PARENTAL PRACTICES AS PROTECTIVE FACTORS: THE RELATION BETWEEN DEFICITS IN DECISION MAKING AND CHILDHOOD AGGRESSION

by

CAMERON ELIZABETH POWE

JOHN E. LOCHMAN, COMMITTEE CHAIR
JOAN M. BARTH
RANDY J. SALEKIN

A THESIS

Submitted in partial fulfillment of the requirements
for the degree of Master of Arts
in the Department of Psychology
in the Graduate School of
The University of Alabama

TUSCALOOSA, ALABAMA

2014

ABSTRACT

This study will present preliminary analyses on children's Iowa Gambling Task (IGT) scores, BASC Teacher reports of children's levels of aggression, and scores on parenting practices taken from the Alabama Parenting Questionnaire. The study will attempt to answer whether parental practices (monitoring, positive parenting, and involvement) will act as a moderator for affective decision making deficits in children with aggression, and whether supervision and monitoring, positive parenting, and involvement, each act as a protective factor for deficits in affective decision making.

Previous research has not examined the connection between positive parental practices and IGT decision making measurements, and the ability of those positive parental practices to act as a protective factor for aggressive children's deficits in affective decision making. The hypothesized connection between positive parental practices and deficits in implicit learning could act as an early testing factor for childhood aggression as well as influence future interventions.

The study hypothesized that the IGT will predict poor affective decision making in children who have aggression. The study also hypothesized that positive parenting practices will act as a moderator for poor implicit learning: (1) high scores on monitoring will act as a protective factor, (2) high scores on positive parenting will act as a protective factor, and (3) high scores on involvement will act as a protective factor.

DEDICATION

This thesis is dedicated to all of the people who have aided and guided me through this process, and without whom this manuscript would not be possible. To both of my parents and my brother, you have all been a source of wisdom and have helped me immensely throughout this project. Without your patience, kindness, love, and affection I could not have done it. To my friends, you have encouraged me without even realizing you were being encouraging, and I want to thank you for that. Your strength and humor have helped make this process fun. Without my family, friends, and my mentor this would not be possible, so I thank you.

LIST OF ABBREVIATIONS AND SYMBOLS

$\propto$	Alpha: the level of significance or criterion for a hypothesis test
APQ	Alabama Parenting Questionnaire
BASC-TRS	Behavior Assessment System Checklist-Teacher Rating Scale
CD	Conduct Disorder
CP-BT	Coping Power-Basic Training
CP-TF	Coping Power-Training plus Feedback
F	*F* ratio: the mean square regression divided by mean square residual
IGT	Iowa Gambling Task
M	Mean: the sum of a set of measurements divided by the number of measurements in the set
ODD	Oppositional Defiant Disorder
SD	Standard Deviation
p	Probability associated with the occurrence under the null hypothesis of a value as extreme as or more extreme than the observed value
r	Pearson product-moment correlation
RT	Reaction Time
SMH	Somatic Marker Hypothesis
vmPFC	Ventromedial Prefrontal Cortex
X	by

ACKNOWLEDGEMENTS

I would first like to thank my mentor John Lochman for offering both patience and guidance throughout this process. I know that none of this would be possible were it not for our weekly meetings and emails. I would like to thank my committee, Joan Barth, John Lochman, and Randy Salekin for taking the time to guide me through this and offer helpful suggestions along the way. I would like to thank Lixin Qu for helping me understand my analyses and explore my findings further. I would like to thank Caroline Boxmeyer, Shanta Burrell, and Nicole Powell for compiling the archival data that I analyzed and being so helpful when I had any questions come up. I would also like to thank the children and primary caregivers who participated in the original study, because without their time and dedication, none of this would be possible. I would like to thank Casey Dillon, Meghann Sallee, Meagan Wood, and Sara Stromeyer for all of their amazing suggestions, thoughtful guidance, and copious examples. Finally I would like to thank my family for patiently listening when I grew frustrated of writing and helping me continue. Without all of you this thesis would not be possible.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

INTRODUCTION

There are various human, community, and societal costs associated with aggressive behaviors in childhood. Currently, there is a risk of increasing levels of conduct problems and aggression among children and adolescents and it is important to identify early risk factors associated with these aggressive behaviors. The purpose of this thesis is to detect whether parent behaviors will act as protective factors, and moderate the relationship between childhood aggressive behaviors and a known risk factor associated with aggression, deficits in affective decision making.

Risk, Protective, and Promotive Factors

A risk factor is an environmental variable that can predict a higher probability of poor developmental outcomes (e.g. Farrington & Loeber, 2000; Luthar, Cicchetti, & Becker, 2000; Woolley & Grogan-Kaylor, 2006). For example, childhood aggression has previously been linked to such familial risk factors as poverty, parent criminality, substance use, and depression (Barry, Dunlap, Cotten, Lochman, & Wells, 2005), marital conflict (Wolfe, Crooks, Lee, McIntyre-Smith & Jaffe, 2003), single and teenage parenthood (Cuffe, McKeown, Addy & Garrison, 2005), stressful life events (Barry et al., 2005), and controlling, ambivalent attachment between parent and child (Moss, et al., 2006).

A promotive factor is an environmental variable that can predict a lower probability of poor developmental outcomes by decreasing the problem behavior directly regardless of risk (e.g. Garmezy, Masten, & Tellegen, 1984; Loeber, Farrington, Stouthamer-Loeber, & White,

2008; Luthar, Cicchetti, & Becker, 2000). Parental involvement can act as a promotive factor, buffering children against a reliance on aggressive behaviors (Pearce, Jones, Scwab-Stone, & Ruchkin, 2003), for example, children who spend more time with their parents have been linked with lower levels of aggressive or delinquent behaviors (Flannery, Williams, & Vazsonyi, 1999).

A protective factor is an environmental variable that can promote a positive developmental outcome by modifying the risks that can lead to a poor developmental outcome (Herrenkohl et al., 2003; Luthar, Cicchetti, & Becker, 2000; Rutter, 1987; Rutter, 2003; Woolley & Grogan-Kaylor, 2006). Protective factors can also be defined as a variable that acts as a buffer against the negative effects associated with risk factors (Rutter, 1987). Protective factors have previously been studied in regards to parent variables, and their ability to protect against the risk factors associated with aggression. For example, parental involvement can act as a protective factor against the risk of a classroom environment which supported violence (Farrell, Henry, Mays, & Schoeny, 2011).

Impaired Affective Decision Making as a Risk Factor for Aggression

As mentioned previously, there are several risk factors associated with aggressive behaviors in childhood, including impaired affective decision making. Damage to the prefrontal cortex can cause a deficit in affective decision making (Bechara, Damásio, Damásio, & Anderson, 1994; Bechara, Damásio, & Damásio, 2000; Bechara & Van der Linden, 2005; Damásio, 2008; Hooper, Luciana, Conklin, & Yarker, 2004). This damage can result in impaired affective decision making even though general intelligence is relatively well preserved (Damásio, Tranel, & Damásio, 1991).

The ventromedial Prefrontal Cortex (vmPFC) is a region of the brain which allows for the calculation of the monetary value of goods, like food and clothing, and actions which do not

involve money, for instance the choices and consequences associated with the Iowa Gambling Task (Chib, Rangel, Shimojo, & O'Doherty, 2009). The vmPFC encodes action with a specific value, and then compares those actions to decide which action to take to receive the reward which is associated with the choice. The two signals assign value to the stimulus at the time of the decision and evaluate of the outcome associated with that decision (Lin, Adolphs, & Rangel, 2012; O'Doherty, Dayan, Friston, Critchley, & Dolan, 2003; O'Doherty, 2011; Wunderlich, Rangel, & O'Doherty, 2009).

Adolescents with Conduct Disorder (CD) have a genetic vulnerability which can present itself at a young age in the form of the inability to balance reward and punishment sensitivity abnormalities and the long-term negative consequences associated with immediate rewards (Hicks, Kreuger, Lacono, McGue, & Patrick, 2004; Schutter, van Bokhoven, Vandershuren, Lochman, & Matthys, 2010; White et al., 2013). This is similar to response preservation, which is the tendency to continually pursue a previously rewarded response that is now being punished, which has been seen in children and adolescents with CD and Oppositional Defiant Disorder (ODD) (Daugherty and Quay, 1991; Fairchild et al., 2009; Matthys, van Goozen, deVries, Cohen-Kettenis, & van Engeland, 1998; Shapiro, Quay, Hogan, & Schwartz, 1988; Van Goozen et al., 2004) and children with psychopathic propensities (O'Brien and Frick, 1996). Abnormalities in affective decision making such as impulsivity and deficits in amygdala functioning have been identified in children with aggressive behavior and conduct problems (Matthys and Lochman, 2010). This pattern of behavior can be seen in tasks which are designed to measure decision making.

The Iowa Gambling Task. One such task that was developed to assess decision making and decision making impairments is the Iowa Gambling Task (IGT). The IGT was created by

Bechara, Damásio, Tranel and Anderson (1998) to test for deficits in affective decision making through the Somatic Marker Hypothesis (SMH). The SMH postulates that individuals make decisions based on emotional processing within a given situation, regardless of the conscious knowledge the individual has of that situation. It is theorized that deficits in affective decision making occur when the somatic marker signal, also known as the emotion related signal, is missing or the individual cannot process the signal (Bechara, Damásio, Tranel, & Damásio, 2005).

The IGT has the ability to identify affective decision making impairments in individuals with prefrontal cortex damage (Bechara, Damasio, Damsio, & Anderson, 1994; Bechara, Damásio, & Damásio, 2000; Bechara, Damásio, Tranel, & Anderson, 1998; Bechara, Tranel, & Damásio, 2000), Obsessive-Compulsive Disorder (Cavedini, Riboldi, Keller, D'Annucci, & Bellodi, 2002), psychopathy (van Honk, Hermans, Putman, Montagne, & Schutter, 2002), schizophrenia (Sevy et al., 2007), and affective disorders (Jollant et al., 2005). The IGT also has the ability to identify deficiencies in affective decision making in other populations, such as pathological gamblers (Cavedini, Riboldi, Keller, D'Annucci, & Bellodi, 2002) and individuals who engage in substance abuse (Bechara & Damásio, 2002; Bechara et al., 2001; Bechara, Dolan, & Hindes, 2002; Bechara & Martin, 2004).

Children and adolescents who exhibit aggressive behaviors have ODD, CD, or psychopathic propensities and can show a deficit in affective decision making, therefore, children and adolescents who have aggressive behavior and or conduct problems should also have affective decision making deficits on a task like the IGT.

The IGT was designed to measure affective and emotion-based decision making deficits through the SMH. This type of decision making is based on emotion related signals, or somatic

markers, which help individuals to make decisions on a conscious or unconscious level. These emotion related signals are connected to visceral responses, for example heart rate, blood pressure, glandular responses, etc., which in turn help an individual ascertain whether a decision is advantageous or disadvantageous (Damásio, 1998; Damásio, 1996; Damásio et al., 1991; Reimann & Bechara, 2010). Advantageous decisions occur within the IGT in part because individuals feel that another deck will be disadvantageous compared to an advantageous deck (Jameson, Hinson, & Whitney, 2004), and individuals learn from this process, and begin to anticipate the potentially disadvantageous decks of cards, increasing the efficiency of the decision making process (Bechara, Damásio, Damásio, 2000; Damásio, 1998).The IGT is thought to measure these emotion based decision making deficits, as individuals who choose disadvantageously either do not have, or cannot process the emotion related signals, and thus choose disadvantageously. Affective decision making is also defined as the ability to make a decision, weighing both the long-term consequences and the immediate rewards (Xiao et al., 2012), and the IGT is thought to measure this construct due to the rewards and consequences associated with each deck (Bechara, Damásio, Damásio, & Anderson, 1994).

Though the IGT was designed to measure the SMH and affective emotional based decision making, there are several different factors which go into the decision making process, see Figure A. There are several neurological processes which have a role in affective decision making, including the autonomic nervous system, the sympathetic nervous system, the peripheral nervous system, the orbitofrontal cortex, and the amygdala all of which influence affective decision making, executive decision, and emotional and behavioral propensity (Beauchaine, 2001; Blair, 2004; Blair, 2007; Weber, Safir, & Blais, 2004; Zelazo, Müller, 2011). An individual's age, gender, affect, and various other individual differences will also affect how and

what decision an individual will ultimately make (Crone & Van Der Molen, 2004; Cauffman et al., 2010; Slovic & Alhakami, 1994; Finucane, Slovic, Johnson, & Alhakami, 2000; Slovic, Finucane, Peters, & MacGregor, 2004; Geen, 2001; Caffray & Schneider, 2000; Levin & Hart, 2003).

Though there are several risk factors associated with childhood aggressive behaviors, such as deficits in affective decision making, there are several protective factors, defined previously, which can help to buffer a child against the risk factors associated with aggression.

Parenting Behaviors as Protective Factors in the Relation between Risk Factors and Aggression

Parental behaviors can act as protective factors, buffering children from the risks associated with aggressive behavior and conduct problems. These parental behaviors can moderate the relationship between childhood aggression and the risks that are associated with childhood aggression by acting on those risks and shielding the child. For example, parental monitoring of children's activities can be a protective factor, reducing the risk associated with peer pressure (Curtner-Smith & MacKinnon-Lewis, 1994), and the overall impact of behavior problems (Fletcher, Steinberg, & Williams-Wheeler, 2004; Henry, Tolan, & Gorman-Smith, 2001). Similarly, parenting which was accepting of the child, provided behavior supervision, and granted the child psychological autonomy (i.e. positive parenting and monitoring), protected children with aggressive behaviors from facing the risk of long-term unemployment during adulthood (Kokko & Pulkkinen, 2000). Higher levels of positive parenting moderated the relationship between a child's academic functioning and his or her exposure to violence within the community (Lanclos, N., 2002, August). Parental involvement can also act as a protective

factor, shielding an aggressive child from the risk of a classroom environment which supported violence (Farrell, Henry, May, & Schoeny, 2011).

CURRENT STUDY

At this time, it is unknown how positive parental practices might moderate the relation between impaired affective decision making and childhood aggression and conduct problems, as no previous study has looked directly at the ability of parenting behaviors to moderate the deficits in affective decision making associated with childhood aggressive behaviors. Specifically, the study is interested in answering the following questions: (1) will aggressive children have poor affective decision making abilities and (2) will positive parent practices act as a moderator for aggressive children's poor affective decision making abilities?

The study hypothesizes that (1) the IGT will predict poor affective decision making in children with aggression and conduct problems, and (2) positive parent practices (parental involvement, positive parenting, and monitoring) will act as moderators for poor affective decision making in Blocks 3, 4, and 5 of the Iowa Gambling Task as learning occurs in the later blocks of the IGT (Bowman & Turnbull, 2004; Turnbull, Evans, Bunce, Carzolio, & O'Conner, 2005). Specifically, the study hypothesizes that: (a) higher levels of parental involvement will act as a protective factor for poor affective decision making, (b) higher levels of positive parenting will act as a protective factor for poor affective decision making, and (c) higher levels of monitoring will act as a protective factor for poor affective decision making. The study expects that the aggressive children will make more disadvantageous card picks on the IGT overall. The study also expects that parents who exhibit higher levels of parental involvement (i.e. taking part in their child's daily activities), positive parenting (i.e. praising or complimenting their child),

and monitoring behaviors (i.e. knowing where their child is and who their child is with), will be more likely to have children who exhibit lower levels of aggressive behavior and fewer deficits in affective decision making.

METHOD

This study is a secondary data analysis, making use of the *cohort 2, control group* data from the Coping Power NIDA-Birmingham Field Trial Protocol. In this study, elementary schools were randomly assigned to one of three conditions; Coping Power-Training plus Feedback (CP-TF), Coping Power-Basic Training (CP-BT), and a control group. There were 19 schools in the control group (N = 92).

The Coping Power Child Component is an 18-month program, composed of 34 group sessions. The sessions took place at the child's school and lasted 45 to 50 minutes on average. The sessions were composed of four to six children and were led by two co-leaders. In addition each child received twelve individual 30-minute sessions. The Coping Power Child Component helps address social-cognitive deficits by concentrating on the establishment of group rules, contingent reinforcement, use of self-statements, relaxation, distraction techniques, identification of problems, social perspective taking, alternative solution generation, recognition of consequences for actions, awareness of physiological arousal, enhancement of social skills, and coping with peer pressure.

The Coping Power Parent Component is an 18-month program, composed of 16 group sessions. On average, the parents met in groups of 10 with one Coping Power staff member. It was not required for the parents to attend those sessions; however, the Coping Power staff encouraged participation from both of the child's parents. The Coping Power Parent Component helps address the identification and definition of pro-social and disruptive behavior, rewarding

appropriate child behaviors, the use of effective instructions, establishing age-appropriate rules for children, establishing family communication, creating a family monitoring system, and stress management for parents (Lochman, Boxmeyer, Powell, Qu, Wells, & Windle, 2009).

Participants

Participants were recruited from 57 elementary schools; Birmingham City (33), Bessemer City (5), Tuscaloosa City (8), Shelby County (8), and Tuscaloosa County (3). Children at each school were screened for at-risk aggressive behaviors based upon their 3rd grade teachers rating using the Teacher Report of Proactive and Reactive Aggression (Dodge, Lochman, Harnish, Bates, & Pettit, 1997). This is a six item measure which asks the teachers to rate the children in their classroom on proactively aggressive behaviors (i.e. "This child uses physical force (or threatens to use physical force) in order to dominate other kids") and reactively aggressive behaviors (i.e. "When this child has been teased or threatened he/she gets angry easily and strikes back"). Based upon these teacher ratings, the top 30% most aggressive children across all of the classrooms were determined (Lochman, Boxmeyer, Powell, Qu, Wells, & Windle, 2009). Children in the 2nd percentile are believed to be more likely to either already have psychiatric diagnoses or engage in antisocial behavior (Lochman & Wells, 2004), therefore, the children who were classified as being in the 3rd through 30th percentile were eligible to be contacted for this study. At each assessment point, the participants were compensated for their time. The primary caretakers received $60, and the children received $15 each (Lochman, Boxmeyer, Powell, Qu, Wells, & Windle, 2009).

Within the *cohort 2, control group*, 92 children (61 male, 24 female, 7 missing) completed the study. Within the cohort 2, control group, 79 were African American, 7 were Caucasian. Ten of the children lived with two biological parents, 40 lived with their mother only,

13 lived with their mother and an adult male, 2 lived with their father only, 5 lived with their grandparents, 1 lived with their biological parents as well as their mother and an adult male, 1 lived with their mother only and their father only, 4 lived with their mother only and their grandparents, and 8 classified their living arrangement as other (guardian, mother and stepfather, mother and maternal grandfather, grandmother, mother and aunt, and mother, grandparents, and stepfather). Of the children's primary caretaker's, 84 were the birth parents, 1 was an adoptive parent, 1 was a relative (aunt), and 6 were grandparents. In addition, 19 were married, 42 were single, 10 were divorced, 2 were widowed, 7 were separated, 6 were co-habitating, and 6 were missing.

A power analysis using the G*power computer program (Faul, Erdfelder, Lang, & Buchner, 2007) indicated that a total effect size (f^2) of .227 could be found with the sample size of 92 participants with .90 power using a fixed linear multiple regression model with an alpha at .05.

Measures

The Iowa Gambling Task. During the administration of the IGT, the participant is placed in front of a computer screen that displays four decks of cards, each equal in size and appearance. The participant is given $2000 in play money and instructed that the game requires the participant to choose among the four decks in an extended series of card selections (100 card picks), choosing one card at a time, until they are instructed to stop. After the participant makes a choice among the decks, and the card has been turned, the participant receives an amount of money and may be required to pay a penalty amount. These amounts are not disclosed to the participant until after the card has been turned over, and the amount the participant receives or pays varies between each deck.

The IGT measures affective decision making by presenting the participant with simulated real life decisions, involving reward and punishment. The IGT presents the participant with four decks of cards, A, B, C, and D. Decks A and B are considered disadvantageous decks, giving the participant a higher reward, and higher frequency penalties, creating a net loss. Decks C and D are considered advantageous decks, giving the participant a lower reward, and lower frequency penalties, creating a net gain (Bechara, Damásio, Tranel, & Anderson, 1998). Healthy participants learn to choose the smaller rewards which are associated with smaller negative consequences (Schutter, van Bokhoven, Vandershuren, Lochman, & Matthys, 2011). The goals of the task are to maximize the amount of money won by choosing from the advantageous decks C and D, and minimize overall loss by avoiding the disadvantageous decks A and B (Bechara, Damásio, Damásio, & Anderson, 1994).

The IGT has shown consistent learning effects over time when researchers utilized a two-time design (Buelow & Suhr, 2009). According to one study, test/re-test reliability was moderate and positively correlated between first and second applications (r = .43; de Oliveira et al., 2010). Another study examined the content validity of the IGT and found significant correlations between the total advantageous and disadvantageous deck selections over the whole trial ((C+D)-(A+B), Trials 1-100) and the later part of the task ((C+D)-(A+B), Trials 41-100) and several neuropsychological composite scores (Gansler, Jerram, Vannorsdall, & Schretlen, 2011). In the current study, the Cronbach alpha coefficient ranged from .763 to .831.

This study will make use of two methods of scoring. One, the affective decision making score computed by added the advantageous deck decisions together and subtracting the disadvantageous deck decision ((C+D)-(A+B)). The affective decision making score will be calculated to create an overall affective decision making score (Trials 1-100), a Block 1 affective

decision making score (Trials 1-20), a Block 2 affective decision making score (Trials 21-40), a Block 3 affective decision making score (Trials 41-60), a Block 4 net score (Trials 61-80), and a Block 5 affective decision making score (Trials 81-100) (Visagan, Xiang, & Lamar, 2012; Miu et al., 2012; Gansler, Jerram, Vannorsdall, & Schretlen, 2011; Smith, Xiao, & Bechara, 2012). Two, the reaction time in choosing decks will also be analyzed. The reaction time will be calculated to create an overall reaction time (Trials 1-100), a Block 1 reaction time (Trials 1-20), a Block 2 reaction time (Trials 21-40), a Block 3 reaction time (Trials 41-60), a Block 4 reaction time (Trials 61-80), and a Block 5 reaction time (Trials 81-100) (Smith, Xiao, & Bechara, 2012).

Alabama Parenting Questionnaire (APQ). The APQ has a total of 42 questions for which the primary caretaker responds how each item typically occurs in their home environment on a 5 point scale, where 1 is "Never", 2 is "Almost Never", 3 is "Sometimes", 4 is "Often", and 5 is "Always" (Shelton, Frick, & Wootton, 1996).

There are five scales within the APQ; (1) Parental Involvement, (2) Positive Parenting, (3) Parental Monitoring, (4) Inconsistent Discipline, and (5) Corporal Punishment. The scales for parental involvement, positive parenting, and parental monitoring are the primary variables from the APQ used in this thesis. Higher scores on parental involvement mean a more involved parent. Higher scores on positive parenting mean a more positive parent. Higher scores on parental monitoring mean poorer monitoring exhibited by parent.

The APQ demonstrated good internal reliability with the exception of the Corporal Punishment scale (α from .25 to .50) (reliability report based upon data from the Coping Power CDC study). In the current study, the Cronbach alpha coefficient was .701.

Behavior Assessment System for Children – Teacher Rating Scale (BASC-TRS). The BASC-TRS is a behavior problem checklist that was completed by the child's individual teacher.

There are 16 scales with the BASC-TRS; (1) Aggression, (2) Adaptability, (3) Anxiety, (4) Attention Problems, (5) Atypicality, (6) Conduct Problems, (7) Depression, (8) Hyperactivity, (9) Leadership, (10) Learn Skills, (11) Social Skills, (12) Somatization, (13) Withdrawal, (14) Study Skills, (15) Externalizing Composite (the sum score of the subscales Hyperactivity, Conduct Problems, and Aggression), and (16) Internalizing Composite (the sum score of the subscales Somatization, Depression, and Anxiety). The subscales for aggression and conduct problems are the primary variables from the BASC used in this thesis. Higher scores on the aggression subscale indicate that the child has greater levels of aggression. Higher scores on the conduct problem subscale indicate that the child has greater levels of conduct problems (Reynolds & Kamphaus, 1992).

All of the scales display good internal consistency within a time point (α from .61 to .97), and all of the scales display equivalent reliability, and the alphas were consistently high across time points (reliability report based upon data from the NIDA-Birmingham Field Trial). In the current study, the Cronbach alpha coefficient ranged from .916 (Time 3) and .935 (Time 4).

Procedures

After informed consent was collected, the Time 1 pre-intervention assessments were conducted prior to the beginning of the Coping Power program. Time 2 assessments were conducted in the summer after the children's fourth grade year. One year later, after the Coping Power Program was completed, Time 3 assessments were conducted, in the summer after the children's fifth grade year. Six months later, Time 4 assessments were conducted. This study will make use of Time 3 and Time 4 assessments. Time 3 assessments included the APQ, the BASC-TRS, and the IGT. The BASC-TRS was also assessed at Time 4 (Lochman, Powell, Boxmeyer, Qu, Wells, & Windle, 2009).

The APQ was administered to the child's primary caretaker at each time point in their own home or the Coping Power research office. This study makes use of the Time 3 APQ data, examining the ability of parental behaviors to moderate the relationship between children's aggressive behaviors and the risk factors associated with that aggression. The instructions for the APQ given to the primary caretaker are as follows, "The following are a number of sentences about your family. Please rate each item as to how often it TYPICALLY occurs in your home. The possible answers are Never, Almost Never, Sometimes, Often, or Always. PLEASE ANSWER ALL ITEMS" (Lochman, Powell, Boxmeyer, Qu, Wells, & Windle, 2009).

The BASC-TRS was administered to the teacher at each time point within his or her own classroom. This study makes use of the Time 3 and Time 4 BASC-TRS data. The instructions for the BASC-TRS were written on the form that the teachers fill out, and they are as follows, "Please read each phrase and mark the response that describes how this child has acted over the last 6 months. Please mark every item. If you don't know or are unsure, give your best estimate. Please fill in the bubbles under never, sometimes, often, or almost always for every item" (Lochman, Powell, Wells, & Windle, 2009).

The IGT was administered to the child at each time point at their own home, the Coping Power research offices, or their individual classroom. This study makes use of Time 3 IGT data. The instructions for the IGT are, "In front of you on the screen, there are four decks of cards; A, B, C, and D. I want you to select one card at a time, from any deck you choose. Each time you select a card, the computer will tell you that you won some money. Every so often however, when you click on a card, the computer will tell you that you lost some money. The goal of the game is to win as much money as possible." (Bechara, Damásio, Damásio, & Lee, 1999).

Data Analysis

Preliminary data analyses included the creation of the composite scores, the creation of a correlation matrix for IGT scores, APQ scores, and BASC-TRS scores, and an assessment of the reliability of each measure.

Exploratory analyses included a hierarchical regression model with the subscales from the APQ not included in the primary analyses, Corporal Punishment and Inconsistent Discipline, as well as differences in child gender and ethnicity. To predict Aggression and Conduct Problems at Time 4, Aggression and Conduct Problems at Time 3 were entered at Step 1, IGT score variables were entered at Step 2, Corporal Punishment and Inconsistent Discipline were entered at Step 3, and Corporal Punishment X IGT Scores and Inconsistent Discipline X IGT Scores were entered at Step 4. Difference in child gender and ethnicity was also be explored with a hierarchical regression model which controls for gender and ethnicity individually. The correlation between reaction time and decision was also explored.

This data was primarily analyzed using a hierarchical regression analysis, in an effort to produce an estimated linear equation to predict the teacher ratings of the child's measured levels of aggression, from the child's performance on the IGT, and the primary caretaker's parenting practice scores on the APQ. Specifically, to predict Time 4 BASC-TRS Aggression, Time 3 BASC-TRS Aggression variables were entered at Step 1, IGT score variables were entered at Step 2, Parental Involvement, Positive Parenting, and Monitoring main effects were entered at Step 3, and Parental Involvement X IGT Scores, Positive Parenting X IGT Scores, and Monitoring X IGT Scores interaction effects were entered at Step 4. To predict Time 4 BASC-TRS Conduct Problems, Time 3 BASC-TRS Conduct Problem variables were entered at Step 1, IGT score variables were entered at Step 2, Parental Involvement, Positive Parenting, and

Monitoring main effects were entered at Step 3, and Parental Involvement X IGT Scores, Positive Parenting X IGT Scores, and Monitoring X IGT Scores interaction effects were entered at Step 4. It is important to note that because there are two time points (Time 3 APQ, BASC-TRS, and IGT scores, and Time 4 BASC-TRS), the change in the child's behavior over time could be assessed, allowing for the approximation of a causal relationship.

RESULTS

This data was analyzed using hierarchical regression analyses; the teacher ratings of the child's aggression was predicted from the child's performance on the IGT, and the primary caretaker's parenting practice scores on the APQ. Preliminary analyses were conducted to ensure no violation of the assumption of normality, linearity, multicollinearity, homoscedasticity, skewness, kurtosis, and outliers, and variables were transformed to correct these violations with transformations. Each variable was assessed to determine which transformation would reduce the skewness and kurtosis the most, and the specific transformations used are noted in Table 1. The transformation generally reduced skewness substantially. The outliers among the IGT affective decision making score lacked a consistent pattern, and there were no notable differences among the primary blocks of interest. The IGT reaction time score displayed few outliers.

Table 1

Descriptive Statistics of all Variables

	N	Mean	Std. Deviation	Skewness		Kurtosis		Transformations
	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error	
Aggression Time 3	92	13.75	8.341	.470	.251	-.411	.498	Normal
Aggression Time 4	92	12.35	10.784	.738	.251	-.377	.498	Normal
Conduct Problems Time 3	92	.6986	.31417	-.430	.251	-.115	.498	Log 10
Conduct Problems Time 4	92	.6065	.41292	-.088	.251	-1.058	.498	Log 10
Parent Involvement Time 3	92	4.0772	.58255	-.292	.251	-.551	.498	Normal
Positive Parenting Time 3	92	4.2899	.59139	-.480	.251	-.831	.498	Normal
Monitoring Time 3	92	.1517	.12165	.781	.251	.217	.498	Log 10
Inconsistent Discipline Time 3	92	2.3388	.67687	.368	.251	.720	.498	Normal
Corporal Punish Time 3	92	1.9710	.60047	-.098	.251	-.399	.498	Normal
IGT Score Overall	92	8.7451	1.07999	-.716	.251	6.063	.498	Square Root
IGT Score Block 1	92	4.5893	.39642	.850	.251	3.848	.498	Square Root
IGT Score Block 2	92	-.0516	.00995	-.525	.251	2.351	.498	Inverse
IGT Score Block 3	92	-1.00	4.957	.509	.251	3.857	.498	Normal
IGT Score Block 4	92	-1.63	6.529	-.319	.251	3.460	.498	Normal
IGT Score Block 5	92	-2.63	7.305	-.783	.251	1.396	.498	Normal
Reaction Time Overall	92	3317.2223	934.71140	.824	.251	.384	.498	Normal
Reaction Time Block 1	92	3.8741	.10928	.482	.251	1.173	.498	Log 10
Reaction Time Block 2	92	2333.6380	1010.74000	.938	.251	.433	.498	Normal
Reaction Time Block 3	92	3.3135	.17938	.345	.251	-.351	.498	Log 10
Reaction Time Block 4	92	3.2710	.21868	-.273	.251	-.075	.498	Log 10
Reaction Time Block 5	92	2169.5522	1062.73981	.841	.251	.406	.498	Normal
Valid N	92							

Across blocks, there is a marked increase in advantageous card selections over time, with learning reaching a peak within Block 3 (Bowman & Turnbull, 2004; Turnbull, Evans, Bunce, Carzolio, & O'Connor, 2005). Due to this increase in learning across blocks, the main analyses will be comprised of blocks 3, 4, and 5. In some analyses, the model was modified to create a best-fit regression model, where variables were removed after being found non-significant.

Primary Analyses - Aggression

To predict Time 4 Aggression, the Time 3 Aggression variables is entered at Step 1, IGT score variables are entered at Step 2, Parental Involvement, Positive Parenting, and Monitoring main effects are entered at Step 3, and Parental Involvement X IGT, Positive Parenting X IGT, and Monitoring X IGT interaction effects are entered at Step 4. In total, there were six separate analyses examining the effects on aggression between IGT and reaction time scores within each of the three IGT blocks. It is important to note that because there are two time points (Time 3 APQ, BASC-TRS, and IGT scores, and Time 4 BASC-TRS), the study can reasonably assess the change in the child's behavior over time, allowing for the approximation of a causal relationship. Table 2 presents a summary of the findings for Blocks 3, 4, and 5 for Aggression and similar summaries will be found prior to the presentation of new analyses.

Table 2

Summary Table for Blocks 3, 4, and 5 for Aggression

	Aggression			
	IGT Score		IGT Reaction Time	
Block	Main	Interaction	Main	Interaction
3	-	X Monitoring	RT	X Monitoring
4	-	X Monitoring	RT	-
5	-	-	-	-

Aggression-Block 3 IGT Score. Time 3 Aggression was entered at step 1, explaining 10.9% of the variance in Time 4 Aggression. After entry of the Block 3 IGT Score at step 2 of

the regression analysis, the total variance explained by the model was 13.2%, and only Time 3 Aggression was significant. After entry of the parenting subscales (Positive Parenting and Monitoring) at step 3, the total variance explained by the model was 14.6%, and only Time 3 Aggression was significant. After entry of the interaction effects between the IGT by the parenting variables at step 4, the total variance explained by the model as a whole was 22.9%, $F(6, 85) = 4.208$, $p = .001$. In the final model, only Time 3 Aggression and IGT X Monitoring were statistically significant, and Block 3 IGT Score was approaching significance.

Table 3

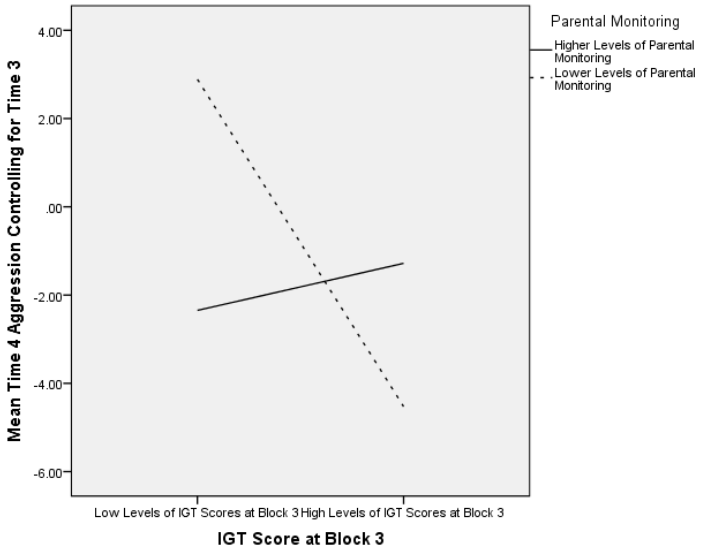
Hierarchical Regression of Aggression and IGT Score at Block 3

	Variables Entered	*B*	*t*	*p*
Step 1	Aggression Time 3	.330**	3.320	.001
Step 2	Aggression Time 3	.321**	3.247	.002
	IGT Score at Block 3	-.151	-1.530	.129
Step 3	Aggression Time 3	.321**	3.230	.002
	IGT Score at Block 3	-.135	-1.346	.182
	Positive Parenting	.092	.904	.369
	Monitoring	.102	.993	.323
Step 4	Aggression Time 3	.295**	3.069	.003
	IGT Score at Block 3	-.191	-1.724	.088
	Positive Parenting	.033	.326	.745
	Monitoring	-.021	-.196	.845
	IGT X Positive	-.164	-1.453	.150
	IGT X Monitoring	-.299**	-2.877	.005

Dependent Variable: Aggression at Time 4, β is Beta, t is the coefficient divided by standard error, p is the significance

Figure 1

Parental Monitoring & IGT at Aggression Block 3



The interaction between parental monitoring and the change in IGT scores in Block 3 predicted to Aggression at Time 4 controlling for Aggression at Time 3. Figure 1 depicts the difference scores for parent reported aggression on the Y-axis (T4-T3), a median split of the Block 3 IGT score on the X-axis, and a median split of parental monitoring in the graphed interaction. Overall, poor parental monitoring in combination with lower IGT scores leads to higher rates of aggression. Poor monitoring plus poor affective decision making predicts more aggressive behaviors, while poor monitoring plus good affective decision making predicts less aggressive behaviors.

Aggression-Block 4 IGT Score. Time 3 Aggression was entered at step 1, explaining 10.9% of the variance in Time 4 Aggression. After entry of Block 4 IGT Score at step 2 of the regression analysis, the total variance explained by the model was 11.1%, and only Time 3 Aggression was significant. After entry of the parenting subscale Monitoring at step 3, the total variance explained by the model was 12.0%, and only Time 3 Aggression was significant. After entry of the interaction effects between the IGT by parenting variables at step 4, the total variance explained by the model as a whole was 16.7%, $F(4, 87) = 4.350$, $p = .003$. In the final model, only Time 3 Aggression and IGT X Monitoring were statistically significant.

Table 4

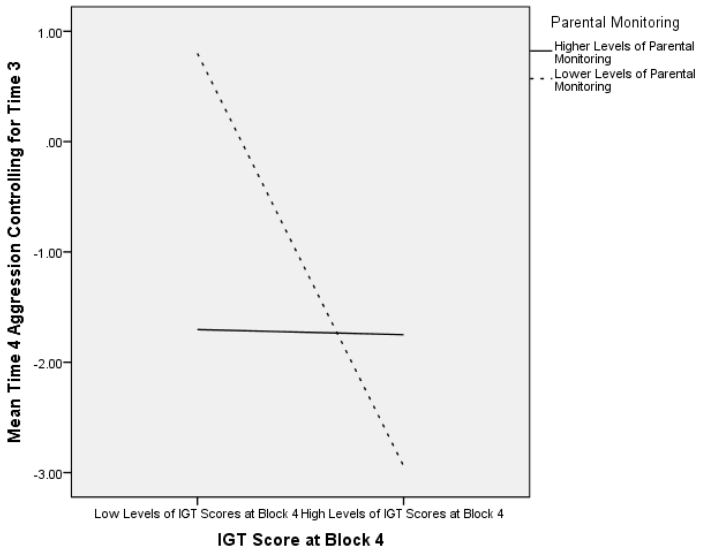
Hierarchical Regression of Aggression and IGT Score at Block 4

	Variables Entered	*B*	*t*	*p*
Step 1	Aggression Time 3	.330**	3.320	.001
Step 2	Aggression Time 3	.331**	3.308	.001
	IGT Score at Block 4	-.039	-.391	.697
Step 3	Aggression Time 3	.332**	3.316	.001
	IGT Score at Block 4	-.019	-.183	.855
	Monitoring	.099	.973	.333
Step 4	Aggression Time 3	.282**	2.808	.006
	IGT Score at Block 4	.003	.026	.979
	Monitoring	.021	.197	.844
	IGT X Monitoring	-.237*	-2.205	.030

Dependent Variable: Aggression Time 4, β is Beta, t is the coefficient divided by standard error, p is the significance

Figure 2

Parental Monitoring & IGT at Aggression Block 4



As with Block 3, the interaction between parental monitoring and the change in IGT scores in Block 4 predicted to Aggression at Time 4 controlling for Aggression at Time 3. Figure 2 depicts the difference scores for parent reported aggression on the Y-axis (T4-T3), a median split of the Block 4 IGT score on the X-axis, and a median split of parental monitoring in the graphed interaction. Overall, poor parental monitoring in combination with lower IGT scores leads to higher rates of aggression. Poor monitoring plus poor affective decision making predicts more aggressive behaviors, while poor monitoring plus good affective decision making predicts less aggressive behaviors.

Aggression-Block 5 IGT Score. Time 3 Aggression was entered at step 1, explaining 10.9% of the variance in Time 4 Aggression. After entry of Block 5 IGT Score at step 2 of the regression analysis, the total variance explained by the model was 11.8%, and only Time 3 Aggression was significant. After entry of the parenting subscales at step 3, the total variance explained by the model was 14.4%, and only Time 3 Aggression was significant. After entry of the interaction effects between the IGT by parenting variables at step 4, the total variance

explained by the model as a whole was 16.5%, F(3, 83) = 2.052, p = .050. In the final model, only Time 3 Aggression was statistically significant.

Table 5

Hierarchical Regression of Aggression and IGT Score at Block 5

	Variables Entered	*B*	*t*	*P*
Step 1	Aggression Time 3	.330**	3.320	.001
Step 2	Aggression Time 3	.330**	3.313	.001
	IGT Score at Block 5	-.096	-.964	.338
Step 3	Aggression Time 3	.338**	3.364	.001
	IGT Score at Block 5	-.075	-.741	.461
	Involvement	.120	.873	.385
	Positive Parenting	.020	.151	.881
	Monitoring	.142	1.344	.183
Step 4	Aggression Time 3	.321**	3.134	.002
	IGT Score at Block 5	-.075	-.718	.475
	Involvement	.111	.793	.430
	Positive Parenting	.032	.237	.813
	Monitoring	.091	.777	.439
	IGT X Involvement	.067	.545	.587
	IGT X Positive	-.108	-.841	.403
	IGT X Monitoring	-.150	-1.296	.199

Dependent Variable: Aggression Time 4, β is Beta, t is the coefficient divided by standard error, p is the significance

Aggression-Block 3 Reaction Time. Time 3 Aggression was entered at step 1, explaining 10.9% of the variance in Time 4 Aggression. After entry of Block 3 Reaction Time Score at step 2 of the regression analysis, the total variance explained by the model was 15.8%, and both Time 3 Aggression and Block 3 Reaction Time were significant. After entry of the parenting subscale Monitoring at step 3, the total variance explained by the model was 16.7%, and only Time 3 Aggression and Block 3 Reaction Time were significant. After entry of the interaction effects between the IGT by parenting variables at step 4, the total variance explained by the model as a whole was 23.2%, F(4, 87) = 6.554, p < .0001. In the final model, only Time 3 Aggression, Block 3 Reaction Time, and RT X Monitoring were statistically significant.

Table 6

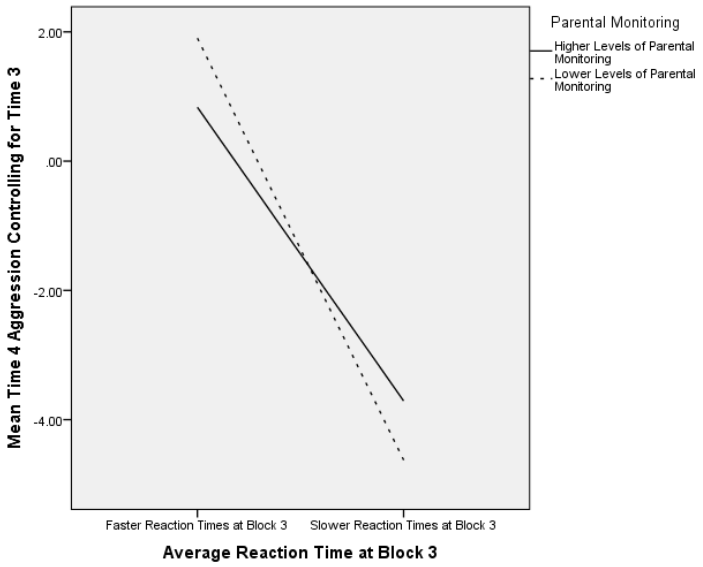
Hierarchical Regression of Aggression and Reaction Time Score at Block 3

	Variables Entered	*B*	*t*	*P*
Step 1	Aggression Time 3	.330**	3.320	.001
Step 2	Aggression Time 3	.299**	3.049	.003
	Reaction Time at Block 3	-.224*	-2.278	.025
Step 3	Aggression Time 3	.301**	3.063	.003
	Reaction Time at Block 3	-.219*	-2.225	.029
	Monitoring	.092	.945	.347
Step 4	Aggression Time 3	.264**	2.752	.007
	Reaction Time at Block 3	-.283**	-2.892	.005
	Monitoring	-.026	-.250	.803
	RT X Monitoring	-.288**	-2.711	.008

Dependent Variable: Aggression Time 4, β is Beta, t is the coefficient divided by standard error, p is the significance

Figure 3

Parental Monitoring & RT at Aggression Block 3



The interaction between parental monitoring and the change in IGT scores in Block 3 predicted to Aggression at Time 4 controlling for Aggression at Time 3. Figure 3 depicts the difference scores for parent reported aggression on the Y-axis (T4-T3), a median split of the Block 3 IGT score on the X-axis, and a median split of parental monitoring in the graphed interaction. Overall, poor parental monitoring in combination with lower IGT scores leads to higher rates of aggression. Poor monitoring plus poor affective decision making predicts more aggressive behaviors, while poor monitoring plus good affective decision making predicts less aggressive behaviors.

Aggression-Block 4 Reaction Time. Time 3 Aggression was entered at step 1, explaining 10.9% of the variance in Time 4 Aggression. After entry of Block 4 Reaction Time Score at step 2 of the regression analysis, the total variance explained by the model was 20.1%, and both Time 3 Aggression and Block 4 Reaction Time were significant. After entry of the

parenting subscales at step 3, the total variance explained by the model was 22.2%, and only Time 3 Aggression and Block 4 Reaction Time were significant. After entry of the interaction effects between the IGT by parenting variables at step 4, the total variance explained by the model as a whole was 26.1%, F(3, 83) = 2.670, p = .001. In the final model, only Time 3 Aggression and Block 4 Reaction Time were statistically significant.

Table 7

Hierarchical Regression of Aggression and Reaction Time Score at Block 4

	Variables Entered	*B*	*t*	*p*
Step 1	Aggression Time 3	.330**	3.320	.001
Step 2	Aggression Time 3	.320**	3.378	.001
	Reaction Time at Block 4	-.303**	-3.192	.002
Step 3	Aggression Time 3	.327**	3.415	.001
	Reaction Time at Block 4	-.291**	-3.038	.003
	Involvement	.095	.732	.466
	Positive Parenting	.019	.149	.882
	Monitoring	.138	1.379	.171
Step 4	Aggression Time 3	.322**	3.255	.002
	Reaction Time at Block 4	-.253**	-2.541	.013
	Involvement	.085	.653	.515
	Positive Parenting	.006	.044	.965
	Monitoring	.093	.869	.387
	RT X Involvement	.223	1.574	.119
	RT X Positive	-.184	-1.299	.197
	RT X Monitoring	-.111	-1.000	.320

Dependent Variable: Aggression Time 4, β is Beta, t is the coefficient divided by standard error, p is the significance

Aggression-Block 5 Reaction Time. Time 3 Aggression was entered at step 1, explaining 10.9% of the variance in Time 4 Aggression. After entry of Block 5 Reaction Time Score at step 2 of the regression analysis, the total variance explained by the model was 11%, and Time 3 Aggression were significant. After entry of the parenting subscales at step 3, the total variance explained by the model was 13.8%, and Time 3 Aggression was significant. After entry of the interaction effects between the IGT by parenting variables at step 4, the total variance explained by the model as a whole was 26.1%, F(3, 83) = 2.548, p = .016. In the final model, only Time 3 Aggression was statistically significant.

Table 8

Hierarchical Regression of Aggression and Reaction Time Score at Block 5

	Variables Entered	*B*	*t*	*p*
Step 1	Aggression Time 3	.330**	3.320	.001
Step 2	Aggression Time 3	.329**	3.291	.001
	Reaction Time at Block 5	-.030	-.299	.765
Step 3	Aggression Time 3	.339**	3.363	.001

	Reaction Time at Block 5	-.006	-.061	.951
	Involvement	.133	.975	.332
	Positive Parenting	.015	.113	.910
	Monitoring	.148	1.386	.169
Step 4	Aggression Time 3	.345**	3.408	.001
	Reaction Time at Block 5	-.056	-.537	.593
	Involvement	.120	.888	.377
	Positive Parenting	.003	.023	.982
	Monitoring	.080	.704	.483
	RT X Involvement	.294	1.966	.053
	RT X Positive	-.146	-.958	.341
	RT X Monitoring	-.105	-.940	.350

Dependent Variable: Aggression Time 4, β is Beta, t is the coefficient divided by standard error, p is the significance

Primary Analyses – Conduct Problems

To predict Time 4 Conduct Problems, Time 3 Conduct Problem variables are entered at Step 1, IGT score variables are entered at Step 2, Parental Involvement, Positive Parenting, and Monitoring main effects are entered at Step 3, and Parental Involvement X IGT, Positive Parenting X IGT, and Monitoring X IGT interaction effects are entered at Step 4. In total, there were six separate analyses. Table 8 presents a summary of the findings for Blocks 3, 4, and 5 for Conduct Problems.

Table 9

Summary Table for Blocks 3, 4, and 5 for Conduct Problems

	Conduct Problems			
	IGT Score		IGT Reaction Time	
Block	Main	Interaction	Main	Interaction
3	IGT Score Approaching	X Monitoring	-	-
4	-	X Monitoring	RT	-
5	-	-	-	-

Conduct Problems-Block 3 IGT Score. Time 3 Conduct Problems was entered at step 1, explaining 10.1% of the variance in Time 4 Conduct Problems. After entry of Block 3 IGT Score at step 2 of the regression analysis, the total variance explained by the model was 12.4%, and Time 3 Conduct Problems was significant. After entry of the parenting subscales (Positive Parenting and Monitoring) at step 3, the total variance explained by the model was 13.8%, and Time 3 Conduct Problems was significant, with Block 3 IGT Score approaching significance. After entry of the interaction effects between the IGT by parenting variables at step 4, the total

variance explained by the model as a whole was 23.9%, F(6, 85) = 4.449, p = .001. In the final model, only Time 3 Conduct Problems and IGT X Monitoring were statistically significant, with IGT X Positive approaching significance.

Table 10

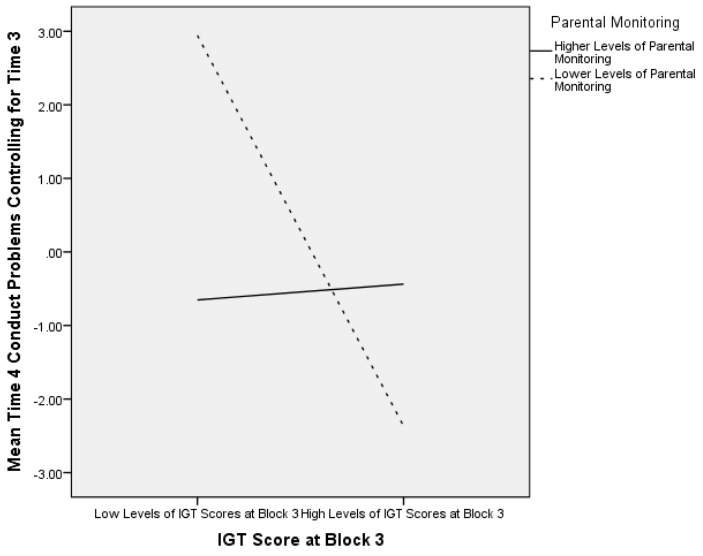
Hierarchical Regression of Conduct Problems and IGT Score at Block 3

	Variables Entered	*B*	*t*	*p*
Step 1	Conduct Problems Time 3	.317**	3.174	.002
Step 2	Conduct Problems Time 3	.322**	3.245	.002
	IGT Score at Block 3	-.153	-1.546	.126
Step 3	Conduct Problems Time 3	.323**	3.248	.002
	IGT Score at Block 3	-.149	-1.478	.143
	Positive Parenting	.121	1.186	.239
	Monitoring	.026	.248	.804
Step 4	Conduct Problems Time 3	.344**	3.597	.001
	IGT Score at Block 3	-.214	-1.955	.054
	Positive Parenting	.054	.545	.587
	Monitoring	-.110	-1.034	.304
	IGT X Positive	-.190	-1.701	.093
	IGT X Monitoring	-.327**	-3.156	.002

Dependent Variable: Conduct Problems Time 4, β is Beta, t is the coefficient divided by standard error, p is the significance

Figure 4

Parental Monitoring & IGT at Conduct Problems Block 3



The interaction between parental monitoring and the change in IGT scores in Block 3 predicted to Conduct Problems at Time 4 controlling for Conduct Problems at Time 3. Figure 4 depicts the difference scores for parent reported conduct problems on the Y-axis (T4-T3), a median split of the Block 3 IGT score on the X-axis, and a median split of parental monitoring in

the graphed interaction. Overall, poor parental monitoring in combination with lower IGT scores leads to higher rates of conduct problems. Poor monitoring plus poor affective decision making predicts more conduct problems behaviors, while poor monitoring plus good affective decision making predicts less conduct problems behaviors.

Conduct Problems-Block 4 IGT Score. Time 3 Conduct Problems was entered at step 1, explaining 10.1% of the variance in Time 4 Conduct Problems. After entry of Block 4 IGT score at step 2of the regression analysis, the total variance explained by the model was 10.3%, and Time 3 Conduct Problems was significant. After entry of the parenting subscale Monitoring at step 3, the total variance explained by the model was 10.3%, and Time 3 Conduct Problems was significant. After entry of the interaction effects between the IGT by parenting variables at step 4, the total variance explained by the model as a whole was 17%, $F(4, 87) = 4.446$, $p = .003$. In the final model Time 3 Conduct Problems and IGT X Monitoring were statistically significant.

Table 11

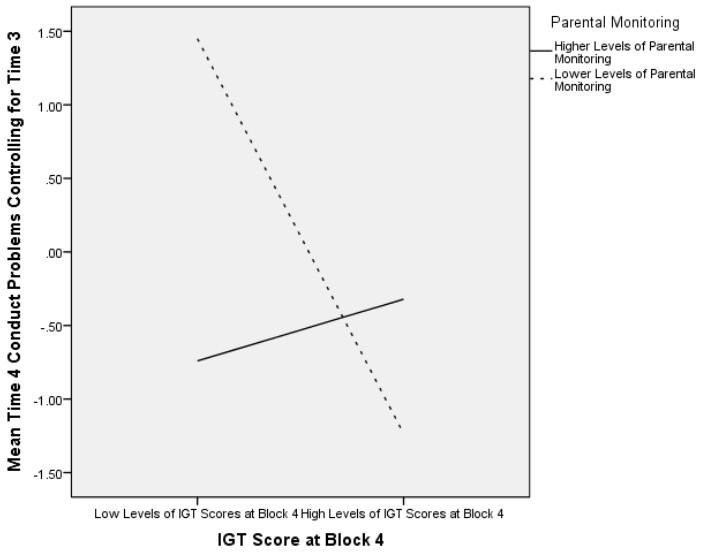
Hierarchical Regression of Conduct Problems and IGT Score at Block 4

	Variables Entered	*B*	*t*	*P*
Step 1	Conduct Problems Time 3	.317**	3.174	.002
Step 2	Conduct Problems Time 3	.319**	3.171	.002
	IGT Score at Block 4	-.044	-.440	.661
Step 3	Conduct Problems Time 3	.319**	3.154	.002
	IGT Score at Block 4	-.041	-.401	.690
	Monitoring	.014	.134	.893
Step 4	Conduct Problems Time 3	.287**	2.911	.005
	IGT Score at Block 4	-.016	-.158	.875
	Monitoring	-.078	-.740	.461
	IGT X Monitoring	-.279**	-2.648	.010

Dependent Variable: Conduct Problems Time 4, β is Beta, t is the coefficient divided by standard error, p is the significance

Figure 5

Parental Monitoring & IGT at Conduct Problems Block 4



As with Block 3, the interaction between parental monitoring and the change in IGT scores in Block 4 predicted to Conduct Problems at Time 4 controlling for Conduct Problems at Time 3. Figure 5 depicts the difference scores for parent reported conduct problems on the Y-axis (T4-T3), a median split of the Block 4 IGT score on the X-axis, and a median split of parental monitoring in the graphed interaction. Overall, poor parental monitoring in combination with lower IGT scores leads to higher rates of conduct problems. Poor monitoring plus poor affective decision making predicts more conduct problems behaviors, while poor monitoring plus good affective decision making predicts less conduct problems behaviors.

Conduct Problems-Block 5 IGT Score. Time 3 Conduct Problems was entered at step 1, explaining 10.1% of the variance in Time 4 Conduct Problems. After entry of Block 5 IGT score at step 2of the regression analysis, the total variance explained by the model was 10.6%, and Time 3 Conduct Problems was significant. After entry of the parenting subscales at step 3, the total variance explained by the model was 12.5%, and Time 3 Conduct Problems was significant. After entry of the interaction effects between the IGT by parenting variables at step

4, the total variance explained by the model as a whole was 14.7%, F(3, 83) = 1.788, p = .091. In the final model Time 3 Conduct Problems was statistically significant.

Table 12

Hierarchical Regression of Conduct Problems with IGT Score at Block 5

	Variables Entered	*B*	*t*	*P*
Step 1	Conduct Problems Time 3	.317**	3.174	.002
Step 2	Conduct Problems Time 3	.321**	3.199	.002
	IGT Score at Block 5	-.071	-.704	.484
Step 3	Conduct Problems Time 3	.342**	3.250	.002
	IGT Score at Block 5	-.056	-.545	.587
	Involvement	.095	.659	.511
	Positive Parenting	.067	.494	.623
	Monitoring	.065	.602	.549
Step 4	Conduct Problems Time 3	.338**	3.105	.003
	IGT Score at Block 5	-.050	-.471	.639
	Involvement	.103	.700	.486
	Positive Parenting	.064	.467	.642
	Monitoring	.042	.352	.726
	IGT X Involvement	.118	.930	.355
	IGT X Positive	-.163	-1.258	.212
	IGT X Monitoring	-.100	-.851	.397

Dependent Variable: Conduct Problems Time 4, β is Beta, t is the coefficient divided by standard error, p is the significance

Conduct Problems-Block 3 Reaction Time. Time 3 Conduct Problems was entered at step 1, explaining 10.1% of the variance in Time 4 Conduct Problems. After entry of Block 3 Reaction Time score at step 2of the regression analysis, the total variance explained by the model was 12.5%, and Time 3 Conduct Problems was significant. After entry of the parenting subscale Positive Parenting at step 3, the total variance explained by the model was 13.6%, and Time 3 Conduct Problems was significant. After entry of the interaction effects between the IGT by parenting variables at step 4, the total variance explained by the model as a whole was 15.6%, F(4, 87) = 4.034, p = .005. In the final model Time 3 Conduct Problems was statistically significant.

Table 13

Hierarchical Regression of Conduct Problems with Reaction Time Score at Block 3

	Variables Entered	*B*	*t*	*p*
Step 1	Conduct Problems Time 3	.317**	3.174	.002
Step 2	Conduct Problems Time 3	.318**	3.206	.002
	Reaction Time at Block 3	-.157	-1.582	.117
Step 3	Conduct Problems Time 3	.319**	3.219	.002
	Reaction Time at Block 3	-.150	-1.509	.135
	Positive Parenting	.106	1.068	.288
Step 4	Conduct Problems Time 3	.324**	3.287	.001
	Reaction Time at Block 3	-.160	-1.615	.110
	Positive Parenting	.087	.870	.387
	RT X Positive	-.143	-1.436	.155

Dependent Variable: Conduct Problems Time 4, β is Beta, t is the coefficient divided by standard error, p is the significance

Conduct Problems-Block 4 Reaction Time. Time 3 Conduct Problems was entered at step 1, explaining 10.1% of the variance in Time 4 Conduct Problems. After entry of Block 4 Reaction Time score at step 2of the regression analysis, the total variance explained by the model was 15.7%, and Time 3 Conduct Problems and Block 4 Reaction Time were significant. After entry of the parenting subscales at step 3, the total variance explained by the model was 17.3%, and Time 3 Conduct Problems and Block 4 Reaction Time were significant. After entry of the interaction effects between the IGT by parenting variables at step 4, the total variance explained by the model as a whole was 22%, $F(3, 83) = 2.931$, $p = .006$. In the final model Time 3 Conduct Problems and Block 4 Reaction Time were statistically significant. RT X Positive was approaching significance.

Table 14

Hierarchical Regression of Conduct Problems with Reaction Time Score at Block 4

	Variables Entered	*B*	*t*	*p*
Step 1	Conduct Problems Time 3	.317**	3.174	.002
Step 2	Conduct Problems Time 3	.347**	3.537	.001
	Reaction Time at Block 4	-.239*	-2.441	.017
Step 3	Conduct Problems Time 3	.365**	3.550	.001
	Reaction Time at Block 4	-.229*	-2.303	.024
	Involvement	.085	.612	.542
	Positive Parenting	.060	.457	.649
	Monitoring	.064	.614	.541
Step 4	Conduct Problems Time 3	.379**	3.553	.001
	Reaction Time at Block 4	-.208*	-2.000	.049
	Involvement	.081	.586	.560
	Positive Parenting	.017	.130	.897
	Monitoring	.020	.179	.858
	RT X Involvement	.196	1.332	.187
	RT X Positive	-.288	-1.962	.053
	RT X Monitoring	-.084	-.737	.463

Dependent Variable: Conduct Problems Time 4, β is Beta, t is the coefficient divided by standard error, p is the significance

Conduct Problems-Block 5 Reaction Time. Time 3 Conduct Problems was entered at step 1, explaining 10.1% of the variance in Time 4 Conduct Problems. After entry of Block 5 Reaction Time score at step 2of the regression analysis, the total variance explained by the model was 10.6%, and Time 3 Conduct Problems was significant. After entry of the parenting subscales at step 3, the total variance explained by the model was 12.6%, and Time 3 Conduct Problems

was significant. After entry of the interaction effects between the IGT by parenting variables at step 4, the total variance explained by the model as a whole was 15.1%, F(3, 83) = 1.843, p = .080. In the final model Time 3 Conduct Problems was statistically significant.

Table 15

Hierarchical Regression of Conduct Problems with Reaction Time Score at Block 5

	Variables Entered	*B*	*t*	*p*
Step 1	Conduct Problems Time 3	.317**	3.174	.002
Step 2	Conduct Problems Time 3	.328**	3.240	.002
	Reaction Time at Block 5	-.075	-.736	.464
Step 3	Conduct Problems Time 3	.350**	3.302	.001
	Reaction Time at Block 5	-.067	-.650	.517
	Involvement	.102	.716	.476
	Positive Parenting	.063	.466	.643
	Monitoring	.060	.556	.580
Step 4	Conduct Problems Time 3	.366**	3.394	.001
	Reaction Time at Block 5	-.082	-.764	.447
	Involvement	.106	.736	.464
	Positive Parenting	.030	.218	.828
	Monitoring	.007	.064	.949
	RT X Involvement	.190	1.230	.222
	RT X Positive	-.179	-1.140	.258
	RT X Monitoring	-.093	-.819	.415

Dependent Variable: Conduct Problems Time 4, β is Beta, t is the coefficient divided by standard error, p is the significance

Exploratory Analyses

Aggression-Blocks 1 and 2. To predict Time 4 Aggression, Time 3 Aggression variables are entered at Step 1, IGT score variables are entered at Step 2 (Global Block 1, Global Block 2, Reaction Time Block 1, and Reaction Time Block 2), Parental Involvement, Positive Parenting, and Monitoring main effects are entered at Step 3, and Parental Involvement X IGT, Positive Parenting X IGT, and Monitoring X IGT interaction effects are entered at Step 4. In total, there were 4 separate analyses. These analyses are considered exploratory as learning is typically not occurring within blocks 1 and 2 of the IGT. Table 15 presents a summary of the findings for Blocks 1 and 2 for Aggression.

Table 16

Summary Table of Blocks 1 and 2 of Aggression

	Aggression			
	IGT Score		IGT Reaction Time	
Block	Main	Interaction	Main	Interaction
1	-	-	-	-
2	-	-	RT	-

Aggression-Block 1 IGT. Time 3 Aggression was entered at step 1, explaining 10.9% of the variance in Time 4 Aggression. After entry of the Block 1 IGT Score at step 2 of the regression analysis, the total variance explained by the model was 12.4%, and only Time 3 Aggression was significant. After entry of the parenting subscales at step 3, the total variance explained by the model was 15.3%, and only Time 3 Aggression was significant. After entry of the interaction effects between the IGT by the parenting variables at step 4, the total variance explained by the model as a whole was 20.6%, $F(8, 83) = 2.687$, $p = .011$. In the final model, only Time 3 Aggression was statistically significant.

Table 17

Hierarchical Regression of Aggression with IGT Score at Block 1

	Variables Entered	*B*	*t*	*p*
Step 1	Aggression Time 3	.330**	3.320	.001
Step 2	Aggression Time 3	.334	3.364	.001
	IGT Score at Block 1	-.124	-1.249	.215
Step 3	Aggression Time 3	.344**	3.443	.001
	IGT Score at Block 1	-.123	-1.214	.228
	Involvement	.145	1.067	.289
	Positive Parenting	-.013	-.097	.923
	Monitoring	.151	1.445	.152
Step 4	Aggression Time 3	.367**	3.651	.000
	IGT Score at Block 1	-.100	-.978	.331
	Involvement	.148	1.080	.283
	Positive Parenting	-.025	-.191	.849
	Monitoring	.104	.975	.333
	IGT X Involvement	-.135	-.929	.356
	IGT X Positive	-.064	-.484	.629
	IGT X Monitoring	.091	.775	.441

Dependent Variable: Aggression Time 4, β is Beta, t is the coefficient divided by standard error, p is the significance

Aggression-Block 2 IGT. Time 3 Aggression was entered at step 1, explaining 10.9% of the variance in Time 4 Aggression. After entry of the Block 2 IGT Score at step 2 of the regression analysis, the total variance explained by the model was 11.3%, and only Time 3 Aggression was significant. After entry of the parenting subscales at step 3, the total variance explained by the model was 14%, and only Time 3 Aggression was significant. After entry of the interaction effects between the IGT by the parenting variables at step 4, the total variance

explained by the model as a whole was 19%, F(8, 83) = 2.432, p = .021. In the final model, only Time 3 Aggression was statistically significant.

Table 18

Hierarchical Regression of Aggression with IGT Score at Block 2

	Variables Entered	*B*	*t*	*p*
Step 1	Aggression Time 3	.330**	3.320	.001
Step 2	Aggression Time 3	.330**	3.306	.001
	IGT Score at Block 2	.060	.603	.548
Step 3	Aggression Time 3	.338**	3.365	.001
	IGT Score at Block 2	.045	.449	.654
	Involvement	.129	.943	.348
	Positive Parenting	.020	.149	.882
	Monitoring	.143	1.350	.180
Step 4	Aggression Time 3	.346**	3.312	.001
	IGT Score at Block 2	.020	.175	.861
	Involvement	.131	.928	.356
	Positive Parenting	.016	.116	.908
	Monitoring	.129	1.187	.238
	IGT X Involvement	.005	.029	.977
	IGT X Positive	-.055	-.323	.747
	IGT X Monitoring	.069	.610	.544

Dependent Variable: Aggression Time 4, β is Beta, t is the coefficient divided by standard error, p is the significance

Aggression-Block 1 Reaction Time. Time 3 Aggression was entered at step 1, explaining 10.9% of the variance in Time 4 Aggression. After entry of the Block 1 Reaction Time Score at step 2 of the regression analysis, the total variance explained by the model was 12.1%, and only Time 3 Aggression was significant. After entry of the parenting subscales at step 3, the total variance explained by the model was 14.4%, and only Time 3 Aggression was significant. After entry of the interaction effects between the IGT by the parenting variables at step 4, the total variance explained by the model as a whole was 14.9%, F(8, 83) = 1.818, p = .085. In the final model, only Time 3 Aggression was statistically significant.

Table 19

Hierarchical Regression of Aggression with Reaction Time Score at Block 1

	Variables Entered	*B*	*t*	*p*
Step 1	Aggression Time 3	.330**	3.320	.001
Step 2	Aggression Time 3	.324**	3.254	.002
	Reaction Time at Block 1	-.107	-1.078	.284
Step 3	Aggression Time 3	.334**	3.321	.001
	Reaction Time at Block 1	-.077	-.756	.452
	Involvement	.123	.902	.369
	Positive Parenting	.009	.069	.945
	Monitoring	.138	1.297	.198
Step 4	Aggression Time 3	.327**	3.162	.002
	Reaction Time at Block 1	-.111	-.961	.340
	Involvement	.119	.843	.402

Positive Parenting	.013	.095	.925
Monitoring	.127	1.070	.288
RT X Involvement	.016	.084	.933
RT X Positive	-.087	-.451	.653
RT X Monitoring	.015	.126	.900

Dependent Variable: Aggression Time 4, β is Beta, t is the coefficient divided by standard error, p is the significance

Aggression-Block 2 Reaction Time. Time 3 Aggression was entered at step 1, explaining 10.9% of the variance in Time 4 Aggression. After entry of the Block 2 Reaction Time Score at step 2 of the regression analysis, the total variance explained by the model was 16.8%, and Time 3 Aggression and Block 2 Reaction Time were significant. After entry of the parenting subscales at step 3, the total variance explained by the model was 19.1%, and Time 3 Aggression and Block 2 Reaction Time were significant. After entry of the interaction effects between the IGT by the parenting variables at step 4, the total variance explained by the model as a whole was 21.3%, $F(8, 83) = 2.804$, $p = .008$. In the final model, only Time 3 Aggression and Block 2 Reaction Time were statistically significant.

Table 20

Hierarchical Regression of Aggression with Reaction Time Score at Block 2

	Variables Entered	*B*	*t*	*p*
Step 1	Aggression Time 3	.330**	3.320	.001
Step 2	Aggression Time 3	.317**	3.275	.002
	Reaction Time at Block 2	-.243*	-2.514	.014
Step 3	Aggression Time 3	.325**	3.320	.001
	Reaction Time at Block 2	-.232*	-2.365	.020
	Involvement	.101	.760	.449
	Positive Parenting	.015	.119	.905
	Monitoring	.144	1.404	.164
Step 4	Aggression Time 3	.350**	3.475	.001
	Reaction Time at Block 2	-.217*	-2.125	.037
	Involvement	.129	.936	.352
	Positive Parenting	-.010	-.077	.939
	Monitoring	.193	1.571	.120
	RT X Involvement	.245	1.485	.141
	RT X Positive	-.202	-1.300	.197
	RT X Monitoring	.078	.604	.547

Dependent Variable: Aggression Time 4, β is Beta, t is the coefficient divided by standard error, p is the significance

Conduct Problems-Blocks 1 and 2. To predict Time 4 Conduct Problems, Time 3 Conduct Problem variables are entered at Step 1, IGT score variables are entered at Step 2, Parental Involvement, Positive Parenting, and Monitoring main effects are entered at Step 3, and

Parental Involvement X IGT, Positive Parenting X IGT, and Monitoring X IGT interaction effects are entered at Step 4. In total, there were 4 separate analyses. Table 20 presents a summary of the findings for Blocks 1 and 2 for Conduct Problems.

Table 21

Summary Table of Blocks 1 and 2 of Conduct Problems

	Conduct Problems			
	IGT Score		IGT Reaction Time	
Block	Main	Interaction	Main	Interaction
1	-	-	-	-
2	-	-	-	X Involvement

Conduct Problems-Block 1 IGT Score. Time 3 Conduct Problems was entered at step 1, explaining 10.1% of the variance in Time 4 Conduct Problems. After entry of the Block 1 IGT Score at step 2 of the regression analysis, the total variance explained by the model was 12.7%, and only Time 3 Conduct Problems was significant. After entry of the parenting subscales at step 3, the total variance explained by the model was 14.4%, and only Time 3 Conduct Problems was significant. After entry of the interaction effects between the IGT by the parenting variables at step 4, the total variance explained by the model as a whole was 20%, $F(8, 83) = 2.588$, $p = .014$. In the final model, only Time 3 Conduct Problems was statistically significant.

Table 22

Hierarchical Regression of Conduct Problems with IGT Score at Block 1

	Variables Entered	*B*	*t*	*p*
Step 1	Conduct Problems Time 3	.317**	3.174	.002
Step 2	Conduct Problems Time 3	.309**	3.117	.002
	IGT Score at Block 1	-.161	-1.625	.108
Step 3	Conduct Problems Time 3	.336**	3.220	.002
	IGT Score at Block 1	-.150	-1.473	.145
	Involvement	.115	.813	.419
	Positive Parenting	.031	.232	.817
	Monitoring	.072	.679	.499
Step 4	Conduct Problems Time 3	.387**	3.634	.000
	IGT Score at Block 1	-.105	-1.017	.312
	Involvement	.133	.925	.358
	Positive Parenting	.030	.227	.821
	Monitoring	.029	.270	.788
	IGT X Involvement	-.213	-1.469	.146
	IGT X Positive	.092	.692	.491
	IGT X Monitoring	.128	1.068	.288

Dependent Variable: Conduct Problems Time 4, β is Beta, t is the coefficient divided by standard error, p is the significance

Conduct Problems-Block 2 IGT Score. Time 3 Conduct Problems was entered at step 1, explaining 10.1% of the variance in Time 4 Conduct Problems. After entry of the Block 2 IGT Score at step 2 of the regression analysis, the total variance explained by the model was 11.7%, and only Time 3 Conduct Problems was significant. After entry of the parenting subscales at step 3, the total variance explained by the model was 13.8%, and only Time 3 Conduct Problems was significant. After entry of the interaction effects between the IGT by the parenting variables at step 4, the total variance explained by the model as a whole was 18.4%, $F(8, 83) = 2.339$, $p = .026$. In the final model, only Time 3 Conduct Problems was statistically significant.

Table 23

Hierarchical Regression of Conduct Problems with IGT Score at Block 2

	Variables Entered	*B*	*t*	*p*
Step 1	Conduct Problems Time 3	.317**	3.174	.002
Step 2	Conduct Problems Time 3	.326**	3.262	.002
	IGT Score at Block 2	.128	1.281	.204
Step 3	Conduct Problems Time 3	.347**	3.318	.001
	IGT Score at Block 2	.128	1.264	.210
	Involvement	.093	.655	.514
	Positive Parenting	.076	.564	.574
	Monitoring	.054	.510	.611
Step 4	Conduct Problems Time 3	.353**	3.288	.001
	IGT Score at Block 2	.104	.919	.361
	Involvement	.096	.650	.517
	Positive Parenting	.069	.501	.617
	Monitoring	.046	.417	.678
	IGT X Involvement	.010	.061	.952
	IGT X Positive	-.062	-.364	.717
	IGT X Monitoring	.033	.295	.769

Dependent Variable: Conduct Problems Time 4, β is Beta, t is the coefficient divided by standard error, p is the significance

Conduct Problems-Block 1 Reaction Time. Time 3 Conduct Problems was entered at step 1, explaining 10.1% of the variance in Time 4 Conduct Problems. After entry of the Block 1 Reaction Time Score at step 2 of the regression analysis, the total variance explained by the model was 10.1%, and only Time 3 Conduct Problems was significant. After entry of the parenting subscales at step 3, the total variance explained by the model was 12.4%, and only Time 3 Conduct Problems was significant. After entry of the interaction effects between the IGT by the parenting variables at step 4, the total variance explained by the model as a whole was

12.6%, F(8, 83) = 1.497, p = .171. In the final model, only Time 3 Conduct Problems was statistically significant.

Table 24

Hierarchical Regression of Conduct Problems with Reaction Time Score at Block 1

	Variables Entered	*B*	*t*	*p*
Step 1	Conduct Problems Time 3	.317**	3.174	.002
Step 2	Conduct Problems Time 3	.319**	3.156	.002
	Reaction Time at Block 1	.014	.137	.892
Step 3	Conduct Problems Time 3	.348**	3.272	.002
	Reaction Time at Block 1	.047	.454	.651
	Involvement	.113	.787	.433
	Positive Parenting	.066	.486	.628
	Monitoring	.077	.712	.479
Step 4	Conduct Problems Time 3	.347**	3.143	.002
	Reaction Time at Block 1	.040	.339	.736
	Involvement	.120	.800	.426
	Positive Parenting	.053	.373	.710
	Monitoring	.056	.461	.646
	RT X Involvement	.033	.173	.863
	RT X Positive	-.063	-.324	.747
	RT X Monitoring	-.033	-.270	.788

Dependent Variable: Conduct Problems Time 4, β is Beta, t is the coefficient divided by standard error, p is the significance

Conduct Problems-Block 2 Reaction Time. Time 3 Conduct Problems was entered at step 1, explaining 10.1% of the variance in Time 4 Conduct Problems. After entry of the Block 2 Reaction Time Score at step 2 of the regression analysis, the total variance explained by the model was 13.3%, and only Time 3 Conduct Problems was significant, with Block 2 Reaction Time approaching significance. After entry of the parenting subscales at step 3, the total variance explained by the model was 14.9%, and only Time 3 Conduct Problems was significant. After entry of the interaction effects between the IGT by the parenting variables at step 4, the total variance explained by the model as a whole was 18.5%, F(8, 83) = 2.357, p = .025. In the final model, only Time 3 Conduct Problems and RT X Involvement were statistically significant.

Table 25

Hierarchical Regression of Conduct Problems with Reaction Time Score at Block 2

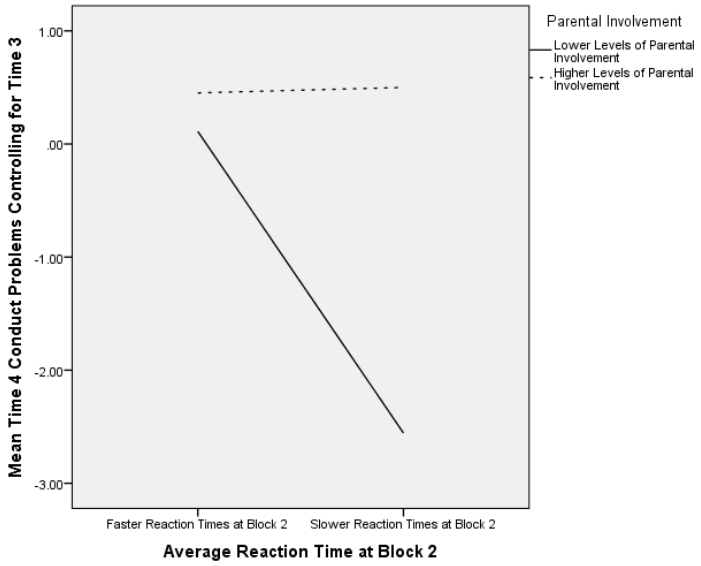
	Variables Entered	*B*	*t*	*p*
Step 1	Conduct Problems Time 3	.317**	3.174	.002
Step 2	Conduct Problems Time 3	.328**	3.319	.001
	Reaction Time at Block 2	-.179	-1.809	.074
Step 3	Conduct Problems Time 3	.347**	3.342	.001
	Reaction Time at Block 2	-.165	-1.645	.104
	Involvement	.085	.603	.548
	Positive Parenting	.061	.459	.648
	Monitoring	.067	.633	.528

Step 4	Conduct Problems Time 3	.347**	3.342	.001
	Reaction Time at Block 2	-.165	-1.645	.104
	Involvement	.085	.603	.548
	Positive Parenting	.061	.459	.648
	Monitoring	.067	.633	.528
	RT X Involvement	.347**	3.342	.001
	RT X Positive	-.165	-1.645	.104
	RT X Monitoring	.085	.603	.548

Dependent Variable: Conduct Problems Time 4, β is Beta, t is the coefficient divided by standard error, p is the significance

Figure 6

Parental Involvement & RT at Conduct Problems Block 2



The interaction between parental involvement and the change in IGT scores in Block 2 predicted to Conduct Problems at Time 4 controlling for Conduct Problems at Time 3. Figure 6 depicts the difference scores for parent reported conduct problems on the Y-axis (T4-T3), a median split of the Block 4 IGT score on the X-axis, and a median split of parental involvement in the graphed interaction. Overall, poor parental involvement in combination with lower IGT scores leads to higher rates of conduct problems. Poor monitoring plus poor affective decision making predicts more conduct problems behaviors, while poor monitoring plus good affective decision making predicts less conduct problems behaviors.

Overall Global IGT Score and Overall Reaction Time. To predict Time 4 Aggression and Conduct Problems, Time 3 Aggression and Conduct Problem variables are entered at Step 1,

IGT score variables are entered at Step 2, Parental Involvement, Positive Parenting, and Monitoring main effects are entered at Step 3, and Parental Involvement X IGT, Positive Parenting X IGT, and Monitoring X IGT interaction effects are entered at Step 4. In total, there were 4 separate analyses. These analyses are considered exploratory as learning is typically not occurring within blocks 1 and 2 of the IGT. These findings were consistent in nature to the previous analyses, and no more additional information was gained from these analyses. Table 25-26 presents a summary of the findings for the overall blocks for Aggression and Conduct Problems.

Table 26

Summary Table of Overall Blocks for Aggression

	Aggression			
	IGT Score		IGT Reaction Time	
Block	Main	Interaction	Main	Interaction
Overall	-	X Monitoring	-	-

Table 27

Summary Table of Overall Blocks for Conduct Problems

	Conduct Problems			
	IGT Score		IGT Reaction Time	
Block	Main	Interaction	Main	Interaction
Overall	-	X Monitoring	-	-

Aggression-Overall IGT Score. The total variance explained by the model as a whole was 21.5%, F(8, 83), p = .008. In the final model, only Time 3 Aggression (beta = .318, p = .002) and IGT X Monitoring (beta = .278, p = .020) were statistically significant.

Aggression-Overall Reaction Time. The total variance explained by the model as a whole was 19.9%, F(8, 83), p = .014. In the final model, only Time 3 Aggression was statistically significant, with beta = .338, p = .001.

Conduct Problems-Overall IGT Score. The total variance explained by the model as a whole was 21%, F(8, 83), p = .009. In the final model, only Time 3 Conduct Problems (beta = .368, p = .001) and IGT X Monitoring (beta = .284, p = .017) were statistically significant.

Conduct Problems-Overall Reaction Time. The total variance explained by the model as a whole was 16.4%, F(8, 83), p = .052. In the final model, only Time 3 Conduct Problems (beta = .364, p = .001) was statistically significant.

Aggression and Conduct Problems Ethnicity Regression. To assess the impact of ethnicity, the original regression was run, with only the African American cases selected. Specifically, to predict Time 4 Aggression, Time 3 Aggression variables are entered at Step 1, IGT score variables are entered at Step 2, Parental Involvement, Positive Parenting, and Monitoring main effects are entered at Step 3, and Parental Involvement X IGT, Positive Parenting X IGT, and Monitoring X IGT interaction effects are entered at Step 4. To predict Time 4 Conduct Problems, Time 3 Conduct Problems variables are entered at Step 1, IGT score variables are entered at Step 2, Parental Involvement, Positive Parenting, and Monitoring main effects are entered at Step 3, and Parental Involvement X IGT, Positive Parenting X IGT, and Monitoring X IGT interaction effects are entered at Step 4. In total, there were 24 separate analyses. The findings were similar in nature to the previous analyses.

Rather than present the full regression results for each analysis, Tables 27-28 shows the variables which were significant in the primary analyses and the exploratory ethnicity analyses. The ethnicity analyses produced the same results in twenty-one analyses. There were changes in significant predictors in only 3 analyses; Block 2 Reaction Time approaching significance within aggression analyses, Block 3 Reaction Time and IGT X Positive interaction within the Overall IGT Score conduct problems analysis, and the loss of the RT X Involvement within the Block 2 Reaction Time conduct problems analysis.

Table 28

Comparison of Primary Aggression Regression Analyses to Ethnicity Specific Regression Analyses

Aggression	Primary Analyses-Significant Variables	Ethnicity Analyses-Significant Variables
Block 3 IGT Score	Time 3 Aggression IGT X Monitoring	Time 3 Aggression IGT X Monitoring
Block 4 IGT Score	Time 3 Aggression	Time 3 Aggression

	IGT X Monitoring	IGT X Monitoring
Block 5 IGT Score	Time 3 Aggression	Time 3 Aggression
Block 3 Reaction Time	Time 3 Aggression Block 3 Reaction Time RT X Monitoring	Time 3 Aggression Block 3 Reaction Time RT X Monitoring
Block 4 Reaction Time	Time 3 Aggression Block 4 Reaction Time	Time 3 Aggression Block 4 Reaction Time
Block 5 Reaction Time	Time 3 Aggression	Time 3 Aggression
Block 1 IGT Score	Time 3 Aggression	Time 3 Aggression
Block 2 IGT Score	Time 3 Aggression	Time 3 Aggression
Block 1 Reaction Time	Time 3 Aggression	Time 3 Aggression
Block 2 Reaction Time	Time 3 Aggression Block 2 Reaction Time	Time 3 Aggression *Block 2 Reaction Time (approaching significance)*
Overall IGT	Time 3 Aggression IGT X Monitoring	Time 3 Aggression IGT X Monitoring
Overall Reaction Time	Time 3 Aggression	Time 3 Aggression

Note: Italicized variables represent differences between the regressions

Table 29

Comparison of Primary Conduct Problems Regression Analyses to Ethnicity Specific Regression Analyses

Conduct Problems	**Primary Analyses-Significant Variables**	**Ethnicity Analyses-Significant Variables**
Block 3 IGT Score	Time 3 Conduct Problems IGT X Monitoring IGT X Positive (approaching significance)	Time 3 Conduct Problems IGT X Monitoring *IGT X Positive*
Block 4 IGT Score	Time 3 Conduct Problems IGT X Monitoring	Time 3 Conduct Problems IGT X Monitoring
Block 5 IGT Score	Time 3 Conduct Problems	Time 3 Conduct Problems
Block 3 Reaction Time	Time 3 Conduct Problems	Time 3 Conduct Problems *Block 3 Reaction Time*
Block 4 Reaction Time	Time 3 Conduct Problems Block 4 Reaction Time RT X Positive (approaching significance)	Time 3 Conduct Problems Block 4 Reaction Time RT X Positive (approaching significance)
Block 5 Reaction Time	Time 3 Conduct Problems	Time 3 Conduct Problems
Block 1 IGT Score	Time 3 Conduct Problems	Time 3 Conduct Problems
Block 2 IGT Score	Time 3 Conduct Problems	Time 3 Conduct Problems
Block 1 Reaction Time	Time 3 Conduct Problems	Time 3 Conduct Problems
Block 2 Reaction Time	Time 3 Conduct Problems *RT X Involvement*	Time 3 Conduct Problems
Overall IGT	Time 3 Conduct Problems IGT X Monitoring	Time 3 Conduct Problems IGT X Monitoring *IGT X Positive*
Overall Reaction Time	Time 3 Conduct Problems	Time 3 Conduct Problems

Note: Italicized variables represent differences between the regressions

Aggression and Conduct Problems Gender Regression. To assess the impact of gender, the original regression was run, with only the male cases selected. Specifically, to predict Time 4 Aggression, Time 3 Aggression variables are entered at Step 1, IGT score variables are entered at Step 2, Parental Involvement, Positive Parenting, and Monitoring main effects are entered at Step 3, and Parental Involvement X IGT, Positive Parenting X IGT, and Monitoring X IGT interaction effects are entered at Step 4. To predict Time 4 Conduct Problems, Time 3 Conduct Problem variables are entered at Step 1, IGT score variables are entered at Step 2,

Parental Involvement, Positive Parenting, and Monitoring main effects are entered at Step 3, and Parental Involvement X IGT, Positive Parenting X IGT, and Monitoring X IGT interaction effects are entered at Step 4. In total, there were 24 separate analyses. Overall these findings were similar to the main analyses with all participants included.

Tables 29-30 shows the variables which were significant in the primary analyses and the variables which were significant in the exploratory gender analyses. The exploratory analyses produced the same results in seventeen analyses. There were changes in significant predictors in only 7 analyses; Block 3 IGT Score and IGT X Positive within the Block 3 IGT Score aggression analysis, RT X Involvement and RT X Positive within the Block 3 Reaction Time aggression analysis, Block 3 IGT Score and Positive Parenting within the Block 3 IGT Score conduct problems analysis, Block 3 Reaction Time, RT X Involvement, RT X Positive Parenting, and RT X Monitoring within the Block 3 Reaction Time conduct problems analysis, and Positive Parenting within the Overall IGT conduct problems analysis and the loss of the Reaction Time and RT X Positive within Block 4 Reaction Time conduct problems analysis and the RT X Involvement within the Block 2 Reaction Time conduct problems analysis.

Table 30

Comparison of Primary Aggression Regression Analyses to Gender Specific Regression Analyses

Aggression	**Primary Analyses - Significant Variables**	**Gender Analyses - Significant Variables**
Block 3 IGT Score	Time 3 Aggression IGT X Monitoring	Time 3 Aggression IGT X Monitoring *Block 3 IGT Score* *IGT X Positive*
Block 4 IGT Score	Time 3 Aggression IGT X Monitoring	Time 3 Aggression IGT X Monitoring
Block 5 IGT Score	Time 3 Aggression	Time 3 Aggression
Block 3 Reaction Time	Time 3 Aggression Block 3 Reaction Time RT X Monitoring	Time 3 Aggression (approaching significance) Block 3 Reaction Time RT X Monitoring *RT X Involvement* *RT X Positive*
Block 4 Reaction Time	Time 3 Aggression Block 4 Reaction Time	Time 3 Aggression Block 4 Reaction Time
Block 5 Reaction Time	Time 3 Aggression	Time 3 Aggression
Block 1 IGT Score	Time 3 Aggression	Time 3 Aggression
Block 2 IGT Score	Time 3 Aggression	Time 3 Aggression
Block 1 Reaction Time	Time 3 Aggression	Time 3 Aggression
Block 2 Reaction Time	Time 3 Aggression Block 2 Reaction Time	Time 3 Aggression Block 2 Reaction Time

Overall IGT	Time 3 Aggression IGT X Monitoring	Time 3 Aggression IGT X Monitoring
Overall Reaction Time	Time 3 Aggression	Time 3 Aggression

Note: Italicized variables represent differences between the regressions

Table 31

Comparison of Primary Conduct Problems Regression Analyses to Gender Specific Regression Analyses

Conduct Problems	**Primary Analyses - Significant Variables**	**Gender Analyses - Significant Variables**
Block 3 IGT Score	Time 3 Conduct Problems IGT X Monitoring IGT X Positive (approaching significance)	Time 3 Conduct Problems IGT X Monitoring IGT X Positive *Block 3 IGT Score* *Positive Parenting*
Block 4 IGT Score	Time 3 Conduct Problems IGT X Monitoring	Time 3 Conduct Problems IGT X Monitoring
Block 5 IGT Score	Time 3 Conduct Problems	Time 3 Conduct Problems
Block 3 Reaction Time	Time 3 Conduct Problems	Time 3 Conduct Problems *Block 3 Reaction Time* *RT X Involvement* *RT X Positive* *RT X Monitoring*
Block 4 Reaction Time	Time 3 Conduct Problems *Block 4 Reaction Time* *RT X Positive (approaching significance)*	Time 3 Conduct Problems
Block 5 Reaction Time	Time 3 Conduct Problems	Time 3 Conduct Problems
Block 1 IGT Score	Time 3 Conduct Problems	Time 3 Conduct Problems
Block 2 IGT Score	Time 3 Conduct Problems	Time 3 Conduct Problems
Block 1 Reaction Time	Time 3 Conduct Problems	Time 3 Conduct Problems
Block 2 Reaction Time	Time 3 Conduct Problems *RT X Involvement*	Time 3 Conduct Problems
Overall IGT	Time 3 Conduct Problems IGT X Monitoring	Time 3 Conduct Problems IGT X Monitoring *Positive Parenting*
Overall Reaction Time	Time 3 Conduct Problems	Time 3 Conduct Problems

Note: Italicized variables represent differences between the regressions

Overall, within the 12 analyses examining the relationship between gender, aggression, and overall IGT and reaction time scores, the findings were similar compared to the original analyses, with the exception of the addition of. Within the 12 analyses examining the relationships between gender, conduct problems, and overall IGT and reaction time scores, the findings were similar compared to the original analyses, with the exception of the addition of.

Inconsistent Discipline and Corporal Punishment Regression. To assess the impact of the APQ subscales not included in the primary analyses, exploratory analyses were conducted. Specifically, to predict Time 4 Aggression, Time 3 Aggression variables are entered at Step 1, IGT score variables are entered at Step 2, Inconsistent Discipline and Corporal Punishment main effects are entered at Step 3, and Inconsistent Discipline X IGT and Corporal Punishment X IGT

interaction effects are entered at Step 4. To predict Time 4 Conduct Problems, Time 3 Conduct Problem variables are entered at Step 1, IGT score variables are entered at Step 2, Inconsistent Discipline and Corporal Punishment main effects are entered at Step 3, and Inconsistent Discipline X IGT and Corporal Punishment X IGT interaction effects are entered at Step 4. In total, there were 24 separate analyses.

Within the analyses, only Aggression Time 3 was significant in the Aggression by IGT Score regression analyses. Conduct Problems Time 3 was significant in the Conduct Problems by IGT Score regression analyses. Aggression Time 3 and Reaction Time Block 2, 3, and 4 were significant in the Aggression by Reaction Time regression analyses. Conduct Problems and Reaction Time Block 4 were significant in the Conduct Problems by Reaction Time regression analyses. For the specific findings related to inconsistent discipline and corporal punishment, please refer to Appendix B.

Table 32

Aggression with Inconsistent Discipline and Corporal Punishment

Aggression	Significant Variables
Overall IGT Score	Aggression Time 3
IGT Score at Block 1	Aggression Time 3
IGT Score at Block 2	Aggression Time 3
IGT Score at Block 3	Aggression Time 3
IGT Score at Block 4	Aggression Time 3
IGT Score at Block 5	Aggression Time 3
Overall Reaction Time	Aggression Time 3 Overall Reaction Time
Reaction Time at Block 1	Aggression Time 3
Reaction Time at Block 2	Aggression Time 3 Reaction Time at Block 2
Reaction Time at Block 3	Aggression Time 3 Reaction Time at Block 3
Reaction Time at Block 4	Aggression Time 3 Reaction Time at Block 4
Reaction Time at Block 5	Aggression Time 3

Table 33

Conduct Problems with Inconsistent Discipline and Coral Punishment

Conduct Problems	Significant Variables
Overall IGT Score	Conduct Problems Time 4
IGT Score at Block 1	Conduct Problems Time 4
IGT Score at Block 2	Conduct Problems Time 4
IGT Score at Block 3	Conduct Problems Time 4
IGT Score at Block 4	Conduct Problems Time 4
IGT Score at Block 5	Conduct Problems Time 4
Overall Reaction Time	Conduct Problems Time 4
Reaction Time at Block 1	Conduct Problems Time 4
Reaction Time at Block 2	Conduct Problems Time 4
Reaction Time at Block 3	Conduct Problems Time 4
Reaction Time at Block 4	Conduct Problems Time 4 Reaction Time at Block 4
Reaction Time at Block 5	Conduct Problems Time 4

DISCUSSION

Findings related to the hypotheses indicated that the Iowa Gambling Task scores and Reaction Time scores partially predicted changes in children's aggression and conduct problems, and that the hypothesis related to positive parenting practices acting as moderators for poor affective decision making was partially supported. Children who had faster Reaction Time scores were more likely to have higher levels of aggression and conduct problems reported at Time 4 when controlling for Time 3. Children who had lower IGT block scores in conjunction with lower levels of parental monitoring were more likely to have higher levels of aggression and conduct problems reported at Time 4 when controlling for Time 3. Higher levels of parental monitoring partially acted as a protective factor for poor affective decision making. In an exploratory analysis, higher levels of positive parenting also partially acted as a protective factor for poor affective decision making, but only in a male subsample.

Primary Findings

There were several key findings within this study. Of primary interest were the significant findings found in Blocks 3 and 4, due to the increase in learning in those blocks. The primary findings were the main effect of reaction time which appeared in Blocks 3 and 4, parental monitoring as an interaction effect with the IGT score in Blocks 3 and 4, and the increase in performance in Blocks 3 and 4, but not in Block 5. Both of the IGT indicators used in this study, the overall IGT score which measured affective decision making and the IGT reaction time, predicted changes in children′s behavior. Each score predicted those behavioral changes in

different ways. The reaction time score acted as a main effect predictor and predicted to the children′s change in aggressive and conduct problem behavior. The overall IGT score worked in conjunction with parental monitoring. A lower affective decision making score in conjunction with lower levels of parental monitoring predicted higher levels of aggressive and conduct problem behavior.

Reaction Time and Impulsivity

Of the two scores taken from a participant's IGT performance, the overall affective decision making score and reaction time, reaction time was a main effect predictor of a participant's Time 4 Aggression and Conduct problem scores when controlling for Time 3. Therefore a participant's reaction time scores predicted the change in his or her aggression and conduct problem outcome over time. The reaction time score essentially explains how much better or worse the participant performed behaviorally from Time 3 to Time 4, and this main effect could be due to aggressive children behaving more impulsively during the task.

Impulsivity has been defined in a number of ways. For example, impulsivity has been described as not considering the future consequences or behaving in a rash and hurried manner (Connor, Chartier, Preen, & Kaplan, 2010). Impulsive behavior may be evident in the IGT reaction time score, which essentially indicates that children are making choices at a faster rate. When these children have a faster reaction time, they are clicking on each deck in a rapid manner, and they may not be considering the consequences fully. Due to the fact that they cannot comprehend the consequences, the children cannot consider the future, larger costs associated with the disadvantageous decks. They only see the current payoffs coming from those disadvantageous decks. Therefore, due to their impulsive behavior, the children cannot comprehend the future consequences and they only concentrate on current events. This impulsive

behavior may circumvent the affective decision making process, superseding both deliberate and automatic decision making. Similar studies that have looked at IGT reaction time have found similar fast reaction times in children, and attributed this to impulsive response style behaviors. This pattern of response means that those who perform significantly worse on the IGT (i.e. make poorer decisions overall by choosing from the disadvantageous decks) would likely have faster reaction times (Smith, Xiao, & Bechara, 2012; Goudriaan, Oosterlaan, de Beurs, & van den Brink, 2005). This impulsive response style has also been found in children who behave aggressively and have conduct problems (Connor & Doerfler, 2008).

These children who behave aggressively and have conduct problems have also been found to have issues with impulsivity. Impulsivity can impact a child's decision making, when the child makes a choice without examining that decision′s future consequences in great detail. A child is considered to be impulsive when he or she cannot regulate his or her behavior, attention, or emotion when faced with an objective or goal (Tsukayama, Duckworth, & Kim, 2013). A child who is impulsive may fail to complete assignments when not actively being watched, he or she may talk out of turn or get into arguments with other children, and he or she may become distracted from his or her own work and responsibilities (Humphrey, 1982).

This pattern of behavior can be seen when children react in an aggressive manner to a stimulus without thinking about the consequences of their aggression. For example, a child could react aggressively to a neutral stimulus, like another child bumping into him or her, they could choose to pick a fight, and then be suspended (Matthys and Lochman, 2010). Recent studies have found that the children who exhibit higher levels of aggressive and oppositional defiant behavior also have higher levels of impulsivity (Lahey, 2008; Lubke, Muthen, Moilerin, McGough, & Loo, 2007; Rommense et al., 2009; Olson et al., 2013).

When children who behave aggressively or have conduct problems are faced with decisions in the real world, they may choose impulsively, and make a decision without thinking about the future consequences of that decision. This pattern of behavior is similar to reactive aggression. Reactive aggression has been defined as impulsive, defensive, aggressive behavior, which has a high affective valence (Connor, Chartier, & Kaplan, 2010). Reactive aggression is also known as impulsive aggression and impulsive-hostile-affective aggression (Conner, 2002; Zaraa, Cunningham, Pappadopulos, & Jensen, 2013). In general, impulsive-hyperactive behavior has been show to be positively correlated with physical aggression (Ostrov & Godleski, 2009; Taylor, Chadwick, Heptinstall, & Danckaerts, 1996; Conner & Doerfler, 2008). Therefore, when children exhibit more impulsive behavior, they cannot fully consider the consequences of their decisions, and may find themselves making more behaviorally aggressive choices. Once a child has exhibited this aggressive or conduct problem behavior it becomes more likely that he or she will exhibit this behavior again.

Impulsive behavior can occur for a number of reasons. It can occur when the child is placed in an environment with harsh or hostile parenting, when there are specific genetic factors that predict impulsive behavior, and when the child′s genes and environment interact (Harold et al., 2013). It can also occur when a child experiences slower rates of cortical thinning during brain development (Shaw et al., 2011), or when there are neuronal deficits in the attention and executive functioning centers of the brain (De La Fuente, Xia, Branch, & Li, 2013). Impulsive behavior can also be learned, especially when individual impulsive behaviors are rewarded, or when the environment requires impulsive behavior be present (Williams & Dayan, 2005).

Affective Decision Making and Parental Monitoring

The overall affective decision measure is calculated by subtracting the disadvantageous decks from the advantageous decks ((C+D)-(A+B)). The advantageous decks have low reward magnitude, but even lower penalty frequencies, resulting in a net gain. The disadvantageous decks have a higher reward magnitude, and even higher penalty frequencies, resulting in a net loss. Lower or more negative scores indicate poorer decision making skills as the child is choosing primarily from the disadvantageous decks, causing his or her score to be lower or more negative. The IGT is thought to measure affective decision making by presenting the participant with good decks and bad decks of cards. A participant would typically respond by becoming more aroused when he or she chose a card that results in a large deduction of "dollars" from the bad decks. This arousal response would serve as a signal for the participant, identifying the negative consequences associated with the disadvantageous decks. A participant with poor affective decision making would not respond with this typical pattern of responding. He or she would likely not become aroused by the negative consequences associated with the disadvantageous decks, and would concentrate on the larger positive rewards.

Prior Findings About Affective Decision Making. Prior research has indicated that children who exhibit poor affective decision making and behave impulsively are more likely to behave aggressively or have conduct problems, compared to children who do not exhibit poor affective decision making and do not behave impulsively (Matthys & Lochman, 2010). Due to their behavior, these children may have difficulty balancing reward and punishment, especially when they make a decision without examining all of the associated consequences. They do not react to the negative consequences associated with a decision, and they only see the immediate positive consequences of their actions (Hicks, Kreuger, Lacono, McGue, & Patrick, 2004;

Schutter, van Bokhoven, Vandershuren, Lochman, & Matthys, 2010; White et al., 2013). For example, if a child who is aggressive or has conduct problems is faced with a neutral stimulus, like another child bumping into him on accident, he may react with aggression and hit the other child. That child will only see the immediate positive consequences of his actions, the other child will learn to not bump into him again, and not the negative consequences, he may be suspended for fighting.

Prior research suggests that these children may even continue to choose a previously rewarded response that is now being punished (Daugherty and Quay, 1991; Fairchild et al., 2009; Matthys, van Goozen, deVries, Cohen-Kettenis, & van Engeland, 1998; Shapiro, Quay, Hogan, & Schwartz, 1988; Van Goozen et al., 2004; O'Brien and Frick, 1996). For example, a child may start a fight with her sibling over the remote, and because she immediately gained a positive reward (i.e. control over the remote), she may continue to start fights with her sibling. Her parents may continually punish her for fighting with her sibling by removing TV privileges, but she will continue to fight with her sibling because in the past she gained something from that behavior.

Overall, a child with poor affective decision making will find it difficult to learn from the negative consequences of his or her choices, because the child cannot consider the negative consequences of his or her actions, as he or she does not become aroused by the negative consequences as a typically developing child would be. Therefore, when a parent tries to punish a child with poor affective decision making, the child will not display a normal reaction to punishment. He or she will not react with fear or concern, and therefore will not fear punishment for making the same poor decision at a later date.

Affective Decision Making Effects in the Current Study. In the current study, children's affective decision making was found to predict their problem behavior only in conjunction with the presence of certain parenting behaviors. This significant interaction between parental monitoring and the IGT affective decision making measure was found in Blocks 3 and 4. Parental monitoring is defined as a parent knowing where his or her child is and checking in with the child when he or she is not around. When these two variables interact, monitoring acts a protective factor for poor affective decision making, reducing aggressive and conduct problems behaviors at a later time. In previous studies, parental monitoring has been shown to be a protective factor for a variety of childhood risks. It has been shown to protect a child from peer pressures risks (i.e. when a child was engaged in deviancy training with his or her friends), overall behavior problems, and long-term unemployment in adulthood, a risk associated with aggressive behaviors (Curtner-Smith & MacKinnon-Lewis, 1994; Fletcher, Steinberg, & Williams-Wheeler, 2004; Henry, Tolan, & Gorman-Smith, 2001; Kokko & Pulkkinen, 2000).

As for the other positive parenting scales, positive parenting and parental involvement did not appear as significant. Both positive parenting and parental involvement are good parenting behaviors, and they have been shown to be protective factors for other risk factors associated with aggression and conduct problem behaviors. Neither positive parenting nor parental involvement provides structure for the child though, which may be an integral reason why parental monitoring is acting as a protective factor, as parental monitoring can provide structure. Specifically, parents who exhibit higher levels of parental monitoring may be more authoritarian parents. These parents may provide more contingent parenting, allowing their children to pick up on the integral reward system the parents have in place due to their parental

monitoring. This could be due to the authority the parents have, as the children learn to pay attention to system of rules the parents have in place.

This interaction effect is about the interplay between the parent exhibiting higher levels of parental monitoring and the child′s poor affective decision making skills. As the parent monitors his or her child he or she is modeling decision making skills, checking in with the child when he or she is not with the parents. The child then has a defined structure in place to determine if a decision is a good choice or a bad choice according to their parent's healthy decision making modeling. This structure could help the child form his or her own internal hierarchy of rules which allows the child to examine a decision in the moment, weigh the consequences, and determine if that decision is an advantageous or disadvantageous decision. The parent would essentially help the child to think in a more deliberate decision making way. This would not only help the child pay attention to their behavior, it would also help them pay attention to the negative consequences of their behavior. This structure would help the child navigate around the disability of poor affective decision making by helping the child learn to rely on more deliberate decision making, and consequently help the child improve their overall decision making abilities. Therefore, due to this structure the child has the scaffolding in place to support better affective decision making because he or she can rely on those lessons from his or her parents.

When a child has poor affective decision making, the child will make poor decisions, react impulsively, and possibly exhibit aggressive and conduct problems. However, if a parent exhibits higher levels of monitoring, this pattern of behavior can be circumvented. A parent who exhibits higher levels of monitoring will help their child develop better affective decision making skills by helping the child become more attentive to his or her behavior and the associated

outcomes. By providing this type of structure for his or her behavior, the child can learn to regulate his or her impulsive responding style. The child can learn to stop, take a breath, and think about the consequences of his or her actions, especially the negative consequences. Once the child can weigh those negative consequences in his or her mind, their conscious decision making skills should improve, and that child can begin to learn from his or her behavior.

Learning over Blocks 3 and 4

In this study, learning occurred over Blocks 3 and 4, but not Block 5. Block 5 did not follow the pattern set by Blocks 3 and 4 with their increased learning effects, nor did it offer interesting findings as was expected from previous literature. Within the IGT, learning increases across the blocks, with little to no learning taking place in Blocks 1 and 2, and increased learning taking place in Blocks 3, 4, and 5. In fact, optimum performance is typically first seen in trials 50 through 80 in healthy participants, and increases over time (Bechara, Damasio, Tranel, & Damasio, 1997). Increased learning occurs when a participant learns to choose from the advantageous decks compared to the disadvantageous decks. The participant begins to understand the mechanisms behind the task, specifically the punishments associated with the disadvantageous decks.

Several studies that have used the IGT as a measure of affective decision making have found this increase in learning in Blocks 3, 4, and 5 (ex. Bechara, Damasio, Damsio, & Anderson, 1994; Bechara, Damasio, Damasio, & Lee, 1999; Bechara, Tranel, Damasio, & Damasio, 1996; Rogers et al., 1999; Miller, 1992; Bechara, Damasio, Tranel, Damasio, 1997; Cavedini, Riboldi, Keller, D'Annucci, & Bellodi, 2002; Bechara & Damásio, 2002; Bechara et al., 2001; Bechara, Dolan, & Hindes, 2002; Bechara & Martin, 2004). However, as mentioned previously, this did not occur within this sample.

Within this population, learning increased in Blocks 3 and 4, and tapered off in Block 5. This may be due to children becoming more impulsive after Blocks 3 and 4. Therefore, in Block 5, the child may begin to respond randomly. Previous studies have found that typically developing children do not engage in random responding (Crone, Bange, Latenstein, & van der Molen, 2005; Cassotti, Houde & Moutier, 2011). With an at-risk population such as this, these children may engage in random responding when they near the end of the task because the task does not hold interest for them anymore. Ultimately, for this age group, with these aggressive and conduct problem related behaviors, this is the IGT response style that we found.

Previous studies that have looked at this age group have found mixed findings related to learning over the blocks. Some have found that learning increases across all blocks, even when modifications were made to the task, like shortening the numbers of trials, or when the participants were playing the Hungry Donkey Task, a variant of the IGT (Burdick, Roy, & Raver, 2013; Hooper, Luciana, Conklin, & Yarger, 2004; Crone, Bange, Latenstein, & van der Molen, 2005). Others found patterns of learning similar to what is being presented here, where learning increases during Blocks 3 and 4, and then decreases during Block 5 (Kully-Martens, Treit, Pei, & Rasmussen, 2013; Masunami, Okazaki, & Maekawa, 2009; Crone & van der Molen, 2004; Cassotti, Houde & Moutier, 2011; Prencipe, Kesek, Cohen, Lamm, Lewis, & Zelazo, 2011; Crone & van der Molen, 2007). According to these previous studies, this pattern of responding could be due to impulsive behavior, an inability to understand the complex probability involved in the task, and a conscious effort to avoid punishment by choosing from the disadvantageous deck which has the lowest frequency of punishment, but the highest punishment magnitude (Cassotti, Houde, & Moutier, 2011; Crone & van der Molen, 2004; Crone & van der Molen, 2007; Prencipe, Kesek, Cohen, Lamm, Lewis, & Zelazo, 2011).

Exploratory Results Discussion

Overall, Average, and Blocks 1 and 2 Discussion

There was a lack of significant findings within the analyses concerning Overall, Average, and Blocks 1 and 2, as was expected due to the increase in learning during the later blocks. However, one minor finding in these analyses was the interaction effect between reaction time and parental involvement in Conduct Problems Block 2. Lower levels of parental involvement in conjunction with lower IGT scores leads to higher rates of conduct problems at Time 4 when controlling for Time 3. Overall, this means that when a parent is not involved with the child's life, and their child has a more impulsive and reactive response style on the IGT, that child is more likely to exhibit aggressive behaviors at a later date, even when controlling for their previous behavior at Time 3.

The regression analyses with the Overall IGT score and the Average RT score (i.e. average scores across all 100 trials) found similar results compared to the analyses in Blocks 3 and 4. This was expected, as the Overall IGT score and the Average RT score are calculated by averaging the participant′s overall score and their reaction time score over Blocks 1 through 5. Therefore, these regression analyses are an average of the effects found across Blocks 1 through 5.

Ethnicity Effects

Within the ethnicity regression analyses, which included only the African American population, the Aggression analyses were essentially identical to the primary analyses; however the Conduct Problems analyses did differ in some respects. There was a significant interaction between positive parenting and Block 3 IGT scores. Positive parenting is defined as providing a child with praise, or hugging and kissing a child. In this interaction, lower levels of positive

parenting in conjunction with lower and poorer Block 3 IGT scores, led to higher levels of conduct problems at Time 4 when controlling for Time 3. Previous studies have found that positive parenting is a protective factor against aggressive and conduct problem behavior in children, and this is likely why it appeared to be significant (e.g. Kokko & Pulkkinen, 2000; Lanclos, N., 2002, August).

Gender Effects

Within the gender regression analyses, which isolated the male sample, positive parenting also appeared as an interaction effect. In this interaction, lower levels of positive parenting in conjunction with lower and poorer Block 3 IGT and RT scores, led to higher levels of aggression and conduct problems at Time 4 when controlling for Time 3. Positive parenting has been shown to be a protective factor against aggression and conduct problems for children in a variety of studies, and this is likely why it appeared to be significant (e.g. Kokko & Pulkkinen, 2000; Lanclos, N., 2002, August).

Inconsistent Discipline and Corporal Punishment Regression Discussion

Inconsistent discipline and corporal punishment measure whether the primary caregiver is providing discipline within their household, specifically asking about the use of physical punishment and the consistency of the punishment being provided. Within the analyses concerning inconsistent discipline and corporal punishment, there were very few significant findings. Children who do have affective decision making deficits do not have a spike within their arousal levels when they are punished, which is why they will continue to pursue a previously rewarded response which is now being punished (Daugherty and Quay, 1991; Fairchild et al., 2009; Matthys, van Goozen, deVries, Cohen-Kettenis, & van Engeland, 1998; Shapiro, Quay, Hogan, & Schwartz, 1988; Van Goozen et al., 2004; O'Brien and Frick, 1996).

Therefore, parent discipline behaviors may not be expected to interact with children's poor affective decision making abilities.

Limitations

This study had a variety of limitations, including a small sample size (N=92). This was especially true for females, which only made up 26% on the sample. Due to the limited sample size, it may be difficult to generalize results to the entire population, and the study's statistical power was limited. Measures also displayed skewness and kurtosis, which were not completely resolved through data transformations.

Summary

Overall, there were several interesting findings in this study, which partially supported the presented hypotheses. Reaction time acted as a main predictor for aggression and conduct problem behaviors at Time 3 when controlling for Time 4. This could be attributed to these children making choices in an impulsive way without considering the consequences. An interaction between parental monitoring and the IGT affective decision making score appeared as a significant, acting as a protective factor when a parent engaged in higher rates of monitoring. Higher rates of parental monitoring helped to protect children from the risk of affective decision making deficits by teaching the child to pay attention to his or her behavior and the consequences of that behavior. This supports the child so that he or she is able to learn to rely on more deliberate decision making abilities, instead of their weak affective decision making abilities. Future studies would benefit by examining variations in family structure, specifically the variations in the type of primary caregiver (i.e. biological mother, biological father, adoptive mother, adoptive father, grandmother, grandfather, etc.)

REFERENCES

Barry, T. D., Dunlap, S. T., Cotton, S. J., Lochman, J. E., & Wells, K. C. (2005). The influence of maternal stress and distress on disruptive behavior problems in children. *Journal of the American Academy of Child and Adolescent Psychiatry, 44,* 265-273. doi: 10.1097/00004583-200503000-00011

Bechara, A., & Damásio, H. (2002). Decision-making and addiction (part I): Impaired activation of somatic states in substance dependent individuals when pondering decisions with negative future consequences. *Neuropsychologia*, *40*(10), 1675-1689. doi: 10.1016/S0028-3932(02)00015-5

Bechara, A., Damásio, H., & Damásio, A. R. (2000). Emotion, decision making and the orbitofrontal cortex. *Cerebral Cortex, 10*, 295–307. doi: 10.1093/cercor/10.3.295

Bechara, A., Damásio, A. R., Damásio, H., & Anderson, S. W. (1994). Insensitivity to future consequences following damage to human prefrontal cortex. *Cognition*, *50*(1-3), 7-15. doi: 10.1016/0010-0277(94)90018-3

Bechara, A., Damásio, H., Damásio, A. R., & Lee, G. P. (1999). Different contributions of the human amygdala and ventromedial prefrontal cortex to decision-making. *The Journal of Neuroscience*, *19*(13), 5473-5481.

Bechara, A., Damásio, H., Tranel, D., & Anderson, S. W. (1998). Dissociation of working memory from decision making within the human prefrontal cortex. *The Journal of Neuroscience*, *18*(1), 428-437.

Bechara, A. A., Damásio, H. H., Tranel, D. D., & Damásio, A. R. (2005). The Iowa Gambling Task and the somatic marker hypothesis: Some questions and answers. Trends In Cognitive Sciences, 9(4), 159-162. doi:10.1016/j.tics.2005.02.002

Bechara, A. A., Damásio, H. H., Tranel, D. D., & Damásio, A. R. (1997). Deciding advantageously before knowing the advantageous strategy. *Science, 275*(5304), 1293-1295. doi: 10.1126/science.275.5304. 1293

Bechara, A., Dolan, S., Denburg, N., Hindes, A., Anderson, S. W., & Nathan, P. E. (2001). Decision-making deficits, linked to a dysfunctional ventromedial prefrontal cortex, revealed in alcohol and stimulant abusers. *Neuropsychologia*, *39*(4), 376-389. doi: 10.1016/S0028-3932(00)00136-6

Bechara, A., Dolan, S., & Hindes, A. (2002). Decision-making and addiction (part II): Myopia for the future or hypersensitivity to reward? *Neuropsychologia*, *40*(10), 1690-1705. doi: 10.1016/S0028-3932(02)00016-7

Bechara, A., & Martin, E. M. (2004). Impaired decision making related to working memory deficits in individuals with substance addictions. *Neuropsychology*, *18*(1), 152-162. doi: 10.1037/0894-4105.18.1.152

Bechara, A., Tranel, D., & Damásio, H. (2000). Characterization of the decision-making deficit of patients with ventromedial prefrontal cortex lesions. Brain: A Journal Of Neurology, 123(11), 2189-2202.

Bechara, A., & Van der Linden, M. (2005). Decision-making and impulse control after frontal lobe injuries. *Current Opinion in Neurology, 18*, 734 –739. doi: 10.1097/01.wco.0000194141.56429.3c

Bechara, A. A., Damásio, H. H., Tranel, D. D., & Damásio, A. R. (1997). Deciding advantageously before knowing the advantageous strategy. *Science, 275*(5304), 1293-1295. doi: 10.1126/science.275.5304. 1293

Beauchaine, T. P. (2001). Vagal tone, development, and Gray's motivational theory: Toward an integrated model of autonomic nervous system functioning in psychopathology. Development And Psychopathology, 13(2), 183-214. doi:10.1017/S0954579401002012

Blair, R. (2004). The roles of orbital frontal cortex in the modulation of antisocial behavior. *Brain And Cognition*, *55*(Development of Orbitofrontal Function), 198-208. doi:10.1016/S0278-2626(03)00276-8

Blair, R. (2007). Dysfunctions of medial and lateral orbitofrontal cortex in psychopathy. *Linking Affect To Action: Critical Contributions Of The Orbitofrontal Cortex*, *1121*461-479.

Blair, R. R. (2005). Applying a cognitive neuroscience perspective to the disorder of psychopathy. *Development and Psychopathology*, *17*(3), 865-891. doi: 10.1017/S0954579405050418

Blum, K., Braverman, E. R., Holder, J. M., Lubar, J. F., Monastra, V. J., Miller, D., & ... Comings, D. E. (2000). Reward deficiency syndrome: A biogenetic model for the diagnosis and treatment of impulsive, addictive, and compulsive behaviors. Journal Of Psychoactive Drugs, 32SUPPL)1-68.

Bowman, C. H., & Turnbull, O. H. (2004). Emotion-based learning on a simplified card game: The Iowa and Bangor Gambling Tasks. Brain And Cognition, 55(2), 277-282.

Buelow, M. T., & Suhr, J. A. (2009). Construct validity of the Iowa Gambling Task. *Neuropsychology Review, 19*(1), 102-114. doi: 10.1007/s11065-009-9083-4

Burdick, J. D., Roy, A. L., & Raver, C. (2013). Evaluating the Iowa Gambling Task as a direct assessment of impulsivity with low-income children. *Personality And Individual Differences*, *55*(7), 771-776. doi:10.1016/j.paid.2013.06.009

Caffray, C., & Schneider, S. L. (2000). Why do they do it? Affective motivators in adolescents' decisions to participate in risk behaviours.*Cognition And Emotion*, *14*(4), 543-576.

Cassotti, M., Houde, O., & Moutier, S. (2011). Developmental changes of win-stay and loss-shift strategies in decision making. *Child Neuropsychology*, *17*(4), 400-411. doi:10.1080/09297049.2010.547463

Cauffman, E., Shulman, E. P., Steinberg, L., Claus, E., Banich, M. T., Graham, S., & Woolard, J. (2010). Age differences in affective decision making as indexed by performance on the Iowa Gambling Task. *Developmental Psychology*, *46*(1), 193-207. doi:10.1037/a0016128

Cavedini, P., Riboldi, G., Keller, R., D'Annucci, A., & Bellodi, L. (2002). Frontal lobe dysfunction in pathological gambling patients. *Biological Psychiatry*, *51*(4), 334-341. doi: 10.1016/S0006-3223(01)01227-6

Chib, V. S., Rangel, A., Shimojo, S., & O'Doherty, J. P. (2009). Evidence for a common representation of decision values for dissimilar goods in human ventromedial prefrontal cortex. *The Journal Of Neuroscience*, *29*(39), 12315-12320. doi:10.1523/JNEUROSCI.2575-09.2009

Crone, E. A., Bunge, S. A., Latenstein, H., & van der Molen, M. W. (2005). Characterization of Children's Decision Making: Sensitivity to Punishment Frequency, Not Task Complexity. *Child Neuropsychology*, *11*(3), 245-263. doi:10.1080/092970490911261

Crone, E., & Van Der Molen, M. (2004). Developmental changes in real life decision making: Performance on a gambling task previously shown to depend on the ventromedial prefrontal cortex. *Developmental Neuropsychology*, *25*(3), 251-279. doi:10.1207/s15326942dn2503_2

Crone, E. A., & van der Molen, M. W. (2007). Development of decision making in school-aged children and adolescents: Evidence from heart rate and skin conductance analysis. *Child Development*, *78*(4), 1288-1301. doi:10.1111/j.1467-8624.2007.01066.x

Connor, D. F. (2002). *Aggression and antisocial behavior in children and adolescents: Research and treatment*. New York, NY US: Guilford Press.

Connor, D. F., Chartier, K. G., Preen, E. C., & Kaplan, R. F. (2010). Impulsive aggression in attention-deficit-hyperactivity disorder: Symptom severity, co-morbidity, and attention-deficit/hyperactivity disorder subtype. *Journal Of Child And Adolescent Psychopharmacology*, *20*(2), 119-126. doi:10.1089/cap.2009.0076

Connor, D. F., & Doerfler, L. A. (2008). ADHD with comorbid oppositional defiant disorder or conduct disorder: Discrete or nondistinct disruptive behavior disorders?. *Journal Of Attention Disorders*, *12*(2), 126-134. doi:10.1177/1087054707308486

Cuffe, S. P., McKeown, R. E., Addy, C. L., & Garrison, C. Z. (2005). Family and psychosocial risk factors in a longitudinal epidemiological study of adolescents. *Journal of the American Academy of Child and Adolescent Psychiatry, 44,* 121-129. doi: 10.1097/00004583-200502000-00004

Curtner-Smith, M., & MacKinnon-Lewis, C. E. (1994). Family process effects on adolescent males' susceptibility to antisocial peer pressure. *Family Relations: An Interdisciplinary Journal of Applied Family Studies*, *43*(4), 462-468. doi: 10.2307/585379

Damásio, A. R. (1996). The somatic marker hypothesis and the possible functions of the prefrontal cortex. *Philosophical Transactions Of The Royal Society B: Biological Sciences*, *351*(1346), 1413-1420.

Damásio, A. (1998). The somatic marker hypothesis and the possible functions of the prefrontal cortex. In A. C. Roberts, T. W. Robbins, L. Weiskrantz (Eds.), The prefrontal cortex: Executive and cognitive functions (pp. 36-50). New York, NY US: Oxford University Press.

Damasio, A. R. (2008). *Descartes' error: Emotion, reason, and the human brain*. New York, NY: Random House.

Damásio, A.R., Tranel, D., & Damásio, H. (1991). Somatic markers and the guidance of behaviour. In H. Levin, H. Eisenberg, & A. Benton (Eds). *Frontal lobe function and dysfunction* (pp. 217-228). New York: Oxford University Press.

Daugherty, T. K., & Quay, H. C. (1991). Response perseveration and delayed responding in childhood behavior disorders. Journal Of Child Psychology And Psychiatry, 32(3), 453-461. doi:10.1111/j.1469-7610.1991.tb00323.x

De La Fuente, A., Xia, S., Branch, C., & Li, X. (2013). A review of attention-deficit/hyperactivity disorder from the perspective of brain networks. *Frontiers In Human Neuroscience*, *7*doi:10.3389/fnhum.2013.00192

de Oliveira Cardoso, C., Núñez Carvalho, J., Cotrena, C., di Giorgio Schneider Bakos, D., Kristensen, C., & Paz Fonseca, R. (2010). Estudo de fidedignidade do instrumento neuropsicológico Iowa Gambling Task. *Jornal Brasileiro De Psiquiatria*, *59*(4), 279-285. doi: 10.1590/S0047-20852010000400003

Dodge, K. A., Lochman, J. E., Harnish, J. D., Bates, J. E., & Pettit, G. S. (1997). Reactive and proactive aggression in school children and psychiatrically impaired chronically assaultive youth. Journal Of Abnormal Psychology, 106(1), 37-51. doi:10.1037/0021-843X.106.1.37

Fairchild, G., van Goozen, S. M., Stollery, S. J., Aitken, M. F., Savage, J., Moore, S. C., & Goodyer, I. M. (2009). Decision making and executive function in male adolescents with early-onset or adolescence-onset conduct disorder and control subjects. Biological Psychiatry, 66(2), 162-168. doi:10.1016/j.biopsych.2009.02.024

Farrell, A. D., Henry, D. B., Mays, S. A., & Schoeny, M. E. (2011). Parents as moderators of the impact of school norms and peer influences on aggression in middle school students. *Child Development, 82*(1), 146-161. doi: 10.1111/j.1467-8624.2010.01546.x

Farrington, D. P., & Loeber, R. (2000). Epidemiology of juvenile violence. Child And Adolescent Psychiatric Clinics Of North America, 9(4), 733-748.

Faul, F., Erdfelder, E., Lang, A., & Buchner, A. (2007). GPower 3: A flexible statistical power analysis program for the social, behavioral, and biomedical sciences. *Behavior Research Methods*, *39*(2), 175-191. doi: 10.3758/BF03193146

Finucane, M., Slovic, P., Johnson, S., & Alhakami, A. (2000). The affect heuristic in judgments of risks and benefits. *Journal Of Behavioral Decision Making*, *13*(1), 1-17.

Flannery, D. J., Williams, L. L., & Vazsonyi, A. T. (1999). Who are they with and what are they doing? Delinquent behavior, substance use, and early adolescents' after-school time. *American Journal Of Orthopsychiatry*, *69*(2), 247-253. doi: 10.1037/h0080426

Fletcher, A. C., Steinberg, L., & Williams-Wheeler, M. (2004). Parental influences on adolescent problem behavior: Revisiting Stattin and Kerr. *Child Development*, *75*(3), 781-796. doi: 10.1111/j.1467-8624.2004.00706.x

Gansler, D. A., Jerram, M. W., Vannorsdall, T. D., & Schretlen, D. J. (2011). Does the Iowa Gambling Task measure executive function? *Archives Of Clinical Neuropsychology*, *26*(8), 706-717. doi: 10.1093/arclin/acr082

Garmezy, N., Masten, A. S., & Tellegen, A. (1984). The study of stress and competence in children: A building block for developmental psychopathology. Child Development, 55(1), 97-111. doi:10.2307/1129837

Geen, R. G. (2001). *Human aggression / Russell G. Geen*. Buckingham ; Phildelphia, PA : Open University, 2001.

Giancola, P. R., Peterson, J. B., & Pihl, R. O. (1993). Risk for alcoholism, antisocial behavior, and response perseveration. Journal Of Clinical Psychology, 49(3), 423-428. doi:10.1002/1097-4679(199305)49:3<423::AID-JCLP2270490317>3.0.CO;2-1

Goudriaan, A. E., Oosterlaan, J., de Beurs, E., & van den Brink, W. (2005). Decision making in pathological gambling: A comparison between pathological gamblers, alcohol

dependents, persons with Tourette syndrome, and normal controls. Cognitive Brain Research, 23(1), 137-151. doi:10.1016/j.cogbrainres.2005.01.017

Harold, G. T., Leve, L. D., Barrett, D., Elam, K., Neiderhiser, J. M., Natsuaki, M. N., & ... Thapar, A. (2013). Biological and rearing mother influences on child ADHD symptoms: Revisiting the developmental interface between nature and nurture. *Journal Of Child Psychology And Psychiatry*, *54*(10), 1038-1046. doi:10.1111/jcpp.12100

Henry, D. B., Tolan, P. H., & Gorman-Smith, D. (2001). Longitudinal family and peer group effects on violence and nonviolent delinquency. *Journal Of Clinical Child Psychology*, *30*(2), 172-186. doi: 10.1207/S15374424JCCP3002_5

Herrenkohl, T. I., Hill, K. G., Chung, I., Guo, J., Abbott, R. D., & Hawkins, J. (2003). Protective factors against serious violent behavior in adolescence: A prospective study of aggressive children. Social Work Research, 27(3), 179-191. doi:10.1093/swr/27.3.179

Hicks, B. M., Krueger, R. F., Lacono, W. G., McGue, M., & Patrick, C. J. (2004). Family transmission and heritability of externalizing disorders: A twin-family study. Archives Of General Psychiatry, 61(9), 922-928. doi:10.1001/archpsyc.61.9.922

Hooper, C. J., Luciana, M., Conklin, H. M., & Yarger, R. S. (2004). Adolescents' performance on the Iowa Gambling Task: Implications for the development of decision making and ventromedial prefrontal cortex. *Developmental Psychology, 40*, 1148 –1158. doi: 10.1037/0012-1649.40.6.1148

Humphrey, L.L. (1982). Children's and teachers' perspectives on children's self-control: the development of two rating scales. *Journal of Consulting and Clinical Psychology, 50*, 624–633.

Jameson, T. L., Hinson, J. M., & Whitney, P. (2004). Components of working memory and somatic markers in decision making. *Psychonomic Bulletin & Review, 11*(3), 515-520. doi: 10.3758/BF03196604

Jollant, F., Bellivier, F., Leboyer, M., Astruc, B., Torres, S., Verdier, R., & ... Courtet, P. (2005). Impaired Decision Making in Suicide Attempters. *The American Journal Of Psychiatry*, *162*(2), 304-310. doi: 10.1176/appi.ajp.162.2.304

Kokko, K., & Pulkkinen, L. (2000). Aggression in childhood and long-term unemployment in adulthood: A cycle of maladaptation and some protective factors. *Prevention & Treatment, 3*(1), 32a. doi: 10.1037/1522-3736.3.1.332a

Kully-Martens, K., Treit, S., Pei, J., & Rasmussen, C. (2013). Affective decision-making on the Iowa Gambling Task in children and adolescents with fetal alcohol spectrum disorders. *Journal Of The International Neuropsychological Society*, *19*(2), 137-144. doi:10.1017/S1355617712001026

Lahey, B. B., Rathouz, P. J., Van Hulle, C., Urbano, R. C., Krueger, R. F., Applegate, B., & ... Waldman, I. D. (2008). Testing structural models of DSM-IV symptoms of common forms of child and adolescent psychopathology. *Journal Of Abnormal Child Psychology*,*36*(2), 187-206. doi:10.1007/s10802-007-9169-5

Lanclos, N. F. (2002). *Parenting practices as a moderator of exposure to community violence.* ProQuest Information & Learning). *Dissertation Abstracts International: Section B: The Sciences and Engineering, 63*(2-) Retrieved from http://search.ebscohost.com/login.aspx?direct=true&db=psyh&AN=2002-95016-215&site=ehost-live. (2002-95016-215).

Levin, I. P., & Hart, S. S. (2003). Risk Preferences in Young Children: Early Evidence of Individual Differences in Reaction to Potential Gains and Losses. *Journal Of Behavioral Decision Making*, *16*(5), 397-413. doi:10.1002/bdm.453

Lin, A., Adolphs, R., & Rangel, A. (2012). Social and monetary reward learning engage overlapping neural substrates. *Social Cognitive And Affective Neuroscience*, *7*(3), 274-281. doi:10.1093/scan/nsr006

Lochman, J. E., Powell, N. P., Boxmeyer, C., Qu, L., Wells, K. C., & Windle, M. (2009). Implementation of a school-based prevention program: Effects of counselor and school characteristics. Professional Psychology: Research And Practice, 40(5), 476-482. doi:10.1037/a0015013

Lochman, J. E., & Wells, K. C. (2004). The Coping Power Program for Preadolescent Aggressive Boys and Their Parents: Outcome Effects at the 1-Year Follow-Up. Journal Of Consulting And Clinical Psychology, 72(4), 571-578. doi:10.1037/0022-006X.72.4.571

Loeber, R., Farrington, D. P., Stouthamer-Loeber, M., & White, H. R. (2008). Violence and serious theft: Development and prediction from childhood to adulthood. New York: Routledge.

Lubke, G. H., Muthén, B., Moilanen, I. K., McGough, J. J., Loo, S. K., Swanson, J. M., & ... Smalley, S. L. (2007). Subtypes versus severity differences in attention-deficit/hyperactivity disorder in the Northern Finnish birth cohort. *Journal Of The American Academy Of Child & Adolescent Psychiatry*, *46*(12), 1584-1593. doi:10.1097/chi.0b013e31815750dd

Luthar, S. S., Cicchetti, D., & Becker, B. (2000). The construct of resilience: A critical evaluation and guidelines for future work. Child Development, 71(3), 543-562. doi:10.1111/1467-8624.00164

Mardaga, S., & Hansenne, M. (2012). Personality and skin conductance responses to reward and punishment: Influence on the Iowa Gambling Task performance. *Journal Of Individual Differences*, *33*(1), 17-23. doi: 10.1027/1614-0001/a000057

Masunami, T., Okazaki, S., & Maekawa, H. (2009). Decision-making patterns and sensitivity to reward and punishment in children with attention-deficit hyperactivity disorder. *International Journal Of Psychophysiology*,*72*(3), 283-288. doi:10.1016/j.ijpsycho.2009.01.007

Matthys, W., & Lochman, J. E. (2010). *Oppositional defiant disorder and conduct disorder in childhood.* Chichester: Wiley-Blackwell.

Matthys, W., van Goozen, S. M., de Vries, H., Cohen-Kettenis, P. T., & van Engeland, H. (1998). The dominance of behavioural activation over behavioural inhibition in conduct disordered boys with or without attention deficit hyperactivity disorder. Journal Of Child Psychology And Psychiatry, 39(5), 643-651. doi:10.1017/S0021963098002534

Matthys, W., Van Goozen, S. M., Snoek, H., & Van Engeland, H. (2004). Response perseveration and sensitivity to reward and punishment in boys with oppositional defiant disorder. European Child & Adolescent Psychiatry, 13(6), 362-364. doi:10.1007/s00787-004-0395-x

Miu, A. C., Crişan, L. G., Chiş, A. A., Ungureanu, L. L., Drugă, B. B., & Vulturar, R. R. (2012). Somatic markers mediate the effect of serotonin transporter gene polymorphisms on Iowa Gambling Task. *Genes, Brain & Behavior*, *11*(4), 398-403. doi: 10.1111/j.1601-183X.2012.00774.x

Moss, E., Smolla, N., Cyr, C., Dubois-Comtois, K., Mazzarello, T., & Berthiaume, C. (2006). Attachment and behavior problems in middle childhood as reported by adult and child informants. *Development and Psychopathology, 18,* 425-444. doi: 10.1017/S0954579406060238

O'Brien, B. S., & Frick, P. J. (1996). Reward dominance: Associations with anxiety, conduct problems, and psychopathy in children. Journal Of Abnormal Child Psychology, 24(2), 223-240. doi:10.1007/BF01441486

O'Doherty, J.P. (2011). Contributions of the ventromedial prefrontal cortex to goal-directed action selection. *Annals of the New York Academy of Sciences, 1239*(1), 118-129. doi: 10.111/j.1749-6632.2011.06290.x

O'Doherty, J. P., Dayan, P., Friston, K., Critchley, H., & Dolan, R. J. (2003). Temporal difference models and reward-related learning in the human brain. *Neuron, 38*(2), 329-337. doi:http://dx.doi.org/10.1016/S0896-6273(03)00169-7

Olson, S. L., Sameroff, A. J., Lansford, J. E., Sexton, H., Davis-Kean, P., Bates, J. E., & ... Dodge, K. A. (2013). Deconstructing the externalizing spectrum: Growth patterns of overt aggression, covert aggression, oppositional behavior, impulsivity/inattention, and emotion dysregulation between school entry and early adolescence. *Development And Psychopathology*, *25*(3), 817-842.

Ostrov, J. M., & Godleski, S. A. (2009). Impulsivity-hyperactivity and subtypes of aggression in early childhood: An observational and short-term longitudinal study. *European Child & Adolescent Psychiatry*, *18*(8), 477-483. doi:10.1007/s00787-009-0002-2

Pearce, M. J., Jones, S. M., Schwab-Stone, M. E., & Ruchkin, V. (2003). The protective effects of religiousness and parent involvement on the development of conduct problems among youth exposed to violence. *Child Development*, *74*(6), 1682-1696. doi: 10.1046/j.1467-8624.2003.00631.x

Prencipe, A., Kesek, A., Cohen, J., Lamm, C., Lewis, M. D., & Zelazo, P. (2011). Development of hot and cool executive function during the transition to adolescence. *Journal Of Experimental Child Psychology*, *108*(3), 621-637. doi:10.1016/j.jecp.2010.09.008

Reimann, M., & Bechara, A. (2010). The somatic marker framework as a neurological theory of decision-making: Review, conceptual comparisons, and future neuroeconomics research. Journal Of Economic Psychology, 31(5), 767-776. doi:10.1016/j.joep.2010.03.002

Reynolds, C. R., & Kamphaus, R. W. (1992). *Behavior Assessment System for Children (BASC).* Circle Pines, MN.: American Guidance Service.

Rommelse, N. J., Altink, M. E., Fliers, E. A., Martin, N. C., Buschgens, C. M., Hartman, C. A., & ... Oosterlaan, J. (2009). Comorbid problems in ADHD: Degree of association, shared endophenotypes, and formation of distinct subtypes. Implications for a future DSM. *Journal Of Abnormal Child Psychology*, *37*(6), 793-804. doi:10.1007/s10802-009-9312-6

Rutter, M. (1987). Psychosocial resilience and protective mechanisms. American Journal Of Orthopsychiatry, 57(3), 316-331. doi:10.1111/j.1939-0025.1987.tb03541.x

Rutter, M. (2003). Genetic Influences on risk and protection: Implications for understanding resilience. In S. S. Luthar (Ed.) , Resilience and vulnerability: Adaptation in the context of childhood adversities (pp. 489-509). New York, NY US: Cambridge University Press.

Schutter, D., van Bokhoven, I., Vanderschuren, L., Lochman, J., & Matthys, W. (2011). Risky decision making in substance dependent adolescents with a disruptive behavior disorder. *Journal Of Abnormal Child Psychology*, *39*(3), 333-339. doi:10.1007/s10802-010-9475-1

Sevy, S., Burdick, K. E., Visweswaraiah, H., Abdelmessih, S., Lukin, M., Yechiam, E., & Bechara, A. (2007). Iowa Gambling Task in schizophrenia: A review and new data in patients with schizophrenia and co-occurring cannabis use disorders. Schizophrenia Research, 92(1-3), 74-84. doi:10.1016/j.schres.2007.01.005

Shapiro, S. K., Quay, H. C., Hogan, A. E., & Schwartz, K. P. (1988). Response perseveration and delayed responding in undersocialized aggressive conduct disorder. Journal Of Abnormal Psychology, 97(3), 371-373. doi:10.1037/0021-843X.97.3.371

Shaw, P., Gilliam, M., Liverpool, M., Weddle, C., Malek, M., Sharp, W., & ... Giedd, J. (2011). Cortical development in typically developing children with symptoms of hyperactivity and impulsivity: Support for a dimensional view of attention deficit hyperactivity disorder. *The American Journal Of Psychiatry*, *168*(2), 143-151. doi:10.1176/appi.ajp.2010.10030385

Shelton, K. K., Frick, P. J., & Wootton, J. (1996). Assessment of parenting practices in families of elementary school-age children. *Journal of Clinical Child Psychology*, *25*(3), 317-329. doi: 10.1207/s15374424jccp2503_8

Slovic, P., & Alhakami, A. (1994). A Psychological Study of the Inverse Relationship Between Perceived Risk and Perceived Benefit. *Risk Analysis: An International Journal*, *14*(6), 1085-1096.

Slovic, P., Finucane, M. L., Peters, E., & MacGregor, D. G. (2004). Risk as Analysis and Risk as Feelings: Some Thoughts about Affect, Reason, Risk, and Rationality. *Risk Analysis: An International Journal*, *24*(2), 311-322. doi:10.1111/j.0272-4332.2004.00433.x

Smith, D. G., Xiao, L., & Bechara, A. (2012). Decision making in children and adolescents: Impaired Iowa Gambling Task performance in early adolescence. *Developmental Psychology*, *48*(4), 1180-1187. doi: 10.1037/a0026342

Taylor, E., Chadwick, O., Heptinstall, E., & Danckaerts, M. (1996). Hyperactivity and conduct problems as risk factors for adolescent development. *Journal Of The American Academy Of Child & Adolescent Psychiatry*, *35*(9), 1213-1226. doi:10.1097/00004583-199609000-00019

Tsukayama, E., Duckworth, A., & Kim, B. (2013). Domain-specific impulsivity in school-age children. *Developmental Science*, *16*(6), 879-893.

Turnbull, O. H., Evans, C. Y., Bunce, A., Carzolio, B., & O'Connor, J. (2005). Emotion-based learning and central executive resources: An investigation of intuition and the Iowa Gambling Task. Brain And Cognition, 57(3), 244-247.

Upton, D. J., Bishara, A. J., Ahn, W., & Stout, J. C. (2011). Propensity for risk taking and trait impulsivity in the Iowa gambling task. *Personality and Individual Differences*, *50*(4), 492-495. doi: 10.1016/j.paid.2010.11.013

van Goozen, S., Cohen-Kettenis, P., Snoek, H., Matthys, W., Swaab-Barneveld, H., van Engeland, H. Executive functioning in children: a comparison of hospitalised ODD and ODD/ADHD children and normal controls. Journal Of Child Psychology And Psychiatry [serial online]. February 2004;45(2):284-292. Available from: PsycINFO, Ipswich, MA. Accessed March 30, 2013.

van Honk, J., Hermans, E. J., Putman, P., Montagne, B., & Schutter, D. G. (2002). Defective somatic markers in sub-clinical psychopathy. *Neuroreport: For Rapid Communication of Neuroscience Research*, *13*(8), 1025-1027. doi: 10.1097/00001756-200206120-00009

Visagan, R., Xiang, A., & Lamar, M. (2012). Comparison of deck- and trial-based approaches to advantageous decision making on the Iowa Gambling Task. *Psychological Assessment*, *24*(2), 455-463. doi: 10.1037/a0025932

Weber, E., Shafir, S., & Blais, A. (2004). Predicting Risk Sensitivity in Humans and Lower Animals: Risk as Variance or Coefficient of Variation. *Psychological Review*, *111*(2), 430-445. doi:10.1037/0033-295X.111.2.430

White, S. F., Pope, K., Sinclair, S., Fowler, K. A., Brislin, S. J., Williams, W., & ... Blair, R. R. (2013). Disrupted expected value and prediction error signaling in youth with disruptive behavior disorders during a passive avoidance task. *The American Journal Of Psychiatry*, *170*(3), 315-323.

Williams, J., & Dayan, P. (2005). Dopamine, Learning, and Impulsivity: A Biological Account of Attention-Deficit/Hyperactivity Disorder. *Journal Of Child And Adolescent Psychopharmacology*, *15*(2), 160-179. doi:10.1089/cap.2005.15.160

Wolfe, D. A., Crooks, C. V., Lee, V., McIntyre-Smith, A., & Jaffe, P. G. (2003). The effects of children's exposure to domestic violence: A meta-analysis and critique. *Clinical Child and Family Psychology Review, 6,* 171-187. doi: 10.1023/A:1024910416164

Woolley, M. E., & Grogan-Kaylor, A. (2006). Protective family factors in the context of neighborhood: Promoting positive school outcomes. *Family Relations: An Interdisciplinary Journal of Applied Family Studies, 55*(1), 93-104. doi: 10.1111/j.1741-3729.2006.00359.x

Wunderlich, K., Rangel, A., & O'Doherty, J. P. (2009). Neural computations underlying action-based decision making in the human brain. *PNAS Proceedings Of The National Academy Of Sciences Of The United States Of America*, *106*(40), 17199-17204. doi:10.1073/pnas.0901077106

Xiao, L., Bechara, A., Gong, Q., Huang, X., Li, X., Xue, G., . . . Johnson, C. A. (2012). Abnormal affective decision making revealed in adolescent binge drinkers using a functional magnetic resonance imaging study. *Psychology of Addictive Behaviors,* doi: 10.1037/a0027892

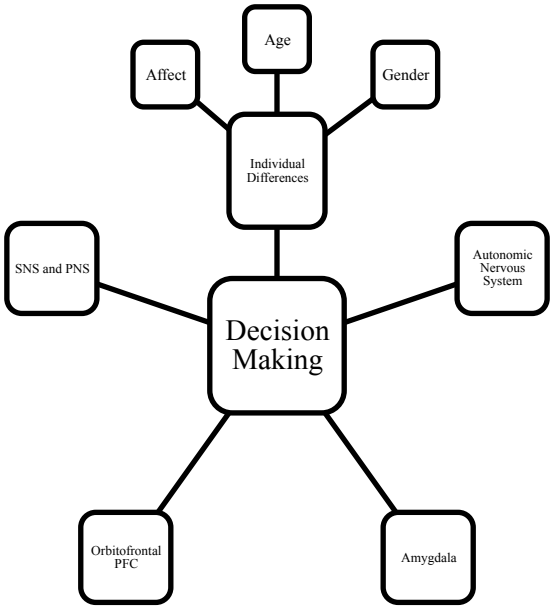
Zaraa, S. G., Cunningham, N., Pappadopulos, E., & Jensen, P. S. (2013). Disruptive behavior disorders and aggression. In M. McVoy, R. L. Findling (Eds.) , *Clinical manual of child and adolescent psychopharmacology (2nd ed.)* (pp. 97-146). Arlington, VA US: American Psychiatric Publishing, Inc.

Zelazo, P., & Müller, U. (2011). Executive function in typical and atypical development. In U. Goswami (Ed.) , *The Wiley-Blackwell handbook of childhood cognitive development (2nd ed.)* (pp. 574-603). Wiley-Blackwell.

APPENDIX

Figure 7

Decision Making



Inconsistent Discipline and Corporal Punishment Regression

Table 34

Hierarchical Regression of Aggression and IGT Score at Block 3 with Inconsistent Discipline and Corporal Punishment

	Variables Entered	*β*	*t*	*p*
Step 1	Aggression Time 3	.330**	3.320	.001
Step 2	Aggression Time 3	.321**	3.247	.002
	IGT Score at Block 3	-.151	-1.530	.129
Step 3	Aggression Time 3	.313**	3.025	.003
	IGT Score at Block 3	-.144	-1.419	.160
	Inconsistent Discipline	.087	.848	.399
	Corporal Punishment	-.018	-.173	.863
Step 4	Aggression Time 3	.277*	2.589	.011
	IGT Score at Block 3	-.072	-.624	.535
	Positive Parenting	.096	.912	.364
	Monitoring	-.023	-.212	.833
	IGT X Inconsistent	-.123	-1.086	.281
	IGT X Corporal	-.080	-.732	.466

Dependent Variable: Aggression at Time 4, β is Beta, t is the coefficient divided by standard error, p is the significance

Table 35

Hierarchical Regression of Aggression and IGT Score at Block 4 with Inconsistent Discipline and Corporal Punishment

	Variables Entered	*β*	*t*	*p*
Step 1	Aggression Time 3	.330**	3.320	.001
Step 2	Aggression Time 3	.331**	3.308	.001
	IGT Score at Block 4	-.039	-.391	.697
Step 3	Aggression Time 3	.327**	3.137	.002
	IGT Score at Block 4	-.017	-.160	.873
	Inconsistent Discipline	.094	.886	.378
	Corporal Punishment	-.045	-.426	.671
Step 4	Aggression Time 3	.282*	2.600	.011
	IGT Score at Block 4	.027	.246	.806
	Positive Parenting	.075	.703	.484
	Monitoring	-.039	-.367	.715
	IGT X Inconsistent	-.143	-1.189	.238
	IGT X Corporal	-.046	-.426	.671

Dependent Variable: Aggression at Time 4, β is Beta, t is the coefficient divided by standard error, p is the significance

Table 36

Hierarchical Regression of Aggression and IGT Score at Block 5 with Inconsistent Discipline and Corporal Punishment

	Variables Entered	*β*	*t*	*p*
Step 1	Aggression Time 3	.330**	3.320	.001
Step 2	Aggression Time 3	.330**	3.313	.001
	IGT Score at Block 5	-.096	-.964	.338
Step 3	Aggression Time 3	.325**	3.132	.002
	IGT Score at Block 5	-.091	-.906	.367
	Inconsistent Discipline	.094	.921	.360
	Corporal Punishment	-.039	-.376	.708
Step 4	Aggression Time 3	.336**	3.157	.002
	IGT Score at Block 5	-.131	-1.174	.244
	Positive Parenting	.091	.879	.382
	Monitoring	-.046	-.439	.662
	IGT X Inconsistent	.013	.108	.914
	IGT X Corporal	-.141	-1.144	.256

Dependent Variable: Aggression at Time 4, β is Beta, t is the coefficient divided by standard error, p is the significance