying, feelings of guilt, suicidal ideation, engagement in self-injurious behavior

• **Anger (ANG):** endorsement of angry thoughts and feelings, expression of anger through behavior, difficulty calming down when angry, desire to yell at or hurt people, dislike of other people, fighting

• **Posttraumatic Stress (PTS):** intrusive thoughts, sensations, and memories of painful past events, avoidance of painful thoughts and feelings, nightmares

• **Dissociation (DIS):** emotional numbing, derealization, pretending to be someone else or somewhere else, memory problems, daydreaming, mind going blank

• **Sexual Concern (SC):** atypical sexual thoughts and feelings including those that occur with greater than normal frequency or at an earlier age than typical, negative responses to sexual stimuli, fear of sexual exploitation

**Statistical Analysis**

**Research Question 1:** Is there a significant relationship between self-reported trauma history, including type of trauma endorsed, and scores on the TSCC in juvenile offenders?

A two-tailed bivariate correlation was performed in order to determine whether there is a significant relationship between self-reported trauma history and endorsement of trauma symptomology on the TSCC in the juvenile offender population. A bivariate correlation was used as this study is exploratory, with the intent of gathering more information about the use of the TSCC in the juvenile offender population and the relation between trauma symptomology as measured by the TSCC and self-identified trauma history.

**Research Question 2:** Is there a significant relationship between self-reported trauma history and RIAS scores in juvenile offenders?
A two-tailed bivariate correlation was performed in order to determine if there is a significant relationship between self-reported history of trauma and scores on the RIAS indices. A correlation was performed as limited research is available on the relationship between trauma and cognitive functioning specifically within the juvenile offender population, with no published studies found investigating the relationship between RIAS scores and self-report of trauma. As such, this study sought to gather initial exploratory information about relation between RIAS performance and self-identified trauma exposure in adolescent offenders.

**Research Question 3:** Does cognitive functioning as measured by the RIAS predict endorsement of trauma exposure juvenile offenders?

Based on significant relationships identified in the correlation matrix (Question 2) further analysis was conducted in order to determine directionality. Specifically, a binary logistic regression was conducted to further examine correlations between RIAS scores and endorsement of trauma experience in order to determine if RIAS performance significantly predicted type of trauma history disclosed. In addition, binary logistic regression analyses were performed in order to determine if performance on the RIAS significantly predicted self-reported history of trauma and self-reported history of multiple trauma experiences. Binary logistic regression was chosen as it is used for prediction about relationships between dichotomous dependent variables and at least one predictor variable (Peng, Lee, & Ingersoll, 2002).

**Research Question 4:** Is there a significant relationship between TSCC scores and RIAS scores in juvenile offenders?

A two-tailed bivariate correlation was performed in order to determine if there is a significant relationship between scores on the TSCC and scores on the RIAS indices in juvenile offenders. No published studies were found investigating the relation between these two
instruments; as such, bivariate correlation was chosen for the purpose of providing initial exploratory data about the relationship between TSCC and RIAS profiles.

**Research Question 5:** Do TSCC subscale scores predict cognitive functioning in juvenile offenders as measured by the RIAS?

Based on the significant relationships found in the correlation matrix (Question 4), further analysis was conducted to test predictive hypotheses. Linear regression analyses were conducted to examine whether scores on the TSCC scales significantly predicted performance on each of the RIAS indices. Linear regression is a common form of predictive analysis between a dependent variable and one or more independent variables. The backward linear regression method was used in order to fully investigate all possible predictor variables and limit risk of making a Type II error (Field, 2009).

**Research Question 6:** Are there gender differences in endorsement of trauma history, TSCC scores, and/or performance on the RIAS in the juvenile offender population?

For the purpose of determining gender differences in endorsement of trauma history, a chi-square test was performed. To investigate whether there were significant differences between male and female adolescents in TSCC profile, a single sample t-test was performed. A single sample t-test was also used to determine gender differences in performance on the RIAS.
CHAPTER 4

RESULTS

Descriptive Statistics

Table 1 shows the mean number of youth who endorsed each category of trauma experience. The means and standard deviations of scores on the TSCC youth based on self-reported trauma history is reported on Table 2. Table 3 reveals the means and standard deviations of RIAS scores in this sample for youth who self-reported history of trauma versus those that reported no history of trauma.

Table 1. Description of Trauma Experiences Endorsed by Adolescents

<table>
<thead>
<tr>
<th>Experience</th>
<th>N</th>
<th>Mean</th>
<th>Std. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experienced physical abuse or assault</td>
<td>108</td>
<td>.3519</td>
<td>.479</td>
</tr>
<tr>
<td>Experienced rape/sexual assault/sexual abuse</td>
<td>108</td>
<td>.1574</td>
<td>.366</td>
</tr>
<tr>
<td>Experienced neglect</td>
<td>108</td>
<td>.1111</td>
<td>.316</td>
</tr>
<tr>
<td>Witnessed domestic violence</td>
<td>108</td>
<td>.1296</td>
<td>.337</td>
</tr>
<tr>
<td>Experienced grief/loss event</td>
<td>108</td>
<td>.1944</td>
<td>.398</td>
</tr>
<tr>
<td>Experienced multiple trauma</td>
<td>108</td>
<td>.2685</td>
<td>.445</td>
</tr>
<tr>
<td>Reported trauma history</td>
<td>108</td>
<td>.5833</td>
<td>.495</td>
</tr>
</tbody>
</table>

Table 2. Mean TSCC Scores for Adolescents Who Reported Trauma or No Trauma History

<table>
<thead>
<tr>
<th>TSCC</th>
<th>Reported trauma history</th>
<th>No</th>
<th>Yes</th>
<th>Overall</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>N</td>
<td>Mean Std. Deviation</td>
<td>Mean Std. Deviation</td>
</tr>
<tr>
<td>UND</td>
<td></td>
<td>52.64</td>
<td>13.902</td>
<td>50.78</td>
</tr>
<tr>
<td>HYP</td>
<td></td>
<td>46.73</td>
<td>.467</td>
<td>53.78</td>
</tr>
<tr>
<td>ANX</td>
<td></td>
<td>47.00</td>
<td>9.317</td>
<td>48.16</td>
</tr>
<tr>
<td>DEP</td>
<td></td>
<td>50.73</td>
<td>14.684</td>
<td>49.16</td>
</tr>
<tr>
<td>ANG</td>
<td></td>
<td>50.73</td>
<td>9.829</td>
<td>51.47</td>
</tr>
<tr>
<td>TSCC PTS</td>
<td>48.36</td>
<td>10.356</td>
<td>49.97</td>
<td>10.660</td>
</tr>
<tr>
<td>----------</td>
<td>-------</td>
<td>--------</td>
<td>-------</td>
<td>--------</td>
</tr>
<tr>
<td>TSCC DIS</td>
<td>51.27</td>
<td>11.967</td>
<td>49.78</td>
<td>10.254</td>
</tr>
<tr>
<td>TSCC SC</td>
<td>51.91</td>
<td>9.853</td>
<td>54.43</td>
<td>16.921</td>
</tr>
<tr>
<td>TSCC DISO</td>
<td>53.45</td>
<td>13.677</td>
<td>50.19</td>
<td>11.541</td>
</tr>
<tr>
<td>TSCC DISF</td>
<td>46.73</td>
<td>6.246</td>
<td>48.03</td>
<td>8.723</td>
</tr>
<tr>
<td>TSCC SCP</td>
<td>50.64</td>
<td>9.405</td>
<td>53.43</td>
<td>16.410</td>
</tr>
<tr>
<td>TSCC SCD</td>
<td>51.27</td>
<td>12.571</td>
<td>55.83</td>
<td>17.842</td>
</tr>
</tbody>
</table>

Table 3.  
Mean RIAS Scores for Adolescents Who Reported Trauma or No Trauma History

<table>
<thead>
<tr>
<th></th>
<th>Reported trauma history</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Reported trauma history</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Reported trauma history</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>Mean</th>
<th>Std. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>RIAS VIX</td>
<td>81.67</td>
<td>13.766</td>
<td>85.57</td>
<td>11.902</td>
</tr>
<tr>
<td>RIAS NIX</td>
<td>93.65</td>
<td>12.324</td>
<td>94.52</td>
<td>11.698</td>
</tr>
<tr>
<td>RIAS CIX</td>
<td>85.87</td>
<td>12.616</td>
<td>88.59</td>
<td>10.945</td>
</tr>
<tr>
<td>RIAS CMX</td>
<td>88.20</td>
<td>14.830</td>
<td>90.19</td>
<td>14.545</td>
</tr>
</tbody>
</table>

Research Questions

Research Question 1:

Is there a significant relationship between self-report trauma history, including type of trauma endorsed, and scores on the TSCC in juvenile offenders?

A two-tailed Bivariate Correlation (N = 43) was conducted to examine the relationship between the dependent variable (self-reported history of trauma) and scores on the RIAS. The results indicated that there is no significant relationship between self-reported history of trauma and TSCC scale scores. The findings are reported on Table 4. In addition, Figures 1 and 2 present graphical depictions of TSCC profiles for trauma endorsement of adolescent offenders.
Table 4.
Correlations Between Self-Reported History of Trauma and TSCC Scores

<table>
<thead>
<tr>
<th>Reported trauma history</th>
<th>Physical abuse or assault</th>
<th>Rape or sexual abuse</th>
<th>Neglect</th>
<th>Witnessed domestic violence</th>
<th>Grief/Loss</th>
<th>Multiple types of trauma</th>
</tr>
</thead>
<tbody>
<tr>
<td>Underresponse</td>
<td>-.074</td>
<td>-.201</td>
<td>.099</td>
<td>-.017</td>
<td>-.058</td>
<td>-.048</td>
</tr>
<tr>
<td>Hyperresponse</td>
<td>.231</td>
<td>.068</td>
<td>-.018</td>
<td>.151</td>
<td>-.077</td>
<td>.013</td>
</tr>
<tr>
<td>Anxiety</td>
<td>.054</td>
<td>.104</td>
<td>-.094</td>
<td>.111</td>
<td>-.086</td>
<td>-.071</td>
</tr>
<tr>
<td>Depression</td>
<td>-.070</td>
<td>.054</td>
<td>-.122</td>
<td>-.029</td>
<td>-.043</td>
<td>.009</td>
</tr>
<tr>
<td>Anger</td>
<td>.038</td>
<td>.105</td>
<td>.030</td>
<td>-.051</td>
<td>-.103</td>
<td>.212</td>
</tr>
<tr>
<td>Posttraumatic Stress</td>
<td>.068</td>
<td>.140</td>
<td>.092</td>
<td>.016</td>
<td>.018</td>
<td>-.119</td>
</tr>
<tr>
<td>Dissociation</td>
<td>-.062</td>
<td>.011</td>
<td>-.025</td>
<td>-.003</td>
<td>-.124</td>
<td>-.102</td>
</tr>
<tr>
<td>Overt Dissociation</td>
<td>-.120</td>
<td>-.057</td>
<td>-.123</td>
<td>.095</td>
<td>-.228</td>
<td>-.146</td>
</tr>
<tr>
<td>Fantasy</td>
<td>.071</td>
<td>.205</td>
<td>.166</td>
<td>-.216</td>
<td>.014</td>
<td>.088</td>
</tr>
<tr>
<td>Sexual Concerns</td>
<td>.074</td>
<td>-.037</td>
<td>-.096</td>
<td>-.116</td>
<td>.122</td>
<td>.061</td>
</tr>
<tr>
<td>Sexual Preoccupation</td>
<td>.085</td>
<td>-.084</td>
<td>-.141</td>
<td>-.126</td>
<td>.133</td>
<td>.055</td>
</tr>
<tr>
<td>Sexual Distress</td>
<td>.123</td>
<td>.216</td>
<td>.110</td>
<td>-.113</td>
<td>.111</td>
<td>.105</td>
</tr>
</tbody>
</table>

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

*Correlation is significant at the 0.05 level (2-tailed)

Figure 1. TSCC profile for juvenile offenders who endorsed trauma or no trauma history
Figure 2. TSCC profile for juvenile offenders based on type of trauma endorsed

Research Question 2:

Is there a significant relationship between self-reported trauma history and RIAS scores in juvenile offenders?

A two-tailed Bivariate Correlation (N = 108) was conducted to examine the relationship between the dependent variable (self-reported history of trauma) and composite scores on the RIAS. The results indicated that there is no significant relationship between self-report of trauma and scores on the RIAS. The findings are reported on Table 5.

Table 5.

Correlations Between Self-Reported History of Trauma and RIAS Scores

<table>
<thead>
<tr>
<th></th>
<th>VIX</th>
<th>NIX</th>
<th>CIX</th>
<th>CMX</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reported trauma history</td>
<td>.151</td>
<td>.036</td>
<td>.115</td>
<td>.067</td>
</tr>
</tbody>
</table>

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

*Correlation is significant at the 0.05 level (2-tailed)*
In addition, a two-tailed Bivariate Correlation (N = 108) was conducted to examine any significant relationships between type of trauma reported and composite scores on the RIAS. The correlation matrix revealed a significant correlation between experience of sexual abuse or rape and performance on the RIAS Nonverbal Intelligence Index (NIX) \( (r = -0.212, p = 0.027) \) and Composite Memory Index (CMX) \( (r = -0.217, p = 0.024) \). No significant relations were found between composite scores on the RIAS and self-report of physical abuse/assault, neglect, witnessed domestic violence, experience of grief/loss, or history of multiple types of trauma. The findings are reported on Table 6. In addition, Figures 3 and 4 present graphical depictions of RIAS profiles for trauma endorsement of adolescent offenders.

Table 6.

<table>
<thead>
<tr>
<th>Self-Report of Trauma</th>
<th>VIX</th>
<th>NIX</th>
<th>CIX</th>
<th>CMX</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experienced physical abuse/assault</td>
<td>.145</td>
<td>.031</td>
<td>.121</td>
<td>.027</td>
</tr>
<tr>
<td>Experienced rape or sexual abuse</td>
<td>-.098</td>
<td>-.212*</td>
<td>-.183</td>
<td>-.217*</td>
</tr>
<tr>
<td>Experienced neglect</td>
<td>.177</td>
<td>.119</td>
<td>.171</td>
<td>.062</td>
</tr>
<tr>
<td>Witnessed domestic violence</td>
<td>.041</td>
<td>-.134</td>
<td>-.051</td>
<td>.085</td>
</tr>
<tr>
<td>Experienced grief/loss</td>
<td>-.084</td>
<td>-.103</td>
<td>-.100</td>
<td>.012</td>
</tr>
<tr>
<td>Experienced multiple traumas</td>
<td>.057</td>
<td>-.123</td>
<td>-.025</td>
<td>-.101</td>
</tr>
</tbody>
</table>

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

*Correlation is significant at the 0.05 level (2-tailed)*
Figure 3. RIAS profiles for juvenile offenders who reported trauma or no trauma history

Figure 4. RIAS profiles for juvenile offenders based on type of trauma endorsed
Research Question 3:

Does cognitive functioning as measured by the RIAS predict endorsement of trauma exposure juvenile offenders?

Binary logistic regression analyses were conducted in order to determine if performance on the RIAS significantly predicted self-reported history of trauma and/or self-report of multiple types of trauma exposure. The results indicated that performance on the RIAS composite scales did not significantly predict either self-report of trauma experience or endorsement of multiple types of trauma exposure. The findings are reported on Table 7.

Table 7.
Summary of Binary Logistic Regression Analyses for RIAS Scores Predicting Trauma Endorsement

<table>
<thead>
<tr>
<th>Predictors</th>
<th>B</th>
<th>SE</th>
<th>e^B</th>
<th>B</th>
<th>SE</th>
<th>e^B</th>
</tr>
</thead>
<tbody>
<tr>
<td>VIX</td>
<td>0.030</td>
<td>0.020</td>
<td>1.031</td>
<td>0.041</td>
<td>0.023</td>
<td>1.042</td>
</tr>
<tr>
<td>NIX</td>
<td>-0.011</td>
<td>0.019</td>
<td>0.989</td>
<td>-0.037</td>
<td>0.022</td>
<td>0.964</td>
</tr>
<tr>
<td>CMX</td>
<td>0.000</td>
<td>0.015</td>
<td>1.000</td>
<td>-0.023</td>
<td>0.017</td>
<td>0.977</td>
</tr>
</tbody>
</table>

p=.05*, p=.01**

In addition, a binary logistic regression analysis was conducted to further examine the correlation between self-reported history of sexual abuse or rape and performance on the RIAS measure of cognitive functioning. The logistic regression analysis was performed to determine if score on the RIAS Nonverbal Intelligence Index (NIX) and/or Composite Memory Index (CMX) significantly predicted self-reported history of sexual abuse or rape. The results indicated that the combination of NIX and CMX scores was not a significant predictor of sexual abuse/rape endorsement. However, score on the Composite Memory Index (CMX) was independently a significant predictor of endorsement of sexual abuse or rape (χ^2 (1, N = 108) = 4.938, p = .026).
The odds ratio was .961, indicating that every one point increase in CMX score decreased the likelihood that an adolescent would endorse history of sexual abuse by rape by 4%. Moreover, CMX score predicted 84.3% of the participants correctly. The Nagelkerke $R^2$ indicated that 7.7% of the variance in endorsement of sexual abuse was predicted by performance on the CMX. The findings are reported on Table 8.

**Table 8.**
*Summary of Binary Logistic Regression Analysis for RIAS Scores Predicting Endorsement of Sexual Abuse/Rape*

<table>
<thead>
<tr>
<th>Variable</th>
<th>$B$</th>
<th>$SE B$</th>
<th>$e^B$</th>
<th>$\chi^2$</th>
<th>$p$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Step 1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NIX</td>
<td>-.0398</td>
<td>.3283</td>
<td>1.219</td>
<td>.965</td>
<td>.002</td>
</tr>
<tr>
<td>CMX</td>
<td>-.032</td>
<td>.019</td>
<td>.969</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Step 2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CMX</td>
<td>-.040</td>
<td>.018</td>
<td>.961</td>
<td>4.939*</td>
<td>.01**</td>
</tr>
</tbody>
</table>

$p=.05^*, p=.01^{**}$

**Research Question 4:**
Is there a significant relationship between TSCC scores and RIAS scores in juvenile offenders?

A two-tailed Bivariate Correlation (N =37) was conducted to examine any significant relationship between scores on the TSCC scales and composite scores on the RIAS. The correlation matrix revealed a significant correlation between performance on the RIAS Verbal Intelligence Index (VIX) and scores on the following TSCC scales: Depression ($r = .327, p = .048$), Overt Dissociation ($r = .333, p = .044$), and Sexual Preoccupation ($r = .334, p = .046$). A significant relationship was also found between performance on the RIAS Nonverbal Intelligence Index and the following TSCC scales: Underresponse ($r = -.369, p = .025$), Anxiety ($r = .420, p = .010$), Depression ($r = .411, p = .012$), Anger ($r = .371, p = .024$), and Posttraumatic Stress ($r = .402, p = .014$). In addition, a significant relationship was found between performance on the RIAS Composite Memory Index (CMX) and score on the
Hyperresponse TSCC scale ($r = -0.350, p = 0.034$). Finally, a significant correlation was identified between score on the RIAS Composite Intelligence Index (CIX) and scores on the Underresponse ($r = -0.336, p = 0.042$), Anxiety ($r = 0.401, p = 0.014$), Depression ($r = 0.424, p = 0.009$), Anger ($r = 0.328, p = 0.047$), Posttraumatic Stress ($r = 0.367, p = 0.025$), Dissociation ($r = 0.358, p = 0.029$), and Overt Dissociation ($r = 0.377, p = 0.021$) TSCC scales. The findings are reported on Table 9.

**Table 9.**

*Correlations Between TSCC and RIAS Scores*

<table>
<thead>
<tr>
<th>TSCC Scores</th>
<th>VIX</th>
<th>NIX</th>
<th>CIX</th>
<th>CMX</th>
</tr>
</thead>
<tbody>
<tr>
<td>Underresponse (UND)</td>
<td>-.199</td>
<td>-.369*</td>
<td>-.336*</td>
<td>-.323</td>
</tr>
<tr>
<td>Hyperresponse (HYP)</td>
<td>.137</td>
<td>.165</td>
<td>.214</td>
<td>-.350*</td>
</tr>
<tr>
<td>Anxiety (ANX)</td>
<td>.252</td>
<td>.420**</td>
<td>.401**</td>
<td>-.148</td>
</tr>
<tr>
<td>Depression (DEP)</td>
<td>.327*</td>
<td>.411**</td>
<td>.424**</td>
<td>.069</td>
</tr>
<tr>
<td>Anger (ANG)</td>
<td>.188</td>
<td>.371*</td>
<td>.328*</td>
<td>-.082</td>
</tr>
<tr>
<td>Posttraumatic Stress (PTS)</td>
<td>.231</td>
<td>.402**</td>
<td>.367*</td>
<td>-.155</td>
</tr>
<tr>
<td>Dissociation (DIS)</td>
<td>.298</td>
<td>.291</td>
<td>.358*</td>
<td>-.105</td>
</tr>
<tr>
<td>Overt Dissociation (DIS-O)</td>
<td>.333*</td>
<td>.307</td>
<td>.377*</td>
<td>-.148</td>
</tr>
<tr>
<td>Fantasy (DIS-F)</td>
<td>.063</td>
<td>.312</td>
<td>.257</td>
<td>.063</td>
</tr>
<tr>
<td>Sexual Concerns (SC)</td>
<td>.303</td>
<td>.114</td>
<td>.251</td>
<td>.092</td>
</tr>
<tr>
<td>Sexual Preoccupation (SC-P)</td>
<td>.334*</td>
<td>.118</td>
<td>.268</td>
<td>.110</td>
</tr>
<tr>
<td>Sexual Distress (SC-D)</td>
<td>.184</td>
<td>.080</td>
<td>.169</td>
<td>.034</td>
</tr>
</tbody>
</table>

**Correlation is significant at the 0.05 level (2-tailed)**

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

Research Question 5:

Do TSCC subscale scores predict cognitive functioning in juvenile offenders as measured by the RIAS?

Linear regression analyses were conducted in order to further examine the correlations identified between TSCC subscale scores and cognitive functioning as measured by the RIAS.
Specifically, a backward linear regression analysis was conducted to determine if scores on the Depression, Overt Dissociation, and Sexual Preoccupation scales on the TSCC significantly predicted performance on the RIAS Verbal Intelligence Index (VIX). The results of the linear regression indicated that Model 1, consisting of Depression, Overt Dissociation, and Sexual Preoccupation TSCC scales, did not significantly predict VIX performance. In addition, Model 2, consisting of the Overt Dissociation and Sexual Preoccupation TSCC scales, did not significantly predict VIX performance. However, the results indicated that Model 3, consisting of only the Overt Dissociation TSCC scale, significantly predicted VIX score. Elevated score on the Overt Dissociation scale individually predicted higher score on the VIX \(R^2 = .11, F(1, 35) = 4.29, p = .046\). This indicates that adolescent offenders who scored higher on the Overt Dissociation scale of the TSCC performed better on the RIAS Verbal Intelligence Index. Approximately 11\% of the variance in VIX scores among adolescent offenders is accounted for by score on the Overt Dissociation scale. Neither Depression nor Sexual Preoccupation were revealed to be significant predictors of score on the Verbal Intelligence Index. The findings are reported on Table 10.

**Table 10.**
Summary of Simple Regression Analysis for TSCC Scales Predicting Performance on the RIAS Verbal Intelligence Index

<table>
<thead>
<tr>
<th>Predictors</th>
<th>(B)</th>
<th>(SE) (B)</th>
<th>(\beta)</th>
<th>(R^2)</th>
<th>Adjusted (R^2)</th>
<th>(F)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model 1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Depression</td>
<td>.185</td>
<td>.261</td>
<td>.148</td>
<td>.176</td>
<td>.099</td>
<td>2.278</td>
</tr>
<tr>
<td>Overt Dissociation</td>
<td>.167</td>
<td>.217</td>
<td>.161</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sexual Preoccupation</td>
<td>.185</td>
<td>.147</td>
<td>.221</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Model 2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overt Dissociation</td>
<td>.254</td>
<td>.178</td>
<td>.244</td>
<td>.163</td>
<td>.112</td>
<td>3.214</td>
</tr>
<tr>
<td>Sexual Preoccupation</td>
<td>.204</td>
<td>.144</td>
<td>.244</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Model 3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overt Dissociation</td>
<td>.348</td>
<td>.168</td>
<td>.335</td>
<td>.112</td>
<td>.086</td>
<td>4.285*</td>
</tr>
</tbody>
</table>

\(p=.05^*, p=.01^{**}\)
Another backward linear regression analysis was conducted to determine if scores on the Underresponse, Anxiety, Depression, Anger, and Posttraumatic Stress scales on the TSCC significantly predicted performance on the RIAS Nonverbal Intelligence Index (NIX). The results of the linear regression indicated that Model 1, consisting of the combination of Underresponse, Anxiety, Depression, Anger, and Posttraumatic Stress TSCC scales, did not significantly predict NIX performance. However, Model 2 (Underresponse, Anxiety, Depression, and Posttraumatic Stress), Model 3 (Underresponse, Depression, and Posttraumatic Stress), Model 4 (Underresponse and Depression), and Model 5 (Depression) all significantly predicted performance on the RIAS NIX. Overall, the backwards linear regression found that the model including just the Depression TSCC scale best predicted NIX score. The results indicated that elevated scores on the Depression scale significantly predicted higher score on the NIX \( R^2 = .169, F(1, 36) = 7.114, p = .012 \). This indicates that adolescents who endorsed elevated symptoms of depression on the TSCC scored higher on the RIAS Nonverbal Intelligence Index. Approximately 17% of the variance in NIX scores among adolescent offenders is accounted for by score on the Depression scale. The findings are reported on Table 11.

**Table 11.**
Summary of Simple Regression Analysis for TSCC Scales Predicting Performance on the RIAS Nonverbal Intelligence Index

<table>
<thead>
<tr>
<th>Predictors</th>
<th>B</th>
<th>SE B</th>
<th>β</th>
<th>( R^2 )</th>
<th>Adjusted ( R^2 )</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Model 1</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Underresponse</td>
<td>-.246</td>
<td>.265</td>
<td>-.198</td>
<td>.239</td>
<td>.116</td>
<td>1.946</td>
</tr>
<tr>
<td>Anxiety</td>
<td>.089</td>
<td>.373</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Depression</td>
<td>.231</td>
<td>.251</td>
<td>.202</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Anger</td>
<td>-.013</td>
<td>.341</td>
<td>-.010</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Posttraumatic Stress</td>
<td>.152</td>
<td>.342</td>
<td></td>
<td>.138</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Model 2</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Underresponse</td>
<td>-.242</td>
<td>.238</td>
<td>-.195</td>
<td>.239</td>
<td>.144</td>
<td>2.510*</td>
</tr>
<tr>
<td>Anxiety</td>
<td>.089</td>
<td>.367</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Depression</td>
<td>.229</td>
<td>.241</td>
<td>.200</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Posttraumatic Stress</td>
<td>.200</td>
<td>.315</td>
<td></td>
<td>.134</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
A linear regression analysis was also conducted to determine if score on the Hyperresponse scale on the TSCC significantly predicted performance on the RIAS Composite Memory Index (CMX). The results of the linear regression indicated that lower score on the Hyperresponse scale significantly predicted higher score on the CMX \( R^2 = .122, F(1, 37) = 4.879, p = .034 \). This indicates that adolescents who scored lower on the Hyperresponse scale performed better on the RIAS Composite Memory Index. Approximately 12% of the variance in CMX scores among adolescent offenders is accounted for by score on the Hyperresponse scale. The findings are reported on Table 12.

Table 12.
Summary of Simple Regression Analysis for TSCC Scales Predicting Performance on the RIAS Composite Memory Index

<table>
<thead>
<tr>
<th>Predictor</th>
<th>B</th>
<th>SE B</th>
<th>β</th>
<th>R²</th>
<th>Adjusted R²</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hyperresponse</td>
<td>-.321</td>
<td>.145</td>
<td>-.350</td>
<td>.122</td>
<td>.097</td>
<td>4.879*</td>
</tr>
</tbody>
</table>

\( p=.05*, p=.01** \)

Finally, a backward linear regression analysis was conducted to determine if scores on the Underresponse, Anxiety, Depression, Anger, Posttraumatic Stress, Dissociation, and Overt Dissociation scales on the TSCC significantly predicted performance on the RIAS Composite Intelligence Index. The results of the backward linear regression indicated that Model 1, consisting of the combination of Underresponse, Anxiety, Depression, Anger, Posttraumatic...
Stress, Dissociation, and Overt Dissociation scales, did not significantly predict CIX performance. Model 2 (Underresponse, Depression, Anger, Posttraumatic Stress, Dissociation, and Overt Dissociation), Model 3 (Underresponse, Depression, Posttraumatic Stress, Dissociation, and Overt Dissociation), and Model 4 (Underresponse, Depression, Posttraumatic Stress, Dissociation, and Overt Dissociation) were also not significant predictors of CIX performance. However, Model 5 (Underresponse, Depression, and Overt Dissociation), Model 6 (Underresponse and Depression), and Model 7 (Depression) were all significant predictors of score on the RIAS CIX. Overall, the linear regression found that the model including just the Depression TSCC scale best predicted CIX score. The results indicated that elevated scores on the Depression scale significantly predicted higher score on the CIX \( R^2 = .180, F(1, 36) = 7.672, \ p = .009 \). This indicates that adolescents who endorsed elevated symptoms of depression scored higher on the RIAS Composite Intelligence Index. Approximately 18% of the variance in CIX scores among adolescent offenders is accounted for by score on the Depression scale. The findings are reported on Table 13.

Table 13.
Summary of Simple Regression Analysis for TSCC Scales Predicting Performance on the RIAS Composite Intelligence Index

<table>
<thead>
<tr>
<th>Predictors</th>
<th>( B )</th>
<th>( SE \ B )</th>
<th>( \beta )</th>
<th>( R^2 )</th>
<th>Adjusted ( R^2 )</th>
<th>( F )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model 1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Underresponse</td>
<td>-.280</td>
<td>.277</td>
<td>-.228</td>
<td>.253</td>
<td>.073</td>
<td>1.404</td>
</tr>
<tr>
<td>Anxiety</td>
<td>.034</td>
<td>.428</td>
<td>.028</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Depression</td>
<td>.306</td>
<td>.257</td>
<td>.271</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Anger</td>
<td>-.092</td>
<td>.360</td>
<td>-.068</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Posttraumatic Stress</td>
<td>.184</td>
<td>.365</td>
<td>.169</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dissociation</td>
<td>-.758</td>
<td>.787</td>
<td>-.713</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overt Dissociation</td>
<td>.658</td>
<td>.637</td>
<td>.704</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Model 2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Underresponse</td>
<td>-.289</td>
<td>.245</td>
<td>-.236</td>
<td>.253</td>
<td>.103</td>
<td>1.692</td>
</tr>
<tr>
<td>Depression</td>
<td>.307</td>
<td>.253</td>
<td>.278</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Anger</td>
<td>-.096</td>
<td>.350</td>
<td>-.072</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Posttraumatic Stress</td>
<td>.200</td>
<td>.297</td>
<td>.184</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Dissociation - .762 .773 -.717  
Overt Dissociation .671 .606 .718

Model 3

Underresponse - .264 .222 -.215 .251 .130 2.078
Depression .296 .246 .263
Posttraumatic Stress .179 .283 .164
Dissociation -.780 .758 -.734
Overt Dissociation .669 .579 .716

Model 4

Underresponse - .260 .220 -.212 .241 .147 2.545
Depression .347 .230 .308
Dissociation -.595 .693 -.560
Overt Dissociation .595 .579 .636

Model 5

Underresponse - .209 .211 -.171 .224 .153 3.173*
Depression .308 .224 .274
Overt Dissociation .125 .189 .133

Model 6

Underresponse - .245 .203 -.200 .214 .167 4.620*
Depression .389 .186 .345

Model 7

Depression .478 .172 .424 .180 .156 7.672**

p = .05*, p = .01**

Research Question 6:

Are there gender differences in endorsement of trauma history, TSCC scores, and/or performance on the RIAS in the juvenile offender population?

A chi-square test was used to determine significant differences between males and females on endorsement of trauma history. The results revealed a significant relationship between gender and self-report of trauma history [χ² (1, N = 159) = 7.951, p = .005]. Female juvenile offenders were significantly more likely than male juvenile offenders to endorse history of trauma. The findings are reported on Table 14.
Table 14.

Summary of Chi Square Tests for Endorsement of Trauma History by Gender

<table>
<thead>
<tr>
<th>Gender</th>
<th>Reported Trauma History</th>
<th>( \chi^2 )</th>
<th>n</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>65</td>
<td>55</td>
<td>7.951**</td>
</tr>
<tr>
<td>Female</td>
<td>11</td>
<td>28</td>
<td></td>
</tr>
</tbody>
</table>

\( p=.05^*, p=.01^{**} \)

A single sample t-test was conducted to determine if there was a significant difference between male and female adolescent offenders in TSCC score profile and performance on the RIAS. No significant gender differences were found on any of the TSCC scales or RIAS indices. The findings are reported on Table 15.

Table 15.

Summary of Independent-Sample T-Test for Scores on the TSCC and RIAS Based on Gender of Adolescent offender

<table>
<thead>
<tr>
<th>Gender</th>
<th>N</th>
<th>M</th>
<th>SD</th>
<th>Mean Difference</th>
<th>Standard error of difference</th>
<th>t</th>
<th>df</th>
</tr>
</thead>
<tbody>
<tr>
<td>TSCC UND</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>female</td>
<td>17</td>
<td>52.18</td>
<td>14.888</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TSCC HYP</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>male</td>
<td>28</td>
<td>51.32</td>
<td>13.714</td>
<td>-1.149</td>
<td>4.035</td>
<td>- .285</td>
<td>35.875</td>
</tr>
<tr>
<td>female</td>
<td>17</td>
<td>52.47</td>
<td>12.753</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TSCC ANX</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>male</td>
<td>28</td>
<td>47.39</td>
<td>9.612</td>
<td>-.254</td>
<td>2.860</td>
<td>-.089</td>
<td>35.365</td>
</tr>
<tr>
<td>female</td>
<td>17</td>
<td>47.65</td>
<td>9.110</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TSCC DEP</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>male</td>
<td>28</td>
<td>49.79</td>
<td>10.301</td>
<td>1.727</td>
<td>2.984</td>
<td>.579</td>
<td>36.591</td>
</tr>
<tr>
<td>female</td>
<td>17</td>
<td>48.06</td>
<td>9.324</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TSCC ANG</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>male</td>
<td>28</td>
<td>50.36</td>
<td>8.301</td>
<td>-1.408</td>
<td>2.750</td>
<td>-.512</td>
<td>30.904</td>
</tr>
<tr>
<td>female</td>
<td>17</td>
<td>51.76</td>
<td>9.311</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TSCC PTS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>male</td>
<td>28</td>
<td>47.89</td>
<td>11.053</td>
<td>-2.401</td>
<td>3.175</td>
<td>.756</td>
<td>36.974</td>
</tr>
<tr>
<td>female</td>
<td>17</td>
<td>50.29</td>
<td>9.860</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TSCC DIS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>male</td>
<td>28</td>
<td>49.07</td>
<td>11.304</td>
<td>-2.223</td>
<td>3.100</td>
<td>-.717</td>
<td>39.074</td>
</tr>
<tr>
<td>female</td>
<td>17</td>
<td>51.29</td>
<td>9.265</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TSCC SC</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>male</td>
<td>27</td>
<td>50.70</td>
<td>8.416</td>
<td>-9.421</td>
<td>5.485</td>
<td>-1.718</td>
<td>17.908</td>
</tr>
<tr>
<td>female</td>
<td>16</td>
<td>60.13</td>
<td>20.963</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RIAS VIX</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>male</td>
<td>76</td>
<td>85.28</td>
<td>12.599</td>
<td>4.743</td>
<td>2.803</td>
<td>1.692</td>
<td>51.203</td>
</tr>
<tr>
<td>female</td>
<td>30</td>
<td>80.53</td>
<td>13.156</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Summary of Findings

Six research questions were investigated in this study. A two-tailed bivariate correlation was performed to investigate Research Question 1. The results indicated no significant relationship between self-report of trauma history and score on any of the TSCC scales. Moreover, no significant relationship was found between type of trauma experience endorsed and TSCC scores.

A two-tailed bivariate correlation was also performed for Research Question 2 in order to explore relation between self-reported trauma history and RIAS scores. Significant correlations were identified between endorsement of sexual abuse/rape and performance on the RIAS Nonverbal Intelligence Index (NIX) and Composite Memory Index (CMX). No significant relations were found between any of the other trauma categories and performance on the RIAS.

Further analysis, as performed for Research Question 3, indicated that score on the RIAS did not significantly predict self-report of trauma history or endorsement of multiple types of trauma exposure. However, binary logistic regression analysis found that score on the RIAS CMX was a significant predictor of endorsement of sexual abuse/rape. The odds ratio indicated that every one-point increase in CMX score decreased the likelihood that an adolescent would endorse history of sexual abuse/rape by 4%.

A two-tailed bivariate correlation was performed for Research Question 4; the results revealed significant correlations between performance on the RIAS composite scales and scores.
on select TSCC subscales. Research Question 5 used linear regression analyses to further examine these correlations. The following results were revealed: Score was on the Overt Dissociation TSCC scale was found to be a significant predictor of RIAS Verbal Intelligence Index (VIX) performance, with elevated Overt Dissociation scale predicting higher performance on the VIX. Score on the Depression TSCC scale was found to be a significant predictor of RIAS Nonverbal Intelligence Index (NIX) performance; adolescents who endorsed elevated symptoms of depression scored higher on the NIX. In addition, score on the Hyperrresponse TSCC scale significantly predicted RIAS Composite Memory Index (CMX) performance. Adolescents who scored lower on the Hyperresponse scale performed significantly better on the CMX. Finally, score on the Depression TSCC scale significantly predicted performance on the RIAS Composite Intelligence Index (CIX), with adolescents who endorsed more depressive symptomology scoring higher on the CIX.

Gender differences across measures were investigated for Research Question 6. A chi-square test revealed a significant relationship between gender and self-report of trauma, with female juvenile offenders significantly more likely to endorse history of trauma than male juvenile offenders. A single-sample t-test indicated that males scored significantly higher than female on the RIAS Verbal Intelligence Index, Nonverbal Intelligence Index, and Composite Intelligence Index. No significant gender differences were found on any of the TSCC scales or in score in the RIAS Composite Memory Index.
CHAPTER 5

DISCUSSION

Summary of Study

Juvenile delinquency is a significant concern in society, with approximately 1.3 million adolescents arrested each year (Puzzanchera, 2014). Juvenile offenders are an underserved population with unique mental health and treatment needs (Teplin et al, 2002; Cauffman, 2004; Kerig et al, 2012; Becker et al, 2012). Adolescents involved with the justice system are significantly more likely to endorse history of childhood maltreatment and other forms of complex trauma than the general population (Wasserman & McReynolds, 2011; Abram et al, 2004; Wilson et al, 2013; Silvern & Griese, 2012). Trauma exposure is associated with a variety of detrimental symptoms, including elevated mental health disorder, cognitive deficit, and learning and memory problems. Rates of PTSD are also significantly greater in the juvenile offender population than in non-delinquent community samples (Silvern & Griese, 2012; Abram et al, 2004). Research suggests a mediating effect of PTSD symptoms on offending behavior, such that specific symptoms manifest as behavior associated with delinquency (Kerig & Becker, 2010). Specifically, re-experiencing, avoidance, and arousal may present as dysregulation of affect, oppositional behavior, and irritability, respectively (Kerig & Becker, 2010).

Moreover, adolescence represents a critical period in cognitive development, which is negatively impacted by environmental factors such as trauma exposure (Raine et al, 2005; Lowenthal, 2000; Romer et al, 2011). Research suggests that cognitive profiles of delinquent youth differ from their non-offending peers, with adolescent offenders performing lower on
measures of verbal, spatial, and memory ability (Raine et al., 2005). It is important for service providers to understand adolescent cognitive strengths and weaknesses, as well as behavioral and trauma symptom profiles of youth at risk for delinquency in order to develop effective intervention and prevention programs.

The current study investigated cognitive functioning and trauma symptomology in adolescents involved in the juvenile justice system with an aim to increase understanding of the ways that trauma history and related trauma symptomology impact cognitive functioning, including verbal ability, nonverbal ability, executive functioning, and working memory. Adding to the research on the impact of trauma within this population is of benefit in understanding the specific needs of different groups of adolescent offenders and increasing insight into characteristics associated with court involvement.

Study participants included adolescent offenders who were referred by the juvenile court to the Juvenile Counseling and Assessment Program (JCAP) for psychological evaluation. Juveniles were either on probation or in a detention center at the time of the evaluation. The reason for referral was to determine appropriate treatment and placement recommendations. For the purpose of psychological evaluation, all youth in this study completed a thorough clinical interview that included assessment of trauma experience. Participants were also administered the Reynolds Intelligence Assessment System (RIAS) as a measure of cognitive ability. A subtest of the youth completed the Trauma Symptom Checklist for Children (TSCC) to investigate trauma. Following completion of the evaluation, trauma history was coded into the following categories: physical abuse/assault, sexual abuse/rape, neglect, grief/loss, and witnessed domestic violence. Experience of multiple types of trauma was additionally noted.
The six research questions and hypotheses for this study were:

1. Is there a significant relationship between self-reported trauma history, including type of trauma endorsed, and scores on the TSCC in juvenile offenders?
   
   *Hypothesis 1*: There is a significant relationship between self-report of trauma history and scores on the TSCC scales in juvenile offenders. There is also significant relationship between type of trauma experience endorsed and TSCC profile.

2. Is there a significant relationship between self-reported trauma history and RIAS scores in juvenile offenders?

   *Hypothesis 2*: There is a significant relationship between whether juvenile offenders’ self-report history of trauma and how they score on the RIAS composite scales.

3. Does cognitive functioning as measured by the RIAS predict endorsement of trauma exposure in juvenile offenders?

   *Hypothesis 3*: RIAS scores are a significant predictor of trauma exposure in the juvenile offender population. Adolescents who score higher on the RIAS indices are significantly less likely to report history of trauma.

4. Is there a significant relationship between TSCC scores and RIAS scores in juvenile offenders?

   *Hypothesis 4*: There is a significant relationship between scores on the TSCC scales and scores on the RIAS indices in juvenile offenders.

5. Do TSCC subscale scores predict cognitive functioning in juvenile offenders as measured by the RIAS?

   *Hypothesis 5*: Scales elevations on the TSCC are associated with lower performance on the RIAS measure of cognitive ability. Adolescent offenders with a clinical profile
on the TSCC are likely to demonstrate lower ability across areas of cognitive functioning.

6. Are there gender differences in endorsement of trauma history, TSCC scores, and/or performance on the RIAS in the juvenile offender population?

_Hypothesis 6:_ There are gender differences in endorsement of trauma history; consistent with the literature on trauma exposure in juvenile offenders, females involved with the juvenile justice system are significantly more likely to report history of trauma than males. There are also gender differences in TSCC profile, with female offenders endorsing a higher level of symptomology than males. There are no gender differences in RIAS performances, with females performing comparable to males across areas of cognitive ability.

A two-tailed bivariate correlation was performed to investigate Research Question 1. The results indicated no significant relationship between self-report of trauma history and score on any of the TSCC scales. Moreover, no significant relationship was found between type of trauma experience endorsed and TSCC scores.

A two-tailed bivariate correlation was also performed for Research Question 2 in order to explore relation between self-reported trauma history and RIAS scores. Significant correlations were identified between endorsement of sexual abuse/rape and performance on the RIAS Nonverbal Intelligence Index (NIX) and Composite Memory Index (CMX). No significant relations were found between any of the other trauma categories and performance on the RIAS. Further analysis, as performed for Research Question 3, indicated that score on the RIAS did not significantly predict self-report of trauma history or endorsement of multiple types of trauma exposure. However, binary logistic regression analysis found that score on the RIAS CMX was a
significant predictor of endorsement of sexual abuse/rape. The odds ratio indicated that every one-point increase in CMX score decreased the likelihood that an adolescent would endorse history of sexual abuse/rape by 4%.

A two-tailed bivariate correlation was performed for Research Question 4; the results revealed significant correlations between performance on the RIAS composite scales and scores on select TSCC subscales. Research Question 5 used linear regression analyses to further examine these correlations. The following results were revealed: Score was on the Overt Dissociation TSCC scale was found to be a significant predictor of RIAS Verbal Intelligence Index (VIX) performance, with elevated Overt Dissociation scale predicting higher performance on the VIX. Score on the Depression TSCC scale was found to be a significant predictor of RIAS Nonverbal Intelligence Index (NIX) performance; adolescents who endorsed elevated symptoms of depression scored higher on the NIX. In addition, score on the Hyperresponse TSCC scale significantly predicted RIAS Composite Memory Index (CMX) performance. Adolescents who scored lower on the Hyperresponse scale performed significantly better on the CMX. Finally, score on the Depression TSCC scale significantly predicted performance on the RIAS Composite Intelligence Index (CIX), with adolescents who endorsed more depressive symptomology scoring higher on the CIX.

Gender differences across measures were investigated for Research Question 6. A chi-square test revealed a significant relationship between gender and self-report of trauma, with female juvenile offenders significantly more likely to endorse history of trauma than male juvenile offenders. A single-sample t-test indicated that males scored significantly higher than females on the RIAS Verbal Intelligence Index, RIAS Nonverbal Intelligence Index, and RIAS
Composite Intelligence Index (CIX). No significant gender differences were found on any of the TSCC scales or in score in the RIAS CMX.

Conclusions

This study added to the research on trauma in the juvenile offender population. No relationship was found between disclosure of trauma history and endorsement of trauma symptomology on the TSCC. Several conclusions can be drawn from this result. First, only 52.15% of study participants endorsed history of trauma. This is much lower than previous research findings that 80-92.5% of the juvenile offender population has experienced at least one traumatic event (Wasserman & McReynolds, 2011; Abram et al, 2004; Wilson et al, 2013; Silvern & Griese, 2012). It is likely that the percentage of youth that self-disclosed trauma history in this study represents a significant underrepresentation of actual trauma experiences. Youth may be more likely to self-disclose trauma experience with in the context of a long-term, trusting therapeutic relationship; these factors cannot be established within the format of the psychological evaluation. It is also possible that the adolescents who were able to identify and acknowledge specific trauma experiences within their history represent a unique subset of youth who are more accepting and self-aware of their experience of trauma and who have already engaged in processing of trauma history. Future research should investigate the role of history of experience in psychotherapy on awareness and acknowledgement of trauma experiences.

Adolescent offenders with history of sexual trauma scored significantly lower on the RIAS Composite Memory Index. This finding is consistent with the literature on experience of sexual abuse and memory impairment. Research indicates that individuals with history of sexual abuse and PTSD symptomology demonstrate lower verbal memory ability (Bremner et al, 1995) and have smaller hippocampal volume (Bremner et al, 2003) than their peers with no trauma.
history. This is of concern as deficits in working memory and other areas of executive function that impact memory performance (attention, concentration, inhibition, behavior regulation etc.) are symptoms of trauma exposure (Cook et al, 2005) as well as associated with delinquent behavior (Thompson & Morris, 2016). Trauma history is linked to problems with memory, emotional control, and ability to consider consequences and use appropriate judgement (Cellini, 2004; Cook et al, 2005; Gabowitz et al, 2008). Moreover, trauma exposure can have a long-term impact on brain structure, with corresponding functional deficits (Cellini, 2004; Gabowitz, Zucker, & Cook, 2008; Davis, Moss, Nogin, & Webb, 2015; Bremner, 1999). A pattern of neurological deficits is also seen in the adolescent offender population in contrast with non-offending youth. For instance, Moffitt, Lynam, & Silva (1994) completed a longitudinal study of adolescents from New Zealand and found that lower verbal and nonverbal memory ability significantly predicted offending behavior. In correspondence, trauma symptomology, such as hyperarousal, can further impact cognitive performance (Bremner, 1999). As such it is likely that lower memory scores in youth with a history of sexual abuse are a function of a combination of immediate trauma symptomology plus long-term trauma-related neurological changes.

In correspondence, adolescents who scored higher on the TSCC Hyperresponse scale demonstrated lower memory ability as measured by the RIAS. Hyperresponse is a validity scale on the TSCC, with elevated scores suggesting over-endorsement of symptoms, which may indicate a high level of trauma symptomology, a cry for help, or intention to present poorly or exaggerate symptoms (Briere, 1996). In line with study hypotheses, higher self-report of trauma symptomology, including endorsement of rare symptoms, was associated with significantly lower memory ability. This finding is consistent with the literature which indicates that PTSD diagnosis is related to memory impairment (Bremner 1999; McNally, 2006). Not only is trauma
exposure associated with abnormal brain development and cognitive deficits (Romano et al, 2014; Lowenthal, 2000; Davis, Moss, Nogin, & Webb 2015), but symptoms of trauma include intrusive thoughts and flashbacks, both of which can impact memory performance (McNally, 2006). It is also possible that adolescents with lower memory scores are poorer reporters, which would further account elevation on the Hyperresponse validity scale.

Interestingly, higher verbal and nonverbal cognitive ability were predictive of higher scores on the TSCC Overt Dissociation and Depression scales, respectively. This finding is inconsistent with the hypothesis that increased trauma symptomology would be associated with lower performance across areas of cognitive ability. It is also inconsistent with previous research noting that individuals who demonstrate lower cognitive ability present with more severe symptoms of PTSD as well as increased risk of developing PTSD symptomology (McNally, 2006).

However, a couple of interpretations can be drawn from the predictive relationship between verbal ability and dissociative symptoms. Research indicates that dissociation may at times serve as a protective factor by reducing level of distress and physiological arousal and distancing the adolescent from their experience of trauma (Bryant, 2007). In addition, trauma exposure is associated with problems with affect regulation, including difficulty identifying and expressing emotions and internal states (Cook et al, 2005). Individuals with higher verbal ability may be better able to verbalize their internal experience of dissociation than other trauma-exposed youth.

Similarly, in terms of the predictive relationship between nonverbal ability and depressive symptoms, individuals with higher cognitive ability may be more self-aware of mental health symptoms, such as depression. They may also have a greater ability to
conceptualize their experience of trauma, as such increasing related depressive symptomology. It should also be noted that the majority of the research on trauma and PTSD focuses on deficits in verbal ability and memory in trauma exposed youth; there is less evidence for lower nonverbal ability in individuals with PTSD (Qureshi et al, 2011).

Congruent with previous research, gender differences in trauma exposure were identified, with females significantly more likely to self-report trauma history than males. However, while the research states that females involved with the juvenile justice system demonstrate higher rates of PTSD and are more susceptible to posttraumatic symptoms (Dixon & Starling, 2005), TSCC profiles did not differ by gender in this study. It is recommended that that gender differences in trauma exposure and presentation be further examined with a larger group of participants and with a more equal number of males and females; it is possible that a larger sample size would provide a more robust clinical picture.

Female offenders also demonstrated significantly lower verbal ability, nonverbal ability, and overall cognitive ability than male offenders. Higher rates of trauma exposure, particularly sexual trauma, within females involved with the juvenile justice system may account for this discrepancy. It may also be that females referred for psychological evaluation present with more impaired overall functioning; it is recommended that future studies further examine the gender discrepancy in cognitive functioning.

Limitations

Several potential limitations are present in this study. The majority of the youth used in the analysis came from one county in a small Southeastern city. As such, this sample may not be representative of the general adolescent offender population. In addition, this study relied on self-report of trauma history and self-report of trauma symptomology. This is a potential
limitation as information was gathered from youth during a psychological evaluation. It is likely that youth would be more forthcoming in disclosure of trauma history and symptomology in the context of a longer relationship with greater development of trust than allowed for the purpose of the evaluation. Moreover, the trauma categories used in this study were not all-inclusive. Categories were chosen following the practice of previous studies; however, the limitations inherent in restricting analyses to five groups of trauma exposure as well as the challenges in measuring complex and ongoing forms of trauma are acknowledged. A final limitation is sample size. While the sample size was appropriate for the analyses conducted, it is recommended that future studies consider these research questions with a greater sample of adolescent offenders.

Implications

These findings highlight unique challenges that trauma-exposed youth may experience related to both cognitive functioning and trauma symptomology. Memory impairment within trauma-exposed juvenile offenders is of particular concern, with youth who self-disclose history of sexual abuse/rape at particular risk for memory deficit. Lower memory performance is further associated with higher endorsement of trauma symptomology, including self-report of rare symptoms and greater overall symptoms than commonly seen in trauma-exposed adolescents. Such adolescents are likely to perform worse in school and have more difficulty with tasks of executive function (memory, attentional and behavioral regulation, planning, problem-solving, task initiation) than other adolescents. These findings have significant implications for future academic and occupational functioning, highlighting the importance of additional school support within this population.

The higher incident of self-report of trauma in females speaks to the unique needs of females in the juvenile justice system. Females are more likely to experience and disclose history
of trauma. It is importance for clinicians working with female offenders to be aware of trauma risk and approach therapy from a trauma-informed perspective. Adolescents exposed to trauma are more likely to display acting-out behavior, depression, and risk-taking behavior, such as substance use and engagement in delinquent activity (Gabowitz et al, 2008), so it is essential for clinicians and other service providers focus on increasing safety by reducing engagement in risky behavior.

Moreover, the findings speak to the utility of the TSCC as a supplement to a trauma-focused clinical interview. Decision to administer the TSCC should not be dependent on self-endorsement of trauma history, as adolescents may underreport trauma experience. The TSCC allows clinicians to identify youth with possible trauma history who do not acknowledge or identify with their experience of trauma during the clinical interview. This is essential as trauma experience and symptoms are associated with cognitive and behavioral impairment, including increased risk for delinquency. Identification of trauma symptomology is necessary to better understand factors associated with offending behavior and to create appropriate treatment plan in therapy.

**Recommendations for Future Research**

The results of this study highlight the utility of the TSCC in capturing youth presenting with trauma-associated symptomology who underreport trauma exposure during the clinical interview. Future research should expand on the finding of this study by investigating the relationship between trauma profile on the TSCC, cognitive ability, and risk for recidivism. Developing profiles of youth most at risk for recidivism is important in order to connect adolescents in the juvenile justice system to the most effective intervention programs and reduce risk for re-offending.
Moreover, while the RIAS is a useful measure in gathering information about broad cognitive functioning in the areas of verbal ability, nonverbal ability, and memory, it is recommended that future research concentrate on executive functioning. Executive functioning is an area negatively impacted by trauma exposure (Cook et al, 2005; Gabowitz et al, 2008); it is inclusive of skills such as planning, inhibition, self-regulation, and impulse control, areas which are linked to delinquent behavior. As such, further exploration of the role of trauma experience on executive function and offending behavior would create a more holistic cognitive profile of risk and protective factors in the juvenile offender population.

It is also recommended that future research investigate the impact of age of trauma on cognitive functioning in adolescent offenders. Research suggests that cognitive ability is differently impacted by age in which individuals experienced trauma and by the nature of the trauma they experienced (e.g. ongoing/complex trauma, category of trauma) (Lupien et al, 2009; Teicher et al, 2006). Looking at age of trauma experience and whether the trauma was single-incident or ongoing would provide further information about the ways in which cognitive functioning is associated with trauma experience in the juvenile offender population.

Finally, it is likely that more robust results would be found with increased sample size. As such, it is recommended that the association between trauma history, symptoms of trauma, and cognitive functioning be re-evaluated with a greater number of participants.
REFERENCES


Mothes, L., Kristensen, C.H., Grassi-Oliveira, R., Fonseca, R.P., Lima Argimon, I.I., & Irigaray,


http://www.ojjdp.gov/ojstatbb/ezajcs/


