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# Adolescent aggression during a laboratory provocation:

# Assessing the protective role of prosocial peers and effortful control

Rachel Dyson, M.S.

Idaho State University

A dissertation

submitted in partial fulfillment

of the requirements for the degree of

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To the Graduate Faculty:

The members of the committee appointed to examine the dissertation of RACHEL DYSON find it satisfactory and recommend that it be accepted.

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September 9, 2014

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RE: Your application dated 9/9/2014 regarding study number 4140: Adolescent aggression during a laboratory provocation: Assessing the protective role of prosocial peers and effortful control

Dear Ms. Dyson:

Thank you for your response to requests from a prior review of your application for the new study listed above. Your responses are eligible for expedited review under FDA and DHHS (OHRP) designation.

This is to confirm that your application is now fully approved. The protocol is approved through 9/9/2015.

You are granted permission to conduct your study as most recently described effective immediately. The study is subject to continuing review on or before 9/9/2015, unless closed before that date.

Please note that any changes to the study as approved must be promptly reported and approved. Some changes may be approved by expedited review; others require full board review. Contact Tom Bailey (208-282-2179; fax 208-282-4723; email: humsubj@isu.edu) if you have any questions or require further information.

Sincerely,

Ralph Baergen, PhD, MPH, CIP
Human Subjects Chair

**Acknowledgements**

*"It is this belief in a power larger than myself and other than myself, which allows me to venture into the unknown and even the unknowable."*

- Maya Angelou

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**Abstract**

Violent and aggressive behavior has been identified as a significant public health issue that has widespread consequences for both the perpetrator and its recipients. Research assessing risk factors for aggressive behavior has found that systemic social variables such as peer group values affect the development of these behaviors (Dishion et al., 2004). Moreover, individual characteristics such as self-control or regulatory skills have also been identified as predictive factors for later problem behaviors (DeWall, Baumeister, Stillman & Gaillot, 2007). The current study aimed to better understand how social relationships, particularly prosocial peer group interactions can influence aggressive behavior in response to a laboratory provocation. The extent to which an individual's self-control can mediate that relationship was also explored. The study sample contained 153 adolescents aged 11-14, who were asked to participate in the Survivor Game, a mock social media contest in which they were provided either positive or negative feedback by same-age peer confederates. It was hypothesized that adolescents who reported higher prosocial peer behaviors would exhibit higher levels of effortful control, which would predict lower aggressive behavior. Although the direct relationship between peer prosocial behaviors and aggression was not significant ($p > .05$), self-control significantly mediated the relationship between peer prosocial behaviors and aggression, 95% ACI [.009, .177], $p < .05$. Multiple groups analysis did not yield any significant differences across experimental and control conditions, suggesting that the mediated effect was the same regardless of the level of provocation received during the experimental manipulation. Implications for continued research and clinical intervention in a developmental framework are discussed.

# Chapter 1

## Introduction

In 2012, the Bureau of Justice reported a continued increase in crimes of violent victimization as compared to the previous two years. Statistics suggest that approximately 26.1 in 10,000 individuals aged 12 years or older experienced some form of violent victimization (i.e., rape, sexual assault, robbery, aggravated, and simple assault) over the past year. In addition, reports suggest that the commission of violent acts was significantly underreported to authority officials as compared to previous years (BJS, 2012), suggesting that the available statistics likely represent a portion of actual aggressive attempts pursued in the United States annually.

As is evidenced by these increases in criminal behaviors, aggression and violence represent a significant social and public health issue that threatens the well-being of both the individual and their surrounding social community. Expressions of aggression are associated with a number of psychiatric diagnoses, including conduct disorder, oppositional defiant disorder, and antisocial personality disorder (DSM-V; 2012). Empirical research focused on the epidemiology of these disorders has identified young adulthood (ages 17-29) as a significantly high-risk period for the development of these externalizing problems (Hamdi & Iacono, 2014). Thus, exploring factors that may contribute to or change the expression of these aggressive behaviors earlier in the developmental trajectory may offer valuable information regarding the prevention of later developing these problematic patterns.

Results from my own master's thesis (2013) yielded support for the relationship among perceptions of peer prosocial behaviors and subsequent externalizing problems.

The results indicated that peer prosocial behavior was associated with higher effortful control (defined as the ability to inhibit a dominant response in order to perform a subdominant response) in adolescents. Moreover, higher effortful control was related to lower externalizing problems. Despite this study's contributions in understanding the effects of positive friendships on maladaptive behavior, the study adopted a correlational design and relied on participants' self-report.

Recent studies have begun to test similar research questions within a laboratory setting (Reijntjes et al., 2006, Reijntjes et al., 2011a & b) and have found consistent relationships among important social variables (e.g., emotion regulation, presence of psychiatric symptoms) and aggressive behavior. However, to my knowledge, there are currently no studies that have systematically explored the relationship between positive peer group behaviors and aggressive behavior in a laboratory setting.

Stemming from the findings of my master's thesis as well as the existing literature on aggressive behavior in adolescence, the current study aimed to assess the way in which aggression, effortful control, and executive functions are affected by the prosocial behaviors modeled by the peer group. Using a mock social media program, this study manipulated levels of provocation in a laboratory setting to assess the extent to which peer relationships affect aggression expressed in response to a novel stimulus (e.g., a critical peer judge). Effortful control and executive functions were hypothesized to be mediators of the relationship between prosocial peer relationships and aggression.

**Aggression**

Externalizing problems in the adolescent encompass all behavioral problems that are directed toward another person or group of people (Dishion, Andrews & Crosby,

1994; Rescorla et al., 2007). Such behaviors may be aggressive, delinquent or emotional in nature. These behaviors have been found to predict problems at school, in the workplace and within social circles (Calkins & Keane 2009; Patterson, Debrayshe & Ramsey, 1989). A clear distinction between aggression and delinquency should be understood. Aggressive externalizing problems are most often forceful and hostile, involving the intention to cause harm. It is more succinctly defined as any action with the intention to harm another organism (physically or psychologically; Berkowitz, 1988). It can also be considered an action aimed at increasing social dominance. Aggressive behavior can be relational (verbal abuse, rumors), hostile (physical, solely to cause harm) or instrumental (serving a means to an end) in form (Dishion, Nelson, Winter & Bullock, 2004).

Contrastingly, delinquency can be defined as any antisocial or illegal behavior committed by an individual, which society deems as inappropriate or unacceptable (Steiner et al., 2011). While some of these actions may be violent in nature (rape, assault, murder), others are nonviolent (theft, underage drinking, vandalism, etc.; Bureau of Justice Statistics, 2009). Delinquency is often aimed at attaining some material goal or reward, whereas aggressive behavior may not offer such reinforcement. Finally, the degree of planning and reflection employed in acts of aggression versus delinquency represent a point of discrepancy. Although certain forms of aggression may be more systematic in nature (e.g., instrumental aggression aimed at obtaining a re-enforcer), typical aggressive responses are committed impulsively and with little thought of long-term consequences (e.g., hitting someone who is teasing you). Contrastingly, delinquent behaviors can be involved in more extensive planning and preparation, occurring over a

longer period of time in which risks and benefits are more likely to be recognized (e.g., planning opportunities to drink alcohol, discussing steps to successfully steal an item). As a result of the overlap between the two concepts, and their frequent comorbidity, they are to be considered under the general umbrella of externalizing problems (Achenbach, 1991 a & b).

The current study focused primarily on the subdomain of aggression due to its socially embedded consequences and the degree of threat it presents to the general social community.

**Predictors and risk factors of aggression.**

Given the social salience of aggressive behavior, the empirical literature has noted several covariates predicting these aggressive outcomes that span biological, social, and systemic realms. The following section will explore the most evident risk variables, in addition to select variables pertinent for the proposed study (e.g., social, interpersonal variables).

Both internal characteristics and external situational factors may contribute to the expression of maladaptive behavior. John et al. (1994), explored the stable personality correlates of antisocial behavior. They found that boys exhibiting externalizing problems scored significantly lower on scales of agreeableness and conscientiousness than those boys who did not express these problems. Moreover, studies focusing on biological components of delinquency have found temperament in infancy as directly related to later aggressive and criminal behavior, potentially becoming an intergenerational trait transmitted both genetically and environmentally to offspring (Dodge & Pettit, 2003). Specifically, those children with more impatient, overly-resistant-to-control

temperaments at birth were substantially more likely to exhibit antisocial tendencies as adolescents. The stability of this aggressive behavior has been shown to be persistent, with those exhibiting problem behaviors in early childhood being significantly more likely to have trouble in adolescence and young adulthood (Huesmann, Eron, Lefkowitz & Walder, 1984). Considering external mechanisms by which these biological predispositions could be elicited is also warranted.

Environmental factors at each level of social interaction work to manipulate the individual's behavior. To fully understand the scope of these risk and protective factors, each systemic unit (individual, family, peer, community) acting on the adolescent should be considered. Factors such as socioeconomic status, parental education and occupation, and parental divorce are all strong predictors of later conduct problems in childhood and adolescence (Brengden et al., 2000). In childhood, parental figures play a large role in the psychological development of the individual and are the first social system available for understanding appropriate behavioral responses. As the primary attachment figures, the parents also have the opportunity to model skillful responses to psychological distress and emotion. Insecure attachments to a caregiver may consequently result in maladaptive responses in later life, including externalizing problems (Salisch, 2001). Research focused on the effects of coercive family characteristics such as parental hostility have discovered that these tactics may also negatively reinforce the child, therefore leading to increases in externalizing problems and other aggressive behaviors (Benson, Buehler & Gerard, 2008; Williams, Conger & Blozis, 2007). One study by Benson and Buehler (2012) assessed family characteristics longitudinally predicting adolescent aggression across three years. Results indicated that increased hostility and decreased parental

warmth predicted to increased aggression at a one-year follow-up. Beyond the immediate family unit, social relationships within adolescence begin to emerge as significant vehicles for behavior change.

In particular, the peer group serves as a social model teaching the individual appropriate emotional expression, problem solving, and emotional dampening when necessary (Keenan, Loeber, Zhang & Stouthamer-Loeber, 1995). Developmentally, peer networks and friendships formed during adolescence serve not only as a fostering environment for identity development, but as a firsthand learning situation from which individuals form their beliefs, discover moral and social norms, and confirm their own attitudes toward societal expectations (Dishion, Spracklen, Andrews, Patterson, 1996; Keenan et al., 1995). Masten, Juvonen and Spatzier (2009) assessed parent and peer influences in elementary and junior high students ($4^{th}$ to $8^{th}$ graders). They found that although parents influenced academic performance across all grades, peer group norms were significantly predictive of social competency for all grades studied. Parental influence affected social competence until fourth grade, at which time peer influences dominantly predicted these abilities in the child. Such findings suggest the peer network's ability to surpass the parental unit in influence and power over the social functioning of the adolescent. A review by Salisch (2001) emphasizes the contribution of "display rules" by peers, the process of training the adolescent to mute or dampen emotions such as anger or frustration. When close friendships require the disclosure of these emotions, it can help the individual to manage their emotions in a healthy manner. However, when there is no expectation by peers to control emotion, higher levels of aggression and

violence may develop and be further exacerbated by adolescents with lower levels of effortful control.

Dishion and colleagues (1997) studied 206 boys aged 13-18 in a laboratory task. They found that teenaged males accompanied by close friends who regularly engaged in violent behavior (as measured by experimenter observation) had consistent discussions and problem solutions that were aggressive in nature. The researchers emphasize the importance of interpersonal processes with peers in forming deviant behavior patterns. Moreover, later research by Dishion et al. (2004) found that adolescent based delinquency was reflected in peer groups with more disorganized (high entropy) and deviant discussion. Those with more organization (low entropy) but equally high levels of deviant content in their discussion had more persistent aggressive and delinquent behavior in to young adulthood. The role of interpersonal qualities in peer networks has continued to emerge as a relevant predictor in the adolescent's overall externalizing symptoms. Additional research has supported the importance of peer rejection and social competence in the expression of externalizing behavior (Cardoos & Hinshaw, 2011; Dishion, Patterson, Stoolmiller & Skinner, 1991). Specifically, these studies have focused on peer rejection resulting from noncompliant behaviors by the individual. Rather than understanding and adhering to the accepted display rules of the peer network, noncompliant adolescents undergo a failure of the "dampening process" discussed by Salisch (2001).

Moving beyond the micro-systemic variables within the adolescent's purview, the larger cultural environment can play a large role in the acceptance and expression of aggressive behaviors. The interactive role of protective and risk factors are directly

maintained by the norms, values, and beliefs of the dominant culture. Specifically, the dichotomy between individual and collectivist values has recently been outlined in the literature as a specific predictor of delinquent and aggressive behaviors. A study by Le and Stockdale (2005) found in a study of 329 Asian-American youth, that cultures with more individualistic principles expressed significantly more delinquent behaviors compared to collectivist counterparts. While often not considered, the role of cultural constructs has the potential to protect or expose the individual to a milieu of maladaptive behaviors (Cicchetti & Rogosch, 2002).

**Theories of aggression.**

In order to conceptualize the widespread empirical findings among the aforementioned risk factors and the development of aggression across childhood and adolescence, several theories of aggression have emerged to provide a framework for understanding this behavioral response. Pulling from both psychological and sociological paradigms, the following theories focus on identifying the etiology and maintenance of aggression across development.

***Agnew's general strain theory.***

General Strain theory initially emerged in the 1930's from Merton (1938), who asserted that aggression and criminal behavior primarily resulted from the discrepancy between one's aspirations and their actual outcomes, resulting in stress and frustration. Initially focused only on one's inability to accumulate monetary wealth, Robert Agnew (1992) revised the theory to include three general forms of strain that could result in deviant behavior: i) inability to achieve positively valenced goals, ii) loss of positive-valued stimuli, and iii) presentation of negative stimuli. Agnew argued that experiencing

these forms of strain leads to increased negative affect (e.g., anger, frustration), and deviant behavior may be one coping mechanism employed by the organism to manage those experiences and engage in corrective action (Agnew, 1992). Although well supported by empirical literature tying GST to deviant or criminal behavior, the theory also accumulated criticisms for being too broad in nature, potentially leading to an un-falsifiable paradigm due to its general and ambiguous definitions. In the most recent revision, Agnew (2001) operationalized the different forms of strain and their correlates. He established the definitions of objective versus subjective strain, in which objective strains are those conditions under which most members of a group experience frustration or aggression. Conversely, subjective strain is the extent to which an individual dislikes the strain they are experiencing. GST asserts that it is differences in individual's subjective experiences of the same objective strain that lead to differential behavioral responses to an aversive condition. Finally, Agnew argued that it is the collective and cumulative experience of several strains on the individual that eventually results in the commission of these deviant responses. While strain theory provides a conceptually useful focus on the macro-level social variables contributing to an individual's maladaptive responding, it fails to consider individual characteristics that contribute to the differential responses across organisms.

Despite the limitations mentioned above, GST has continued to gather empirical support for the importance of environmental strains in producing problematic outcomes. For example, Aseltine, Gore, and Gordon (2000) found that both family and peer conflict was associated with delinquent behaviors in the adolescent such that increased negative interactions within those relationships predicted higher rates of delinquency and

deviance. Moreover, a study by Estrada-Martinez, Caldwell, Bauermeister and Zimmerman (2012), assessed the effects of different strain on an urban African-American population, and found that increased daily stress and experiences of racial discrimination led to increased tendencies for violent behavior in young adulthood. Additional research has linked various general strains, including experienced and witnessed abuse, negative life events, and difficulties with peers, to increased deviant behavior. Patchin and Hinduja (2011) assessed antecedents to instigating bullying in adolescent youth, and found that children who reported more strain (e.g., higher conflict with peers) were more likely to report bullying others both in-person and over social media (e.g., "cyberbullying"). Overall, while support exists for the assumptions proposed by general strain theory, the overgeneralized nature of the term "strain" and its lack of focus on more specified individual differences make it an insufficient theory for conceptualizing the proposed study. Nonetheless, it offers an initial conceptualization of the extent to which social structures, including the peer group, could contribute to overt aggressive behaviors.

***Frustration-aggression hypothesis.***

The frustration-aggression hypothesis was first proposed in 1939 by Dollard and colleagues, as a framework for understanding the emergence of aggressive behaviors in an organism. Specifically, they asserted that experiencing frustration as a result of being "thwarted" or blocked from a desired goal propelled the individual to engage in hostile aggressive behaviors in order to overcome the experience of frustration. Although a groundbreaking theory in the study of aggression and anger, later researchers identified a number of issues with the primary assumptions, thus leading to several revisions, most notably by Berkowitz (1988). Berkowitz argued for the importance of encompassing

various forms of aggression (e.g., instrumental versus hostile) and the unique ways in which they contribute to aggressive behaviors by the organism. He further challenged the assertions that the frustration-aggression link would only emerge following an intentional and illegitimate block of one's goals; rather, he concluded that "reasonable and legitimate" sources of thwarting could also elicit a frustrated and subsequently aggressive response pattern (Berkowitz, 1988). Finally, Berkowitz (1988) proposed that frustration, although a necessary condition for aggressive responding, it is not sufficient for producing the aggressive response, and instead needs to be paired with "suitable cues" for expressing aggression. Without those cues signaling sufficient conditions for the response, aggressive behavior is more probable, but not guaranteed.

Support for the frustration-aggression hypothesis is inconsistent and is typically compromised by a lack of clear operational definitions for a qualifying "frustration." A study conducted by Gustafson (1989) discovered, in a sample of undergraduate males, that subjective levels of frustration predicted increased aggressive behavior as measured by higher shock intensity applied to a confederate in Buss' aggression paradigm (see the review of aggression paradigms on page 17 for more detail). A more recent study by Breuer, Scharkow and Quandt (2013) discovered that losing a video game led to more aggressive behaviors than listening to "trash-talk" by one's opponent. These results offer support for the frustration-aggression hypothesis by identifying differential aggressive responding from provocation (i.e., trash-talk) versus a block of one's goals (i.e., winning the game). Despite this body of research, the frustration-aggression hypothesis is unable to explain other phenomenon leading to aggressive behavior. For instance, understanding

how a provocation from another individual such as teasing or bullying would elicit aggressive behavior, despite a lack of any goal-directed behavior being blocked.

***Gottfredson and Hirschi's self-control theory.***

Gottfredson and Hirschi's (1990) theory of self-control asserts that individuals who exhibit lower self-control capabilities are more likely to engage in problematic deviant behavior, including aggression. Specifically, they propose that those with low self-control are less planful and reflective in their actions, and are less likely to consider the long-term consequences in tandem with the short-term benefits of their behaviors. Characteristics such as *impulsive*, *reckless*, and *unable to defer gratification* are used to describe the low self-control individual (Gottfredson & Hirschi, 1990). Due to these decreased levels of control, it is asserted that individuals are at risk of engaging in more impulsive, deviant behaviors. Gottfredson and Hirschi highlight six common characteristics comprising individuals with low self-control: i) low determination or diligence, ii) high risk-seeking behaviors, iii) poor delay of gratification, iv) preference for simple activities, v) increased self-focused attention, and vi) low frustration tolerance. In regard to the etiology of poor self-control and subsequent aggressive behavior, self-control theory posits that poor parental monitoring and a lack of punishment for undesirable behaviors leads to the continued use of aggression and deviance to pursue immediately gratifying goals. Hirschi (2004) also proposed that social bonds represented a salient mechanism upon which one's levels of self-control operate. Under this assumption, social bonds serve as inhibitors to deviant or aggressive behavior, and can vary in salience based on the number and quality of each of those bonds. Therefore, an individual with relatively few social bonds of poor quality will be more likely to engage

in deviant behavior as compared to an individual with a larger number of positive social bonds.

Research supporting the self-control theory is widespread, with a number of studies linking low self-control and poor social bonds to deviant outcomes, including aggression (Brown & Jennings, 2014; Jennings et al., 2013). One limitation of self-control theory is its focus on the family unit as the sole mechanism of creating self-control in the child. A number of empirical studies have begun to discount that proposition by establishing a more holistic approach to self-control development that incorporates influences from peers, teachers, and other ancillary figures. For example, Jennings et al. (2013) found that peer deviance was a significant predictor of self-control. A second longitudinal study assessing pre-adolescent youths found that peer behavior significantly predicted later adolescent self-control beyond those effects accounted for by parental factors (Meldrum & Hay, 2012). Therefore, understanding the role that social figures (e.g., parents, peers, siblings) play in developing self-control across childhood and adolescence is clearly asserted both empirically and theoretically in this model. In concert with Hirschi's assertion that social models contribute to the development of self-control skills, Bandura's Social Learning Theory explores the systemic nature of skills acquisition.

***Social learning theory.***

A broad psychological approach, social learning theory (SLT) proposes that individuals learn behaviors and attitudes by observing models in their social environment (Bandura, 1977; Watt, Howells, Delfabbro, 2004; Winfree, Bäckström & Mays, 1994). SLT emphasizes the process by which significant figures in an individual's life (i.e.,

peers, siblings, and parents), serve as models for behavior and the associated consequences or rewards associated with that behavior (Cornish, 1993; Watt, Howells & Delfabbro, 2004; Winfree, Bäckström, & Mays, 1994). Bandura (1977) identified three different models through which an individual can observe and learn behavior -- the live model, in which the individual directly observes a person demonstrating the target behavior; verbal instruction, where the desired behavior is described in detail for the individual to perform; and the symbolic model in which modeling occurs through media sources (i.e., television, magazines, internet). Modeled behavior in SLT is learned through four basic mechanisms- *attention* to social models, *retention* of observed behaviors, *reproduction* of the modeled behavior, and *motivation* to engage in an action. Each stage is considered a necessary component for the commission of an observed action (Van Voorhis, 1997). SLT also discusses the importance of model characteristics that affect the likelihood of an individual vicariously learning a behavior. Social models that are similar to, in authority over, or positively valenced toward the target organism are more likely to serve as salient cues for learning. Based on these factors, it is not surprising that peers, parents, and teachers serve as some of the most robust social models in the individual's environment.

Although SLT is a broad theoretical framework that generally applies to learned behavioral responses in the organism, the substantial pool of empirical support using SLT as a paradigm for explaining deviant behavior justifies its utility in conceptualizing aggression under this theory. In the classic social modeling experiment, Bandura et al. (1969) found that children who observed a model aggressively striking a Bobo doll toy during free play were significantly more likely to act aggressively during their own play

period with the same doll. More recent research has continued to support this imitative aggression phenomenon and replicate the findings established by Bandura's early study (Hayes, Rincover & Volosin, 1980; Zumkley, 1980). Another study by Christakis et al. (2013) used a randomized controlled trial of clinical preschool children to determine if presenting pro-social programs (e.g., images of helping others) in substitution for more aggressive television media could reduce aggressive behaviors on a social competency analog. Results yielded significant effects, such that children who had received more pro-social programs exhibited higher social skills scores and lower externalizing problems compared to children who were exposed to more violent media.

**Peer Prosocial Behavior**

In congruence with the assertions of SLT, the peer group can be conceptualized as a major social model within adolescence. A recent study by Calkins and Keane (2009) emphasized the importance of peer relationships in understanding how effortful control relates to externalizing problems. Developmentally, peer networks and friendships formed during adolescence serve not only as a fostering environment for identity development, but as a firsthand learning situation from which individuals form their beliefs, discover moral and social norms, and confirm their own attitudes toward societal expectations (Dishion, Spracklen, Andrews, Patterson, 1996; Keenan et al., 1995). As a result of the developmental relevance of friendship in adolescence, both the protective and risk factors of peer networks has been explored. Current research however, has produced a biased focus on the antisocial over prosocial qualities of the adolescent's peer groups. Theoretically, there is a general support for the overwhelming influence of peers on the development of the adolescent.

## Theories of peer influence.

### *Social learning theory.*

Theoretically, the importance of peer influences has been discussed in Social Learning Theory, and provides a supplement to the theory's conceptualization of emerging aggressive behaviors. As previously discussed, salient social models in the individual's environment can teach various behaviors and associated outcomes. One such social model is the peer group. For example, when the adolescent observes a "model" engaging in prosocial behavior, followed by a positive reward (i.e., gratitude), a positive association is formed and later recalled. An additional component of SLT germane to peer processes is reciprocal determinism, the notion that each individual's behavior influences and is influenced by those around them (Nangle, Erdley, Adrian & Fales, 2010). Under this consideration, peer networks bi-directionally influence each other, making the commission of one act (i.e., prosocial behavior) by a member of the social group a model for others, who then act as models for their own extended social circle.

### *Differential association.*

Differential Association (DA) is a specific sociological theory that considers the contribution of peer networks to adolescents' behavior with origins in learning theories. Specifically, DA proposes that individuals learn the techniques, rewards and maintenance skills to build specific skill sets and behavioral patterns via close associates or peers (Watt, Howells & Delfabbro, 2004). Differential Association has traditionally focused on the deviancy training process an individual undergoes when collaborating with delinquent peers. Peers may teach skills regarding how to behave in social situations, how to commit a crime, and how to escape subsequent punishment. The emphasis on the strength of peer

influences is particularly relevant to the proposed research. While some peers may model deviant or maladaptive behaviors, positive or prosocial peers may model socially appropriate and socially rewarding behaviors, including valuable emotion regulation processes.

***Peer proximity theory.***

The peer proximity theory purports that the closer and more exclusive the friendship between an individual and their peers, the greater the peer influence has on the adolescent (Paek, 2009). Peer proximity theory defines peers as a "multidimensional concept that includes close friends as the immediate social circle of friends and a more general crowd as the larger social context" (Bearman, 2002). Specifically, this positive correlation between friendship strength and relative influence may add an additional dimension into the exploration of peer influences. While the construct of "peers" holds a generally broad definition, focus on the more intimate friendships the adolescent has will, theoretically, target more influential relationships. Based on this theory, empirical research needs clear specification of its operational terms when assessing peer influences.

**Developmental relevance of the peer group.**

Noting the strong theoretical support for peer group influence, empirical support has also illustrated its role across development. In early childhood, the main source of social training and reference comes from the primary parent/caregiver. Parents are the first agent for teaching emotional reactions, reinforcing social norms and providing feedback on behavior (Patterson, DeBaryshe &Ramsey 1989). Current research suggests that a lack of discipline or initiative to change inappropriate behaviors on the parent's behalf predicts later engagement with antisocial peers and poorer academic performance

(Dishion, Patterson, Stoolmiller & Skinner, 1991). Academically, the parental figures' perceived beliefs and values about school have been found to significantly predict academic performance and behavior in the child. Accordingly, parents influence social behavior for younger children as well (Masten, Juvonen & Spatzier, 2009). Generally, studies have found that physical aggression and nonaggressive delinquency surfacing in early childhood will persist into the adolescent years (Broidy et al., 2003). The tendency for these behaviors to persist however can be directly related to the peers the individual associates with. Masten, Juvonen and Spatzier (2009) assessed parent and peer influences in elementary and junior high students ($4^{th}$ to $8^{th}$ graders). They found that although parents influenced academic performance across all grades, peer group norms were significantly predictive of social competency for all grades studied. Such findings suggest the peer network's ability to surpass the parental unit in influence and power over the social functioning of the adolescent.

Social learning theorists have considered processes such as *youth culture*, in which adolescents in each age cohort determine standardized ways of thinking, dressing, behaving etc. that are unique to their age group. The goals of social cohesion and inclusion to these cultures can lead to both unification of adolescent groups and a sense of belonging. For this reason, many researchers have found that adhering to peer expectations and adapting to peer beliefs may serve as a ritual of social acceptance (Vander Zanden, 1985). A study by Hunter (1982) collected a wide range of qualitative information on different social models in child and adolescent populations. The authors concluded that peers offer a varied experience for the adolescent than do their parents (i.e., "hanging out" vs. doing chores) and as a result, are more likely to influence the

social and emotional behavior of the child. As the individual develops into adolescence, the functions of the peer network also allow for a more intimate disclosure of thoughts on topics such as substance use, emotional distress, social status, etc. than do relationships with parents thus perpetuating the strength of those interpersonal relationships during the teenage years (Hunter & Youniss, 1982).

**Antisocial versus prosocial behavior.**

Generally, past research has connected antisocial peers to adverse outcomes in the individual including academic difficulty, poorer social competence and future incarceration (Dishion, Patterson, Stoolmiller & Skinner, 1991; Gillaspy, 2005; Masten, Juvonen & Spatzier, 2009; Murphy & Eisenberg, 1997; Shin, Daly & Vera, 2007). A review by Salisch (2001) emphasizes the contribution of "display rules" by peers, the process of training the adolescent to mute or dampen emotions such as anger or frustration. When close friendships require the disclosure of these emotions, it can help the individual to manage their emotions in a healthy manner. However, when there is no expectation by peers to control emotion, higher levels of aggression and violence may develop and may be further exacerbated by adolescents with lower levels of effortful control.

In studies reviewed earlier, Dishion and colleagues (1997) found that teenaged males accompanied by delinquent/violent friends had consistent that were aggressive in nature. The researchers emphasize the importance of interpersonal processes with peers in forming deviant behavior patterns. The role of interpersonal qualities in peer networks has continued to emerge as a relevant predictor in the adolescent's overall externalizing symptoms. Additional research has supported the importance of peer rejection and social

competence in the expression of externalizing behavior (Cardoos & Hinshaw, 2011; Dishion, Patterson, Stoolmiller & Skinner, 1991). Specifically, these studies have focused on peer rejection resulting from externalizing noncompliant behaviors by the individual.

Despite extensive research linking deviant peers to individual outcomes, relatively little research has been done on the possible protective role of positive peer influence; specifically, peers' prosocial behaviors. Prosocial behavior can be defined as any behavior intended to benefit another, or that is aimed at the social cohesion of one's group. It can further be conceptualized as attitudes and behaviors that are positively oriented toward academic success, abstaining from substance use, helping others in need, creating alliances with figures of authority, etc. (Eisenberg, Fabes, & Spinrad, 2006).

A majority of research assessing peer prosocial behavior has focused on its relation to health risk behaviors. A study by Clay (2004), found that incarcerated male youth (N= 144) were more likely to use condoms when they perceived their peers to have similar positive attitudes toward condoms. Prinstein, Boegers and Spirito (2001) assessed the effects of a range of peer behaviors, including prosocial behavior, on adolescent health-risk outcomes. Associating with peers who endorse prosocial behavior was found to predict fewer reports of risky health and social behavior in adolescents, including deviant/ aggressive actions. Healthy friendships, such as those providing prosocial support to its members, have also been shown to protect girls with attention deficit hyperactivity disorder against peer victimization in school (Cardoos & Hinshaw, 2011). These studies showed that maintaining healthy friendships could protect the at-risk individual against adverse effects in social arenas. Chung (2010) also found that prosocial peer groups related to increased prosocial behaviors in the child, whereas more

aggressive peer groups led to greater social deficits and poorer social, academic, and psychological adjustment one year later. This study also found that associating with a prosocial peer group served as a protective factor against later developing internalizing problems (e.g., anxiety, depression).

Additional research has suggested that perceived social acceptance and preference by mainstream peer networks leads to less aggressive behaviors and externalizing problems in children with adverse temperament and emotion regulation. This effect was significantly found for girls, suggesting a possible gender dichotomy in the relation between peer acceptance and behavioral problems (Berdan, Keane & Calkins, 2008). A study by Berndt and Keefe (1995) found similar influences of peers on academic and social adjustment. Specifically, those students with disruptive friends at the start of the school year exhibited more disruptive behaviors at the end of the year. In contrast, those students whose friends had more positive attributes at the start of the year were more involved in school functions and activities the following spring. This study also found that participants' academic achievement increased as a function of the positive attributes of their close friends.

**The Link between Prosocial and Aggressive Behaviors**

Although research focusing on the predictive relationship between peer pro-sociality and adolescent aggression is relatively nascent, studies have indicated a distinct negative relationship between the prosocial and aggressive behaviors exhibited by an individual (Carlo et al., 2014; Nantel-Vivier, Pihl, Cote, Tremblay, 2014). One study by Carreras and colleagues (2014), found that, for both males and females, higher levels of prosocial behavior in interpersonal interactions was associated with lower indirect

aggression (e.g., relational aggression). In addition, those children who engaged in higher pro-sociality also exhibited higher levels of affective empathy and were subsequently more liked by their peers. The researchers discussed the importance of gaining a "warm social intelligence" for engaging in peer interactions that is often manifest in higher prosocial behaviors and lower aggression. Liao, Li, and Su (2014) discovered that emotion recognition in early childhood (4-6years old) was related to increased prosocial behaviors, more effective conflict resolution, and more positive peer interactions. In adolescence, several studies have found that increased prosocial behaviors related to more positive peer interactions which related to subsequently lower relational and physical aggression (Lansu, Cillessen, & Bukowski, 2013; Molano, Jones, Brown, & Aber, 2013).

While the relationship between the peer group and subsequent deviance is evident, relatively little work has been done to explore this relationship within a laboratory setting. Moreover, understanding the link between positive peer behaviors and aggression is underdeveloped. Studying aggressive behavior in a controlled setting allows researchers to randomly assign participants to different conditions, making it possible to understand causal relationships between aggression and other variables. The following section will review methods for pursuing a more controlled experimental approach to studying aggression.

**Review of Measuring Aggression in the Lab**

Methods for assessing aggression in the laboratory setting have continued to expand, and include a number of designs for assessing varying subdomains (e.g., hostile, instrumental, reactive) of aggressive behavior. These designs have also been used across

adolescent and adult samples, and seem to have good external validity as evidenced by their correspondence with ratings of general aggressive behaviors in natural settings (Anderson & Bushman, 1997; Anderson, Lindsay, & Bushman, 1999; Mitchell, 2012). From a methodological standpoint, there is a need to consider existing provocation paradigms that have been empirically used to elicit anger from participants. In addition, the ethical considerations of implementing one of these laboratory deception protocols within adolescent age groups are explored below.

Beginning with the adult literature, there have been a number of experimental procedures cited for evoking reactive anger responses following provocation by a confederate. Anderson and Bushman (1997) reviewed a number of "trivial" lab-based experiments targeted at eliciting anger. For example, a number of classic studies assessing physical aggression have used the *aggression machine paradigm* (Buss, 1961), also known as the *teacher-learner method*, in which an individual is "assigned" to be the teacher who punishes the learner when an incorrect answer is offered, via electric shock. This method further gave way to the Competitive Reaction Time Game, in which the participant is asked to play a (rigged) computer game against a confederate in which, if they win, they are to choose a level of electric shock to be applied to their opponent (Ritter & Eslea, 2005). This reaction-time paradigm was used by Heppner et al. (2008) with a group of undergraduate males who experienced either social-inclusion (control condition) or social rejection (experimental condition) from a group of confederate males. Following this provocation, they were asked to play the reaction-time game in competition with the other group members by whom they had been rejected. Results

found that individuals who had been rejected chose significantly higher shock intensities as compared to those who were in the socially included condition.

Perhaps a more face valid measure of aggression is the Bungled Procedure Paradigm (Russel et al., 1996), in which participants are asked to engage in a task involving a "novel form of male entertainment" (p. 411), in which they must choose a paintball gun to shoot at a female target. Aggression is measured as the power of the gun that is chosen, combined with the number of paintballs the participant elects to shoot at the participant. Following their weapon choice, participants are informed that a mistake has been made, and they would not be participating in the task after all.

A final measure of overt aggression is the Experimental Graffiti and Tearing Paradigm, in which participants are presented with an illustration (e.g., "Samson and the Lion") and are instructed to i) draw upon it, or ii) tear the illustration into a number of pieces and place it into an envelope (Norlander et al., 1998). Aggression in this paradigm is quantified as the extent of the drawings made, the degree of destruction caused, and any aggressive content included in the "graffiti." In addition, the number of pieces the picture is torn into serves as the second measure of aggression, with more pieces signifying a more aggressive response. The Graffiti paradigm is thought to be a face valid measure of indirect, physical aggression due to the ecological applications to real-world aggression (e.g., destruction of one's property). Support for this paradigm is less extensive when compared to other measures of laboratory aggression, but has been found to measure aggression in some settings, such as assessing differences in the number of torn pieces between males consuming alcohol versus sober males (Kortynk & Perkins, 1983).

Despite its historical precedence in assessing potentially aggressive responses, these overt aggression paradigms would be both unfeasible and likely unethical to conduct with an adolescent population. In addition, these methods have been criticized for the physical distance between the participant and confederate, the seeming acceptance of aggressive behavior by the research assistant (an authority figure), and the participant's lack of opportunity to make a non-aggressive response (Ritter & Eslea, 2005).

Second, procedures addressing verbal aggression may address direct or indirect measures of a participant's response to a provoking confederate. For instance, studies using an "opinionated confederate" have assessed the degree to which extreme comments made by a confederate regarding sensitive topics (e.g., politics, religion, sex) elicit verbal attacks by the participant (Wheeler & Caggiula, 1966). More indirect measures of verbal aggression have also been used with adults. For example, Rohsenow and Bachorowski (1984) conducted a study in which adult participants encountered a highly provoking research assistant who denigrated their performance on a simple task ("trace this circle as slow as possible"), and rudely required that they start over. Following this provocation, participants were asked to complete a brief and anonymous evaluation of the experimenter that would be sent to the primary investigator to inform future employment options. Therefore, the extent to which a participant gave poorer ratings to an employee (which would indirectly harm that individual's occupational integrity) could be used as a measure of indirect aggressive behavior following that provocation.

A similar study conducted by Denson, Pedersen, Friese, Hahm and Roberts (2011) had 54 undergraduates complete a set of difficult anagrams to which they received phony feedback indicating that they had either performed in the average range, or were below

average as compared to other participants. For those individuals that were given "below average" feedback, they also received negative criticism from the research assistant regarding the utility of their responses. Following completion of the study, participants were asked to anonymously rate the researcher on a number of sociability factors, and were told that it would influence their ability to be hired for a highly competitive position at the university. Results indicated that those participants who had been given negative, provoking feedback by the researcher responded more aggressively by making poorer evaluative ratings as compared to those who received neutral feedback.

Stucke and Baumeister (2006) completed a study assessing the effects of self-control depletion on aggressive responding using a similar evaluation paradigm to measure aggression. Study participants were instructed to complete a "creativity" task in which they completed story endings while simultaneously resisting the urge to eat a number of sweet foods placed in front of them. Following completion of the task, they received negative criticism from a research assistant, whom they subsequently evaluated on a phony employment survey (dependent variable). Results suggested that those who had resisted eating the sweet foods (ego depletion condition) and received negative feedback were more likely to harshly rate the researcher as compared to those in the control condition, thus suggesting more aggressive behavior. This method of eliciting anger in the lab appears to be more relevant to adolescent populations due to its conspicuous and seemingly private nature. Some research suggests that adolescent populations, unlike younger children, are less likely to exhibit overt forms of aggression in a novel laboratory setting. However, they may be more likely to engage in variable levels of reactive aggression that is less evident to a bystander (Underwood, 2005).

In regard to measures of indirect aggression, Ritter and Eslea (2005) reviewed the use of the Pont Subtraction Aggression Paradigm, in which participants have a choice between pressing a button that independently earns them 10-15 cents, or pressing a different button that extracts 10-15 cents from another individual (confederate) who is playing the same game in another room. The extent to which the participant chooses to take money from their opponent rather than the alternative source serves as the dependent measure of aggression. Contemporary paradigms of anger response measurement also involve the hot sauce paradigm (Ritter & Eslea, 2005). In this method, individuals are told that they are to prepare a snack for the other participant, and are provided with a brief sheet indicating their taste preferences. Specifically, each contrived "taste preference" sheet indicates the confederate's extreme dislike for spicy foods. Participants are then provided with food items sufficient for preparing a nacho dish, including a bottle of hot sauce. Aggression in this paradigm is measured by the amount of hot sauce an individual chooses to include in the dish, given their knowledge of the recipient's extreme dislike for spicy flavors. Research using this paradigm has found that it has "real-world" applications and likely represents a useful measure of aggression in the laboratory setting. A number of projects using this paradigm have explored its link to individual levels of self-control/regulation (DeWall, Baumesiter, Stillman & Gailliot, 2007).

Specific to an adolescent population (10-15 years), Albert Reijntjes and colleagues (2006, 2011a&b, 2013) utilized the "Survivor Game" to assess aggressive responding following negative feedback from a confederate peer. In this paradigm, children are invited to take part in an online contest in which they are evaluated by a panel of peer

judges by creating an online profile about themselves. Following a waiting period, participants were informed that they would have a brief period of time to review the feedback given by judges, at which point they are provided with pictures of each judge and their narrative feedback regarding the participants' personal profile. Participants are placed in either the neutral feedback condition ("I think this person likes to read a lot"), or the negative feedback condition ("I am not interested in the kinds of things he likes"). Participants were then offered two different opportunities to aggress toward the judges. First, they were informed that they were responsible for deciding how much money each judge should receive for their participation (with $3 as the baseline), by subtracting or adding money from the original amount. Second, they were told that they could make comments on each of the judges' profile. Independent coders rated these comments to make a binary decision of aggressive (1) versus non-aggressive (0) content. Results from several studies have found that receiving negative feedback from the peer judges resulted in increased aggressive responding by the adolescents as compared to those receiving neutral feedback (Reijntjes, Thomaes, Kamphuis, Bushman, de Castro & Telch, 2011; Reijntjes, Kamphuis, Prinzie, Boelen, van der Schoot & Telch, 2011).

While these paradigms have been found to elicit reliable and valid measures of aggression in the lab, there are a number of methodological and ethical factors that should be considered when choosing a provocation-aggression paradigm. In a review of aggression paradigms by Ritter and Eslea (2005), several criticisms of traditional aggression measures are discussed. First, offering participants a non-aggressive option in addition to the aggressive response will allow researchers to make more qualified conclusions about the individual's true intentions to harm another person. Without this

option, it is unclear if participants are truly aggressing toward a stimulus, or simply trying to comply with the experiment's procedures. This concern is evident in paradigms such as the bungle procedure or graffiti method. Second, permissive cues and demand characteristics present in the experimental design will confound the levels of measured aggression by participants and should therefore be limited or eradicated from the study design. For example, using paradigms in which the experimenter is permissive or encouraging the participant to aggress against a target will likely increase the extent to which aggressive responses are committed in the lab, whereas real-world aggression is typically attenuated by the social norms and expectations of the perpetrators in-group (Gottfredson & Hirschi, 1993). With respect to demand characteristics, recognizing the directions given by the researcher, and the demand participants may experience to aggress toward a target are essential, as many individuals will attempt to behave in a socially desirable manner. Ritter and Eslea (2005) discussed results from a previous study using the graffiti paradigm in which females engaged in significantly more graffiti drawing than males, despite a lack of sex differences on other forms of aggression. Although they were not explicitly directed to aggress in a given way, the aggressive response (drawing on the photo) was the target behavior encouraged by the researcher. Thus, recognizing the extent to which experimenters are proponents of aggressive responding and overtly privy to the participant's aggressive responses is useful for reducing confounds in the design and that could limit accuracy, reliability, and validity.

In addition to methodological concerns, Underwood (2005) discusses some of the ethical considerations in conducting deception research with juveniles. Specifically, they discussed concerns of children's understanding and knowledge of their rights as research

participants. Reported findings from their own provocation research with juveniles found that children were aware of, and willing to enforce their rights as evidenced by signaling to withdraw from the study or refusing to participate in components of the research. In addition, Underwood (2005) outlined the structured manner in which parents were informed of and educated on the rationale for deception procedures and their child's involvement in the study procedures. Finally, guidelines for structuring the data collection session and debriefing the child afterward were suggested (i.e., engaging in child-focused play time before and after study protocol, discussing child's proficiency in participation, etc.). Much of the research reviewed by Underwood (2005) involved the use of provocation paradigms with a child confederate. For example, in one study, children were asked to play a computer game with a child actor in which the confederate made a number of provoking comments toward the child while winning most rounds of the computer game. After 10 minutes, the game was stopped and children were questioned about their attitudes toward the confederate and their methods of coping with the provoking comments. Overall, there are a variety of methods for provoking the participant in the lab and the subsequent measurement of aggressive behavior as a result of the provocation. While a majority of this research has been completed with adult populations, some research exists that focuses on child and adolescent samples.

Taken together, the empirical support for assessing aggressive behavior within the lab is evident. In addition, theoretical models of aggression development offer support for several contextual factors that facilitate the emergence of these behaviors. Of interest to the current study, one construct that might mediate this relationship between external social settings and aggressive behavior is self-regulation.

**Self-regulation**

Self-control, or self-regulation is the broader construct that considers an individual's ability to monitor and gage their actions, desires, and emotions in order to receive a desired outcome or avoid an aversive situation (Vohs & Baumeister, 2008). More specifically, self-control focuses on the organism's ability to monitor oneself in relation to a desired goal, while also making necessary adjustments and changes when needed (Baumeister & Vohs, 2004). Additionally, recent research has supported the argument that self-control involves both conscious and non-conscious processes to obtain intended goals (Vohs & Baumeister, 2008).

Self-control is an important variable for determining life outcomes, particularly in social arenas. Those individuals with better levels of self-control exhibit not only increased task performance, but also more effective interpersonal skills, time management, etc. (Baumeister, Leith, Muraven & Bratslavsky, 1998).

One component of self-control is effortful control. Effortful control is defined as the ability to inhibit a dominant response in order to perform a subdominant response (Rothbart & Bates, 1998). Effortful control involves voluntarily activating (activation control) and inhibiting (inhibitory control) behavioral responses while also being able to shift and focus attention on desired tasks (attentional control; Rothbart & Posner, 2006). More specifically, activation control is the ability to perform a response or task when there is an inclination to avoid it. Inhibitory control is the ability to suppress inappropriate responses or behaviors. Lastly, attentional control represents the ability to focus attention on relevant environmental cues, and shifting attention when necessary for

goal attainment. Each of these components is important for an individual to initiate and attain changing goals (Rothbart & Rueda, 2005).

**Theories of self-regulation.**

***Dual process theories of self-regulation.***

A theory suggested by Charles Carver and colleagues involves a two-mode model of self-regulatory processes. The theory argues that the organism operates via two simultaneous yet separate modes of processing (Carver, Johnson & Joorman, 2008). A lower-order system responds quickly and automatically to stimuli whereas the higher-order system is involved in the planful, reflective and conscious processes of regulation. A dominance of one system (lower order vs. higher order) over the other may aid in predicting a likely outcome for an individual in a situation requiring use of self-regulatory processes (e.g., whether they will respond appropriately; Carver et al., 2008).

The organization of the theory parallels that of classic debates over dual cognitive processes. The two processes consist of a sequential, controlled system and a parallel, automatic system of cognition (Dawson, 2005). Epstein (1990, 1994) was one of the first theorists to introduce this "two-mode" model, suggesting that humans experience and act on their environment via two systems; one that is rational, symbolic and controlled, and another that runs off of heuristics, intuition and automaticity. Additional support for dual process models is found in social and personality psychology (Chaiken & Trope, 1999; Rydell & McConnell, 2006). Both implicit and explicit systems work in tandem to guide behaviors, attitudes, moral judgments, etc. Metcalfe and Mischel (1999) discussed the "hot"(reflexive, emotional) and "cold" (strategic, flexible) systems involved in delay of gratification. Ultimately, it is considered that whichever system dominates the individual

will predict the likely outcome on these self-control tasks. For example, an individual who is dominated by the lower-order reactive system may experience a more difficult time monitoring their reactions or behaviors toward a provoking situation as compared to an individual with a dominant higher-order system. Similar parallels can be drawn between these models and the dual process theory of effortful control proposed by Mary Rothbart (Rothbart & Bates, 1998).

***Temperamental effortful control.***

Rothbart and colleagues proposed a second and more general theory of effortful control in 1981. Similar to the two-mode, dual process theory discussed above, Rothbart focuses on two components that make up the individual temperament; reactivity and self-regulation (Rothbart, Ahadi, & Hershey, 1994). Reactivity, considered as the arousability of the individual organism to stimuli in the environment, is present at birth, varying in intensity and frequency across individuals. Reactions are expressed through emotions, actions, and activities. The second component, self-regulation, is represented as the functional and behavioral components that regulate the reactivity of the individual (Rothbart & Posner, 2006). While reactive responses are typically present at birth and persist across the lifetime with relatively little change, the self-regulative mechanism is altered across developmental stages and life experiences. The components of the self-regulatory process (effortful control) include activation control, inhibitory control and attentional control. All three processes are important when a dominant response needs to be suppressed in order to perform a subdominant response (Rothbart & Rueda, 2005).

Effortful control has been linked to a number of developmental outcomes (Eisenberg, Smith, Sadovsky & Spinrad, 2004). Developmental constructs such as

emotionality, delay of gratification, compliance, moral development and social competence have all been found to correlate with individual levels of effortful control. Specifically, it has been found to relate to both emotional/behavioral problems, and the development of prosocial behavior in the developing individual (Rothbart & Bates, 1998, Eisenberg et al., 2004).

The current study used this definition to operationalize the mediating variable effortful control. The three components, activation control, inhibitory control, and attentional control will be measured to determine an overall level of effortful control in the individual.

***Depletion of self-regulatory resources.***

Roy Baumeister and colleagues have proposed a theory of self-control that considers these regulatory processes, or the exertion of will, as a limited capacity resource in the individual. In order to engage in self-regulation, the body must consume energy therefore depleting its limited resource. When the demand for this control supersedes the limited supply, the individual is less able to contain inappropriate emotions, behaviors and responses (Baumesiter & Vohs, 2004; Muraven & Baumeister, 2000).

Consistent with these ideas, research has shown that individuals who are given a task that requires high levels of self-control, followed by a provoking situation, were significantly more likely to behave aggressively than controls (Dewall, Baumeister, Stillman & Gailliot, 2007). A study by Dewall et al. (2007) assessed depletion of self-regulatory resources in 40 undergraduate students. Participants were exposed to either a high self-regulatory condition (resist eating a donut) or a low self-regulatory condition

(resist eating a radish) and were then given either insulting or neutral feedback on a written assignment from a confederate. Those participants in the high self-regulatory condition reacted more aggressively to an insulting critic than any other group. Additionally, those high self-regulatory participants who were not provoked with an insult did not react aggressively. Similar results have been found with subjects asked to control their emotions while watching a particularly comedic or somber film followed by an anagram task. Those asked to regulate their emotions more stringently solved fewer anagrams and were less persistent when attempting an unsolvable anagram than those who were permitted to express their emotions (Baumeister, Bratslavsky, Muraven & Tice, 1999). Additional research by Baumeister and colleagues has found the depletion of effortful control to result in a lower ability to control one's regulatory processes (Baumeister, Leith, Muraven & Bratslavsky, 1998; Muraven &Baumeister, 2000). While a large body of literature has explored the social and temperamental components of effortful control, neuropsychological fields have begun to expand empirical support for executive function skills as an additional facet of this broader self-control construct (Banfield, Wyland, Macrae, & Heatherton, 2004; Rothbart, 2012; Zentner, & Shiner, 2012; Zhou et al., 2012).

**Executive Function**

A neurological component of self-regulation that has gained significant support in regard to understanding deviant behaviors is executive functioning. Executive functioning is a broad construct that encompasses higher order processes involved in solving problems, processing information, executing tasks, reasoning, and maintaining information in working memory (Friedman et al., 2007). Miyake and Friedman (2012)

offer an additional definition of executive functioning as, "general purpose control mechanisms, often linked to the prefrontal cortex of the brain that regulate dynamics of human cognition and action" (p. 2). Despite these available definitions, many researchers interested in the development of executive functions lament about the ambiguity of available conceptualizations of the construct. In addition, the wide range of theoretical models and tasks for measuring different aspects of executive functions has led to even greater confusion regarding an operational definition (Fitzpatrick, Darcy, Colborn & Lock, 2012; Miyake, Friedman, Emerson, Witzki, Howerter & Wager, 2000; Young et al., 2009; Zelazo, Resnick & Frye, 1997).

In order to more parsimoniously understand this broad neurological construct, Miyake et al. (2000) identify three major processes driving the larger construct of common executive functions: updating of working memory representations, shifting between tasks or sets, and inhibition of dominant or prepotent responses (Miyake et al., 2000). It has been hypothesized that these three functions are typically lower order, more easily operationalized, are tied to standardized assessment tasks, and are likely involved in higher order complex tasks that are more difficult to succinctly assess (Baddeley, 1996; Miyake et al., 2000; Smith & Jonides, 1999).

Updating can be operationalized as a process of monitoring factors relevant to a task, and then appropriately accommodating newer information while still maintaining older information useful for completing that task (Miyake et al., 2000). In a basic sense, it involves the use of tracking and making decisions regarding the utility of incoming information, while actively manipulating information in working memory (Miyake &

Shah, 1999). Successful employment of updating skills has been tied to frontal lobe correlates, including the dorsolateral prefrontal cortex (DLPFC; Smith & Jonides, 1999).

The second component of executive function, shifting, typically refers to the ability to shift one's attention among tasks, goals, or mental sets, and has been theorized to be closely connected to failure of cognitive control tasks requiring individuals to shift between components of a problem (Jonides & Smith, 1997). In order to successfully shift between goals, the individual must be able to disengage from an irrelevant task and actively engage in a new, relevant task; which likely requires the ability to remain impermeable to proactive interference that could present itself due to prior focus on an earlier task. Neurologically, executive-shifting abilities appear to be tied to frontal lobe functioning, as evidenced by ERP research and lesion studies of individual's with frontal lobe damage (Kimberg & Farah, 1993).

The final process, inhibition, has been most closely tied to the psychological construct of self-regulation (Mischel et al., 2011; Moffit et al., 2011; Young et al., 2009). Specifically, it addresses the individual's ability to inhibit a dominant response in order to perform a more appropriate, secondary response. The primary mechanism for this process of inhibition is the suppression of a given behavior or action that is traditionally automatic. Neuropsychological research has tied deficits in inhibitory responding to frontal lobe damage or dysfunction (Kok, 1999; Levin et al., 1996; Morris, Miotto, Feigenbaum, Bullock & Polckey, 1997). Literature in this area has also been successful in identifying correlates of poor inhibitory control across children, adolescents, and adulthood (Ozonoff & Strayer, 1997; Towse, Hitch, & Hutton, 1998; Welsh, Pennington, & Groisser, 1991).

**Development of executive function.**

Considering the emphasis placed on neurological correlates in the exhibition of executive function processes, and the widely accepted conclusions that these skills and abilities vary across age, embedding this construct within a developmental framework is warranted. Specifically, understanding areas of stability and change across developmental milestones can offer additional support for the need to focus on adolescent populations.

In general, the literature assessing the development of executive functions has focused on two different patterns: stability and normative fluctuations. Several studies have been successful in longitudinally predicting executive function skills in adolescence from early childhood assessments (Friedman et al., 2007; Levin et al., 1991). For example, a study by Friedman et al. (2011) assessed approximately 950 twins between the ages of 14-36 months, and again at 17 years. Specifically, researchers discovered that children who had better response inhibition skills (self-restraint) during a prohibition task (e.g., don't touch an attractive toy for 30s) also had substantially higher general executive function skills in late adolescence.

Changes in executive functioning as a product of normal human development have also become the focus of empirical research over the past decade, with a majority of research focusing on the isometric relationship between neurological development and subsequent executive functioning skills. Given that most executive functioning skills have been tied to frontal lobe functioning, one of the last sections of the brain to become fully developed, it logically follows that these associated cognitive skills would also develop into early adulthood. Consequently, literature focusing on these developmental trends has confirmed this trajectory, finding that increases in inhibition, switching, and

updating skills continue into late adolescence, at which point they begin to plateau, eventually tapering off in later adulthood (Leon-Carrion, Garcia-Orza & Perez-Santamaria, 2003; Lowe & Rabbitt, 1997). Beginning in pre- and early adolescence, spurts of executive functions are evident, with marked increases occurring in inhibitory control, selective attention, and other goal-directed behaviors (Towse et al., 1998); however, several theorists have suggested that children are unable to master these skills in preadolescence due to an inability to consistently apply these skills cross-contextually. It is not until mid-adolescence that these processes are thought to become better integrated and thus, more fluid in their use. Therefore, adolescence represents a developmental period in which executive functions appear to be nearing levels observed in adulthood, but remain somewhat inconsistent due to continued context-dependent changes and neurological plasticity (Welsh et al., 1991).

**Executive functions: A neurological component of self-regulation.**

Studies focused on understanding the link between executive functioning and self-regulation in the individual have found that specific components of higher order functions could be contributing to overt self-regulatory action (Drabick, Bubier, Chen, Price & Lanza, 2011; Moffitt et al., 2011). A study by Young et al. (2009) discovered that behavioral disinhibition, a related construct of self-regulation, was most closely related to the individual's performance on response inhibition tasks in an adolescent population. Studies focusing on pathological outcomes have also discovered that poorer executive functioning (e.g., set-shifting, response inhibition) are related to problematic outcomes in adolescence and young adulthood (Drabick et al., 2011; Fitzpatrick et al., 2012; Reid, McKittrick, Davtian & Fong, 2012).

Simonds, Kiera, Rothbart and Rueda (2007) found that both executive functions and parent reports of temperamental effortful control predicted socially appropriate responding to receiving an undesirable gift in 7-10 year old children. Research pulling from psychophysiology has also discovered that increased ERPs when engaging in a Go-No Go task measuring executive response inhibition predicted increased self-control in a social decision making task in which individuals were required to work collaboratively with a partner (Kiefer, Marzinzik, Weisbrod, Scherg, & Spitzer, 1998).

Interestingly, findings on the specific factors of executive functioning that might predict self-regulatory skills are somewhat inconsistent. Unlike the findings from the Young et al. (2009) study cited above, several researchers have discovered that temperamental effortful control ratings are more closely related to other constructs of higher order functioning. For example, one study discovered that effortful control was highly correlated with overall executive functioning, but when compared to subdomains, it was more strongly associated with the updating/monitoring components of working memory as compared to inhibitory skills (Bridgett, Oddi, Laake, Murdock & Bachmann, 2013). Moreover, increased levels of effortful control and updating/monitoring skills were associated with decreased negative affectivity.

In a review by Zhou, Chien and Main (2011), commonalities between effortful control and executive functions are discussed. Markedly, the authors identify two areas of convergence for the theories; inhibition and executive attention. Inhibition of motivation, emotions, and inappropriate behaviors is the focus of effortful control and directly relates to the focus on inhibiting pre-potent cognitive responses (Nigg, 2000). Second, the use of an overarching attentional system has been hypothesized to aid both effortful control

skills and executive functioning tasks (Fan, McCandliss, Sommer, Raz & Posner, 2002; Rothbart, Sheese, & Posner, 2007). For example, in order to engage in a given task, or refrain from participating in a dominant response, the individual needs to actively attend to and monitor contextual demands and consequences in order to make a choice.

Finally, Berkman, Graham, and Fisher (2012) propose a domain-specific model of self-regulation that focuses on identifying varying modalities through which self-control would be theoretically expressed. One such identified domain is cognitive or higher-order functions and their connections to maintaining self-control. The authors further implicate executive response inhibition skills in the neurological expression of self-regulation and build upon these correlates to suggest training mechanisms for improving overall self-regulation skills. Recognizing the degree of overlap between self-regulation and executive functioning abilities, and the ability of either construct to consistently predict performance in the other suggests that executive functioning may represent a domain-specific manifestation of the broader self-regulatory system. Thus, understanding methods for reliably measuring and assessing these skills is needed.

**Assessment of executive functions.**

Methods for assessing executive functioning skills are multifaceted and appear to be dependent upon which theoretical model of EF the researcher subscribes to. Despite the wide range of measurements available to sample domains of EF, the current study will focus on the three components proposed by Miyake & Friedman (2012): updating, shifting, and inhibition, as well as complex executive tasks (involving all three components). A sample of reliable and available methods for assessing these constructs is presented below.

Several studies have made use of standardized neuropsychological assessments in order to assess varying abilities. For example, Brocki and Bohlin (2004) used the *Continuous Performance test (CPT)* to assess inhibitory skills in children aged 6-13 years. The CPT is a standardized measure of sustained attention toward simple stimuli as well as inhibition of automatic responses. The *Stroop task* has also been used as a consistent measure of inhibition in which the individual is required to state the color that a word is printed in, rather than the word itself (Brocki & Bohlin, 2004; Miyake et al., 2000; Weibe, Epsy, & Charak, 2008; Zhou, Chien, & Main, 2011). It is theorized that this requires the suppression of an automatic, over learned response (e.g., read the word) in order to perform the target response (state the color). Other tasks tapping inhibitory skills include *Go/No-Go tasks* and the *Stop Signal task*, both of which require the individual to quickly discriminate between target and non-target stimuli. In both the CPT and Go/No-Go tasks, commission errors can serve as a direct measure of response inhibition, such that a higher number of errors are related to poorer inhibitory skills.

With respect to updating tasks, measures originating from cognitive psychology have become useful for understanding one's ability to monitor and appropriately manipulate information in working memory (Zhou, Chien, & Main, 2011). The *Operation Span task (O-span)* has been used in several laboratory-based studies of executive function, and has been identified as the "gold standard" in measuring working memory capacity and updating. The O-span requires the individual to compute a simple math problem (e.g., 3+ [2/4]) followed by a target word (e.g., ring) that the individual is charged to remember for later recall. This process is repeated for several trials until the end of a set, at which point the individual is asked to record all of the target words from

the previous trials on a sheet of paper. Each set becomes consecutively more difficult, thus requiring the individual to maintain and accommodate continuously larger amounts of information in working memory simultaneously (Miyake et al., 2000). Although the O-span is an excellent measure of working memory capacity, it is also reliant upon a basic knowledge of arithmetic and reading skills by the participant, therefore creating potential confounds for younger age demographics. Taking a nonverbal approach to updating tasks, Brocki and Bohlin (2013) used the *Hand Movements Test* from the K-ABC, which requires the participant to remember consecutively more difficult sequences of hand movements in working memory without any available external cues. The authors argue that this task allows for an assessment of working memory abilities that are not contingent upon the use of language or basic academic achievement skills. Several other tasks have been implemented in the lab to assess updating skills, such as the *Keep Track task, Tone Monitoring task,* and the *Letter Memory task,* each of which require the participant to systematically maintain information in working memory for later recall while simultaneously integrating or substituting newer and more appropriate information in their mental set (Friedman et al., 2007; Friedman et al., 2011; Miyake et al., 2000).

The final sub domain, shifting, also maintains several valid methods for assessment. Given that the function of switching is to aid the individual in appropriately focusing attention in order to meet changing goals, many of the available measures for this construct focus on an individual's ability to rapidly shift tasks despite their conflict with previous goals (Miyake & Friedman, 2012). For example, the *Plus-Minus task* requires that an individual add 3 to each number presented in one trial, but then subtract 3 from each number in the second trial. In the third trial, they are then asked to alternate

between adding and subtracting 3 from each number (Miyake et al., 2000). Similarly, the *Local-Global task* presents a macro shape (e.g., triangle) that is made up of many smaller micro shapes (e.g., squares). The participant is instructed to either name the global (triangle) or local (square) figure depending on the color of the figure. Therefore, this task taps abilities to maintain temporary rules in working memory while actively shifting response patterns based on varying stimulus presentations (Friedman et al., 2007; Miyake et al., 2000).

In addition to measuring these sub-categories of executive functions, several studies have recognized the importance of assessing overall executive functioning through the use of complex executive function tasks. Measures within this category are thought to require the use of several executive function skills simultaneously in order to successfully achieve a goal. The *Wisconsin Card Sort Task* is a standardized neuropsychological measure that establishes the individual's ability to integrate ambiguous feedback in order to accurately place a card into the correct category (Heaton, Chelune, Talley, Kay, & Curtis, 1993). The *Tower of Hanoi (TOH)* is a measure of executive problem-solving that requires the individual to construct a tiered tower based on a model picture while adhering to several rules (Miyake et al., 2000). The TOH measures several executive functions including actively maintaining rules in working memory, actively problem-solving and updating plans based on newly acquired information, and inhibiting automatic responses in order to perform more planful moves. Several adaptations have been made to the TOH, including the Tower of London and the Tower Test from the Dellis Kaplan Executive Functioning System (DKEFS; Dellis, Kaplan, & Kramer, 2001).

In sum, several measures have been developed to tap into these skills and provide a more thorough understanding of the broader self-control concept. Self-control has clear connection to several behavioral and emotional outcomes, including the expression of prosocial and aggressive tendencies.

**Self-regulation and Aggression**

Current research has established a strong connection between levels of effortful control and the exhibition of externalizing behavior. Particularly, aggression has been strongly linked to low levels of effortful control. A study by Dewall, Baumeister, Stillman and Gailliot (2007) found that when participants' self-regulation capabilities were "diminished" through tasks requiring the regulation of emotions and actions, they were more likely to aggress toward others when provoked. Similarly, Rothbart, Ahadi and Hershey (1994), found that children with higher reported levels of effortful control were less aggressive and more empathic than those with lower levels of effortful control. Wong (2008) further reported that lower effortful control was associated with higher levels of classroom disruptive behavior and substance use.

Developmentally, studies have also found that learned effortful control as one matures leads to lower levels of aggressive behavior. Research on boys with ADHD, partially characterized by impulsive behavior, found that parenting styles directly affected their expression of socially appropriate behavior (Melnick & Hinshaw, 2000). Specifically, those children with parents who promoted self-control behaviors (i.e., delay of gratification) were significantly more likely to engage in socially acceptable behaviors. Eisenberg and colleagues have published a number of related studies implicating the role of several self-control variables in the prediction of later externalizing problems across

childhood. They have discovered that factors such as negative emotionality, behavioral dysregulation, and poor self-control as rated by the parents were all significant predictors of later externalizing behaviors and social rejection by peers (Calkins & Fox, 2002; Eisenberg et al., 2000; Eisenberg et al., 2001).

Eisenberg, Fabes, Guthrie and Reiser (2000) found that low emotion regulation predicted not only aggressive behavior, but also poorer overall social functioning. Similarly, Kreuger and colleagues (1996) assessed 428 adolescent boys for levels of self-control and the expression of externalizing and internalizing problems. Results suggested that, compared to boys with high self- control and boys exhibiting internalizing symptoms, boys with externalizing problems had significantly lower levels of self-control and poorer delay of gratification in a laboratory task. These results were further supported by parental reports of self-control and personality traits (i.e., conscientiousness, agreeableness). In extreme cases, poorer emotion regulation skills and behavioral control has longitudinally predicted to later psychopathology (e.g., conduct disorder, operational defiant disorder; Roll, Koglin & Petermann, 2012; Sroufe, 1997).

Several studies have narrowed their focus of self-control to distress tolerance skills and have successfully identified a number of connections among distress tolerance and aggressive behavior across development (Cummings et al., 2013; Daughters et al., 2009). Denson et al. (2011) found that provoking undergraduate students in a laboratory setting by giving them negative performance feedback, led to poorer self-control skills on an analog task, and increased aggressive behavior toward the provoking stimulus. Similarly, Stucke and Baumeister (2006) found that provoking an individual after "depleting" their self-regulatory resources (e.g., don't eat these cookies while I am gone),

related to increased levels of indirect aggression toward the researcher, suggesting that both provocation and explicit commands to engage in a high-control task might lead to eventual decreases in one's ability to effectively control their emotional reactions toward other individuals.

**Self- control and Prosocial Behavior**

Although the relationship between effortful control and peer prosocial behavior is unclear, the relationship between effortful control and the expression of individual prosocial responses has been examined in past research. Guthrie and colleagues (1997) discovered that effortful control was linked to empathic behavior and responding in children. They collected parent and teacher ratings of effortful regulation of 5-8 year olds. Participating children were then videotaped while watching an evocative film about a disfigured girl being teased by others. Following the video, children gave responses to the film using simple adjectives. Results indicated that children with higher ratings of effortful control exhibited significantly more expressions of sadness during the film, and had increased levels of "sad adjective" reports, an indication of empathic responding. Additionally, these results were positively correlated with parent and teacher reports of effortful regulation. Those children with lower levels of effortful regulation conversely exhibited higher rates of personal distress in response to the film.

A study by Panfile and Laible (2012) looked at 63 mothers and their 3-year old children on the "baby cry" task. The "baby cry" task is a well-established measure of empathic or prosocial behavior. Most often conducted with infants and younger children, the child is exposed to a distressed infant (stimulus) and their reactions and behaviors oriented around this infant's distress are recorded and coded (i.e., soothing, empathic

facial feedback, affection). Panfile and Laible (2012) observed that more securely attached children, as rated by their mothers, expressed more empathic behaviors toward the distressed infant. Moreover, they found that the relationship between attachment style and empathy was mediated by the child's level of emotion regulation. Those children with more secure attachments exhibited higher levels of emotion regulation and consequently, more empathic behavior toward the distressed organism. Also using the "baby cry" technique, a study by Fabes, Eisenberg, Karbon, and Troyer (1994) examined 49 kindergarten and 54 second-grade children, monitoring their physiological responses to the "baby cry" task, as well as their overt comforting behaviors directed toward the crying infant. Based on physiological responses and parent reports of the children's emotion regulation, the researchers found that those children with higher levels of regulation over arousal and emotions to the "baby cry" task were significantly more likely to respond instrumentally to the distressed infant and were also less likely to express self-distress to the condition.

Eisenberg et al. (1996) found in a study of 199 elementary school children that those children with poorer instrumental coping capabilities, a measure of low emotion regulation, were also significantly less likely to engage in effective social behaviors and were temperamentally shyer in nature. Finally, a study by Rydell, Thorell and Bohlin (2007) discovered that, in a sample of 129 8-9 year old children, while poorer negative emotion regulation was associated with externalizing problems, the increased regulation of all emotions, except fear, was related to the exhibition of more prosocial behaviors in social settings. Taken together, there is a strong body of evidence suggesting that higher

levels of effortful control and emotion regulation are indicative of more empathic, prosocial actions from early childhood to adolescence.

However, there is relatively little research on the relationship between peer prosocial behavior and effortful control, and between peer prosocial behavior and aggression. Research does suggest that systemic relationships are an important factor for increasing regulatory skills. For example, Merritt, Wanless, Rimm-Kaufmann, Cameron, and Peugh (2012) found that emotionally supportive teacher-student relationships were effective in decreasing aggressive responding and increasing behavioral self-control. A handful of studies have also implicated the peer group's prosocial tendencies in contributing to positive improvements regarding substance use, delinquency, and externalizing behaviors (Prinstein, Boergers, & Spirito, 2001; Chung, 2010). In my thesis project (2013), results indicated a significant relationship between prosocial peer behaviors, effortful control, and externalizing problems. However, this study was unable to make any directional conclusions regarding influences of the peer group on individual outcomes. To my knowledge, this is the only study that has simultaneously assessed these variables. The current study expanded the connection between effortful control and prosocial behavior to encompass the peer group's behavior and examine their relationship with externalizing problems in a laboratory setting.

## Current study

### Purpose and rationale.

The current study assessed the importance of peer prosocial behaviors on the relationship between an experience of provocation and subsequent aggressive behavior in early adolescence. Another goal of the study was to understand the provocation-

aggression relationship in the context of self-control skills. I was primarily interested in examining whether self-regulation (measured by self-report and executive functions) mediated the relationship between peer prosocial behavior and aggression. Moreover, I was interested in understanding whether those relationships would vary in the experimental vs. control groups of the provocation paradigm.

There are several potential contributions stemming from the current study that span clinical and experimental domains. First, the use of a laboratory-based design allows for more control in variable presentation and measurement, thus permitting us to examine the causal relationships between provocation and aggression. Although this methodology has been widely used in adult models, the current study extended it to adolescents. In addition to extending the current research literature, this project represents an empirical as well as a logical progression from my master's thesis project focusing on adolescent externalizing problems and their relationship to peer prosocial behaviors and effortful control. Following completion of that project, it was evident that a more thorough investigation of the relationship between peer prosocial behavior and aggression was warranted. The current study aimed to replicate the findings from that project while also using standardized behavioral measures that are theorized to overlap with the original self-report measures. Using this multi-method approach can produce a more complex picture of these interactive social processes while also providing a means for comparing and validating our self-report measures against other objective analog tasks.

**Hypotheses.**

The study tested the following hypotheses:

Experimental vs. control conditions

1. *The main effect of condition was expected to be significant such that participants in the experimental condition would respond more aggressively toward the judges compared to participants in the control condition.*

Mediation Model

2. *Based on the results of my master's thesis project, the direct relationship between peer prosocial behavior and laboratory aggressive behavior was expected to be non-significant.*
3. *The relationship between peer prosocial behavior and self- control was expected to be significant (alpha path), such that higher levels of peer prosocial behavior would relate to higher levels of self- control.*
4. *Self- control was expected to significantly mediate the relationship between peer prosocial behavior and aggressive behavior, such that higher self- control would be associated with lower aggressive behavior while controlling for peer prosocial behavior (beta path).*

Multiple Groups Analysis

5. *There was expected to be a significant difference in the hypothesized mediation model across the experimental and control groups such that the mediated effect of self- control on the relationship between peer prosocial behavior and laboratory aggressive behavior would be attenuated,*

*although still significant, for participants in the experimental condition as compared to the control condition.*

Executive Functioning

6. *Performance on the executive functioning task was hypothesized to mediate the relationship between peer prosocial behavior and laboratory aggressive behavior.*
    a) Scores on both executive functioning and effortful control tasks were initially used as indicator variables to construct the latent variable self-control.
    b) In the instance that the executive functioning task did not significantly load onto the latent construct of self-control, it would be used to separately predict laboratory aggressive responding.

# Chapter 2

# Method

## Participants

Participants were 153 male (47.1%) and female (52.9%) adolescents between the ages of 11-14 (*M*= 12.03) and identified as primarily Caucasian (81.7%). Participants were required to have a signed parental consent form and signed adolescent assent form to participate in the study. They received a $15 Walmart gift card for participating in the study. In total, 154 families were provided with a parental consent form for the study (153 parental consent forms were signed; 99% consent rate) and 153 adolescents provided their assent to participate (100% assent rate). After receiving parental consent and adolescent assent, there were no instances of withdrawal of consent by either parents or adolescent participants. Overall, four (4) children became overtly emotional after completing the laboratory aggression task (e.g., expressing feelings of sadness or anger, becoming tearful). After engaging in the post-study cool-down period (See Phase 4 below), all participants were assessed for continued negative affect and were released to their parent upon determining that they were no longer in distress. Parents were provided with a debriefing form which included the contact information of the main researcher in addition to several mental health resources. This researcher did not receive any later contact from parents regarding ongoing adverse effects of having their child take part in the study.

Three (3) participants were aware of the deceptive nature of the Survivor game prior to the experimenter reveal during the debriefing phase, therefore characterized as a

procedural "spoil." As a result, their responses to the Survivor game were considered invalid and were coded as missing from the final data analyses.

**Procedures**

Data collection took place in a research laboratory in which the participant was free of external distractions and which allowed maintenance of confidentiality and anonymity. Parents were required to be with participants in the lab prior to the study. Parents were given the study consent form and given the opportunity to ask any questions. All information regarding the study, including the deception procedures, were disclosed to the parents in private prior to receiving their consent for their child to participate. After obtaining parental consent, the adolescent was provided with a separate assent form and informed of the study procedures and their rights as a participant (e.g., right to withdrawal, refusal to answer items, etc.). Adolescents who agreed to take part in the study were asked to engage in the following phases:

*Phase 1*

Participants were asked to complete several questionnaires independently (e.g., peer prosocial behavior questionnaires, self-control items, and demographics, etc.). A research assistant was available to clarify any questions and to collect all relevant study information from the participant. In total, the participant was asked to complete four surveys, taking approximately 30 minutes to complete on average. All questionnaires were presented in a random order, varying across three order conditions, therefore reducing the risk of fatigue effects on their response pattern. Participants were randomly assigned to each order condition.

*Phase 2*

Following completion of the relevant self-report components, participants took part in the executive functioning task. The Color-Word Interference test takes approximately 10 minutes to complete, resulting in a total of 10 minutes for the completion of phase 2.

*Phase 3*

Phase 3 of the current study involved the provocation procedure and aggression measurement. Adolescents were invited to participate in the "Survivor Game," a task adapted from Reijntjes and colleagues (2006, 2011a&b, 2012, 2013). Participants were informed that the "Survivor Game" is an internet popularity contest in which they are evaluated by a panel of judges consisting of same-aged children from other schools. In actuality, the feedback is controlled by a computer program and does not involve any actual interactions with other adolescents. Participants were provided with the option to upload a photo of themselves that the judges will see when they view their profile. This photograph was deleted upon completion of their participation as it was not necessary for later use of the data. Next, participants were asked to answer a number of pre-formulated questions that will allow the judges to get to know the participant better (e.g., favorite color, things they like and dislike about themselves, hobbies, etc.). Upon finishing their "profile," participants submitted their information and underwent a brief waiting period while the judges supposedly evaluated and scored their information. After a brief period (e.g., two minutes), the adolescent was informed that they had three minutes to review the judge's feedback, which consisted of four evaluative statements per judge regarding the adolescent's profile. In total, participants were presented with feedback from eight judges

(split evenly by gender), and were also be able to see the first name and age of each judge. During the feedback period, the participant was allowed to move between judge's feedback freely.

In order to manipulate provocation among individuals, participants were randomly assigned to receive either negative or neutral feedback from the judges. In the negative feedback condition, participants received three negative evaluative statements (e.g., "I did not think their profile was interesting"), and one neutral statement (e.g., "They look like an animal person") from each judge. Conversely, in the neutral feedback condition, all four statements were neutral in nature. Participants could view each judge's feedback by clicking on the judge's pictures.

After the 3-minute feedback session, participants were asked to answer two questions serving as a manipulation check for the feedback conditions (Reijntjes, 2011b). Participants rated the extent to which, "The judges had mostly positive things to say about my profile," and "Most of the judges did not seem to like my profile" on a 5-point Likert-type scale where 1= Completely Disagree, 3= Neither Agree nor Disagree, and 5= Completely Agree.

Participants were then asked to rate several other confederate participants in the game, including four of the eight judges who had previously provided them feedback. For each profile, they saw the participant's information and were asked to make a rating about that player. In the instances during which the participant was reviewing a judge's profile, they were also shown the feedback that the judge had earlier provided about the participant's profile.

Finally, adolescents were given the opportunity to aggress against the judges by influencing the amount of money awarded to each judge for their participation (e.g., adding, subtracting, or maintaining a $15 default payment). Participants were informed that they were to make the decision regarding the amount of money awarded to the players, and that their decision is completely anonymous and confidential. Participants indicated the desired dollar amount to be awarded by entering it on a separate screen on the computer. They were also allowed to write comments on the players' fake profile pages, and make a recommendation regarding that player's chances of progressing to the next round of the game. On average, the Survivor Game process took approximately 30-45 minutes to complete.

*Phase 4*

After obtaining all relevant study information, participants were asked several probing questions to assess whether they were aware of the deceptive nature of the Survivor game (e.g., "Did anything seem strange or weird to you about the judges or their comments?"). They were then thoroughly debriefed regarding the nature of the project. Specifically, adolescents were informed that the interactions, profile, and feedback they received during the study were bogus and in no way a reflection of their actual qualities or self-worth. The rationale for using deceptive processes was also presented to the participant. In addition, a review by Hurley and Underwood (2002), discussed the importance of engaging the adolescent in a positive activity following debriefing to reduce any residual negative affectivity resulting from the study procedures. Therefore, participants were invited to play a brief game or chat about an enjoyable experience with the researcher before leaving the study. At this point, participants were encouraged to ask

any questions about the study or procedures, and had the opportunity to indicate if they did not want their data to be used. Adolescents were informed of their rights and thanked for their participation in the study. They were given a small gift ($15 Walmart gift card). Underwood (2005) and Reijntjes et al. (2011a) noted that, when using similar deception procedures and debriefing, they had primarily positive responses from participants and did not experience any related adverse events.

## Measures

### Externalizing problems.

The Youth Self Report (YSR) was used to assess levels of externalizing problems (Achenbach, 2001). The Youth Self Report is a widely used measure designed for ages 11-18 that measures perceived competencies, adaptive functioning and problems of adolescents occurring within the last six months. The questionnaire includes 112 items of behavioral problems based on a 3-point Likert-type scale (0= Not true, 1= Somewhat or sometimes true, 2= Very true or often true). This study focused primarily on the externalizing subscales of the survey; Aggressive Behavior and Rule Breaking Behaviors. Items loading onto the Aggressive Behavior subscale include topics such as "Argues a lot", "Demands attention", "Gets in fights", "Attacks people," etc. Items loading onto the Rule Breaking Behaviors subscale include "Drinking Alcohol," "Stealing things," etc. Higher scores on both subscales and the overall Externalizing scale are indicative of higher levels of behavioral problems. Reliability for items measuring externalizing problems was adequate (Chronbach's alpha= .87-.89).

**Aggression.**

***Judge payment.***

Adolescent's aggressive responding in the lab was assessed using the "Survivor Game," a method adapted from a study by Reinjtjes et al. (2006; 2011a & b). Participants were given the opportunity to influence the dollar amount to be awarded to the confederate participants. Specifically, they were instructed that the default fee is $15, and are given the option of subtracting $5 or $10, leaving the amount unchanged, or adding $5 or $10. Monetary rewards were recoded for ease of interpretation on a scale of 1 (monetary award of $5 [subtracting $10 from default fee]) to 5 (monetary award of $25 [adding $10 to default fee]). Therefore, each profile that the participant judged received a monetary score between 1-5. Lower monetary awards are indicative of more aggressive behavior, given that this is a more damaging response for the target recipient. This method of measuring aggression has been used in research using adult participants as well (Densen et al., 2011; Rohsenow & Bachorowski, 1984), and is considered to be a more ecologically valid measure of hostile aggression as compared to overt physical aggression paradigms, which are less likely to be obtained in adolescent and adult participants.

***Profile comments.***

Participants were also given the opportunity to aggress against each confederate participant by writing on their fake profile page. Participants were told that they can choose to write a comment on the individual's page that "receives a lot of internet traffic." Comments written by the participants were then categorically coded for

aggressive content (*0*= Non-aggressive*; 1*= Aggressive; *-8*= Intentionally Skipped). These comment codes were then summed across the eight profiles each participant voted on, creating a response range of 0-4 for judge profiles and 0-4 for non-judge profiles with higher scores indicating more aggressive comment content. Coding was conducted separately by two independent raters (one of them was the principal investigator). Interrater reliability for aggressive comments was high (*98.6%* agreement). In instances in which the raters disagreed on a rating, the content was discussed and a decision was made collaboratively on the final rating that comment would receive. The two raters were able to come up with a consensus for all responses on which they disagreed. In addition to leaving comments for judges, participants saw profiles of several new, non-judge confederates and were allowed to comment on their profile. By providing opportunities to comment on both neutral and provoking individuals, we can assess for discrepancies in aggressive comments based on the presence of provocation. This method of measuring aggression has been used in previous studies (Reijntjes et al., 2006), and is considered to be a useful measure of relational aggression.

***Recommendation for continued participation.***

A final measure of aggression involved providing the participant the opportunity to recommend each of the judges to continue on to the next round of the game. Participants were asked, "Do you think that (Judge X) should move on to the next round?" and are allowed to respond with either "yes (coded as 1)" or "no (coded as 0)." In addition to making this decision for each judge, the participants also made recommendations for non-judge confederates (i.e., children who did not serve as a judge for the participant). Participants' responses for each profile were summed separately for

judge and non-judge profiles, resulting in a total response range of 0-4, with lower scores indicating more aggressive responding (i.e., voting more people out of the game). Having the participant's recommendations for both judges and non-judges will allow us to assess any significant differences in recommendations. This item represents a measure of hostile aggression as it allows the child to take away a privilege from the provoking confederate, despite any gain for the participant.

**Peer Prosocial Behavior.**

To assess the behaviors of the individual's peers, participants were administered the Peer Behavior Inventory (PBI). The PBI is a composite measure that includes the seven items from the Dishion et al. (1991) measure of antisocial peer association, plus another 12 items constructed by Prinstein, Boergers and Spirito (2001) that assess suicidal, prosocial, and substance abuse behaviors of peers. These 12 items are clustered into four subscales: Deviant Behavior, Prosocial Behavior, Substance Use Behavior, and Suicidal Behavior. The Peer Behavior Inventory allows researchers to assess a number of antisocial and prosocial behaviors of the participant's peers using self-report. Past research has indicated that self-report of peers' behavior is a reliable and valid source as compared to other forms of reporting (teacher, parent, and peer reports; Prinstein et al., 2001). To complete the measure, adolescents were asked to list the number of "close or best" friends they have to ensure that they were considering someone in particular when completing the following items. Participants were then asked to indicate the number of these close friends that engage in the aforementioned behaviors. Ratio scores of peer involvement in prosocial and antisocial activities were then calculated and averaged

across items, therefore creating a response range of 0.0 to 1.0 with higher scores indicating higher rates of prosocial peer behaviors.

## Self-Control

### Effortful control.

The three components of effortful control (attentional control, inhibitory control, activation control) were assessed in the current study using the Early Adolescent Temperament Questionnaire- revised (Rothbart, Ellis & Posner, 2004). This is a 16-item self-report questionnaire in which all responses are made on a 5- point Likert type scale. All subscales have been found to have adequate reliability. Cronbach's alphas for the three scales were .69 (activation control), .73 (attentional control) and .71 (inhibitory control) respectively. Items include questions such as "It's often hard for me to alternate between two different tasks" (attentional control), "Even when I feel energized, I can usually sit still without much trouble if it is necessary" (inhibition control), and "I can keep performing a task even when I would rather not do it" (activation control). Scores for each of the subscales are averaged across items with a response range of 0-5, where higher scores are indicative of increased effortful control.

### Executive functioning.

Executive functioning was assessed using the Color-Word Interference task. The Color-Word Interference test is a measure of inhibition included in the Dellis-Kaplan Executive Function System (D-KEFS), a verbal and non-verbal executive function battery nationally normed for children, adolescents, and adults (Shunk, 2006). It measures response inhibition skills across four different trials.

In trial 1, participants are asked to read a list of simple color words (e.g., green, blue, yellow, red). Trial 2 presents blocks of color and the participant is asked to name the color of each block. In trial 3, color words are presented in discrepant colors (e.g., word "red" printed in blue ink), and participants are asked to *name the ink color and not the word* as quickly as possible. In trial 4, participants must switch between naming tasks. They are instructed to continue reading the ink color of each word; however, for a select number of words enclosed in a rectangle, they are asked to instead read the word and not the ink color. For each trial, participants are instructed to move through the words as quickly as possible without making mistakes. Trials 1 and 2 are used to ensure baseline skills in reading and color identification. Trial 3 assesses basic inhibitory abilities, whereas Trial 4 measures switching and response inhibition skills. Overall, results of the Color-Word Interference test yield scores indicative of general response inhibition skills. A scaled score is obtained for each condition of the test (M= 10, SD= 3) with higher scores suggesting better response inhibition scores. Only the scaled scores from Trials three (3; Inhibition) and four (4; Switching) were used in the current analyses.

**Demographics**

A brief questionnaire was given to identify participant demographics including age, ethnic background, gender, etc. Demographic variables were used as covariates in the hypothesized models. Due to the statistical majority of Caucasian participants that made up the current sample relative to ethnic minority groups, the variable of ethnicity was recoded as a dichotomous variable (0=non-Caucasian; 1=Caucasian). In the current sample, 81.7% of participants were Caucasian and 17.7% were from other ethnic groups

(see Table 3). Ethnicity was used as a covariate for all major and supplementary analyses in addition to age and gender.

**Plan of analysis**

The target sample size was calculated in order to achieve a conventional statistical power of .8 (i.e., 80% of power to detect a statistically significant relationship between independent and dependent variables if the null hypothesis is false; Cohen, 1988). Past literature suggests that effect sizes from aggression paradigms are typically medium to large in size (Reijntjes et al., 2011a & b). Including demographic variables (i.e., age, ethnicity, gender), there were approximately eight observed variables. Sample size was calculated using a method proposed by MacCallum and colleagues (1996, 2003). The method focuses on the power of the data to detect an overall good fit of a theoretical model using the root mean error of approximation (RMSEA) in structural equation modeling. Given that I conducted multiple group analysis, based on past research, degrees of freedom will fall between 60 to100 (Ensor, Hart, Jacobs, & Hughes, 2011; Wong, 2008). Assuming an alpha of .05, a small to medium effect size, a sample size of 150- 200 was necessary to achieve a power of .80 (i.e., 80% chance to detect a significant relationship between IVs and DV if there was indeed one).

Data were analyzed using structural equation modeling (SEM), a statistical method that takes a confirmatory (theory-driven) approach to data analysis (Schumacker & Lomax, 2010). SEM requires the researcher to have a theoretical model guiding the analytic process, and provides confirmatory information regarding the fit (congruence) between the adopted theoretical model and the observed data. SEM has several advantages over other univariate techniques for hypothesis testing. First, it accounts for

measurement error within the model by examining the relationship among latent (unobserved) and observed variables. Second, it allows the researcher to assess multiple structural relationships among the latent variables simultaneously, therefore reducing the probability of type I error.

Model fit was assessed using the chi-square goodness-of-fit statistic, as well as three incremental fit indices: Comparative Fit Index (CFI; Bentler, 1990), Tucker Lewis Index (Tucker & Lewis, 1973) and the root mean square error of approximation (RMSEA; Steiger & Lind, 1980). The goodness-of-fit index measures the degree of difference between the observed covariance matrix (the obtained data), and the implied covariance matrix (the theoretical model); therefore providing an estimate of overall fit between the data and the theory. A non-significant $\chi^2$ statistic is desirable, as this suggests that there is not a significant difference between the observed data and the implied theoretical model. Incremental fit indices measure the adequacy of a model compared to a baseline model. Conventional cutoffs for incremental fit indices are .9 for an adequate fit, and .95 for an excellent fit (Hu & Bentler, 1999). Values of .06 or less on the RMSEA also indicate excellent fit (Hu & Bentler, 1999).

Data were analyzed in Mplus, a statistical modeling program, using the following procedure. First, a measurement model was estimated for the latent variables. Peer prosocial behavior was constructed using scores on the Peer Behavior Inventory (PBI), self-control became a latent variable constructed using the summed scores for each of the subscales on the EATQ-R (activation control, inhibition control, attentional control) as well as the score on conditions three (3) and four (4) of the Color-Word test, and

aggressive behavior was constructed using the scores for each of the three laboratory measurements of aggression (monetary reward, profile comments, recommendations).

Second, the structural model was tested in which peer prosocial behavior is the predictor, aggressive behavior is the outcome, and self- control is the mediator. Gender, age, and ethnicity were entered into the model as covariates. I tested the mediation model using the product of coefficient approach (MacKinnon et al., 2002; MacKinnon, 2008). In this approach, the significance of the mediated effect is tested by dividing the product of the alpha and beta paths by its standard error, where the *alpha path* is equal to the regression coefficient using the predictor (peer prosocial) to predict the mediator (self-control), and the *beta path* is equal to the regression coefficient using the mediator (self-control) to predict the outcome variable (aggression), while controlling for the predictor (peer prosocial). The significance of the mediated effect was tested by two methods – the Sobel test (Sobel, 1982) and MacKinnon's asymmetric confidence interval (ACI; MacKinnon et al., 2007; MacKinnon, 2008). The Sobel z statistic is defined as:

$$\frac{\alpha\beta}{\sqrt{\alpha^2 S_\beta^2 + \beta^2 S_\alpha^2}}$$

The statistic is then compared to critical values of the normal distribution. The mediated effect is significant at $p < .05$ when the statistic exceeds $\pm$ 1.96. A significant mediated effect (*a*b*) would suggest that effortful control significantly mediates the relationship between peer prosocial behavior and aggressive behavior.

The Sobel test assumes that the mediated effect is distributed normally. However, recent research has found that the mediated effect (i.e., the product of two normally distributed variables (*a* and *b*) is often not normally distributed (MacKinnon et al., 2002).

Simulation studies found that the Sobel test is highly conservative and has low statistical power. MacKinnon et al. (2002) argued that the significance of the mediated effect should be evaluated by the asymmetric confidence interval. This test takes the shape of the distribution of the mediated effect into account when calculating the confidence limits. Simulation studies found that the asymmetric confidence interval is less conservative and has accurate Type I error compared with the Sobel test (MacKinnon et al., 2002; MacKinnon, 2008). For this reason, I also test the mediated effect using MacKinnon's asymmetric confidence interval via the ProdClin Program (MacKinnon et al., 2007). If the 95% confidence interval does not include zero, the mediated effect is statistically significant.

To test the hypothesis that the relationship among our variables would be different in the experimental as compared to the control group, I also conducted multiple group analyses. In multiple groups analysis, the groups may be compared by using two different approaches: (i) assuming that every path and factor loading across the experimental and control groups are the same and then testing for differences, or (ii), assuming that every path and factor loading is different across the groups and then testing to see if they are the same. Based on previous research with these constructs and populations (Chung, 2011; Prinstein et al., 2001), it was not expected that the two groups would differ across the alpha path, but that they would differ across the beta path. Therefore, I selected the multiple groups approach which assumed all factor loadings and paths to be the same across the study groups. For each outcome, I computed two sets of analyses --(i) the first set compared a model that constrains the relationship between the IV and the mediator (the alpha path) to be the same among groups and another model that allows them to be

different; (ii) the second set compared a model that constrains the relationship between the mediator and DV while controlling for the IV (the beta path) to be the same among groups and another model that allows them to be different. For each set of analyses, the two models were then compared using a $\chi^2$ difference test. If there is not a significant difference, we concluded that the relationship between peer prosocial behaviors and effortful control in the first set of analyses, and the relationship between effortful control and aggressive behaviors in the second set of analyses, is similar across experimental and control conditions. However, if the $\chi^2$ difference test is significant, we can conclude that the relationships differ across groups.

# Chapter 3

# Results

## Descriptive Analyses

Descriptive statistics and zero-order correlations for all major variables are presented in Tables 1-3. The assumption of normality was assessed in all major variables. Peer prosocial behavior, the three subscales of effortful control, and the Inhibition condition of the color-word test (Condition 3) were normally distributed as evidenced by computing the z statistics for skewness and kurtosis of each variable (see Table 2). The z-statistics for skewness and kurtosis were not significantly different from zero at $p < .001$ (p values were set to be more conservative as the tests were highly sensitive to any deviation from zero; Tabahnick & Fidell, 2013).

A visual inspection of the frequency histograms and normal probability plots for each of those variables further suggested that their distributions were within normal limits. The Color-word Switching condition (Condition 4) evidenced a slight positive skew. However, its distribution did not exceed conventional cutoffs for skewness and kurtosis warranting a transformation of that variable. The distribution for two of the aggression variables, *payments* and *votes* for the judges, were normal as evidenced by standardized skewness and kurtosis statistics. The third aggression variable, comments toward the judges, did show a significant negative skew ($z= 4.25$, $p < .001$). A significant proportion of the sample either declined to provide comments or provided all neutral comments, therefore this variable was recoded as a dichotomous variable where 0= non-aggressive comments/ declined to comment and 1= aggressive comments.

Zero-order correlations between predictor and outcome variables were examined (see Table 1). One of the outcome variables of aggression, comments toward the judges, yielded a significant positive correlation with age such that older children were more likely to provide aggressive comments about the judges. Surprisingly, comments toward the judges were also significantly positively correlated with peer prosocial behaviors suggesting that reporting higher ratios of prosocial friends was related to more aggressive comments toward judges. Another aggressive outcome variable, voting for judges, was significantly positively correlated with the activation subscale of effortful control such that higher activation scores were related to higher ratings of voting judges through to the second round of the competition. None of the three aggressive outcome variables (comments, votes, or payment) significantly correlated with peer prosocial behaviors. Peer prosocial behavior was positively correlated with several variables including age, activation, attention, and the aggregate effortful control variable.

Before conducting analyses for the proposed hypotheses, I examined whether any demographic variables were associated with pertinent predictor (peer prosociality) and outcome variables (self-control and aggression; See Tables 4-6). Ethnicity ($t(149)= .51$, $p= .613$) and age ($F(3,148) = 1.97$, $p=.12$) were not significantly associated with peer prosocial behaviors. However, gender was significantly associated with peer prosocial behaviors ($t(150)= -2.40.$, $p= .02$) such that female participants reported significantly higher prosocial peer behaviors ($M= .74$) compared to males ($M= .65$).

*Table 1.* Zero-order correlations of all major predictor and outcome variables.

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| 1. Peer Prosocial Behavior | --- | | | | | | | | | |
| 2. Activation | .294** | --- | | | | | | | | |
| 3. Attention | .287* | .437** | --- | | | | | | | |
| 4. Inhibition | .140 | .536** | .536** | --- | | | | | | |
| 5. Effortful Control | .303** | .838** | .792** | .818** | --- | | | | | |
| 6. Color-Word Switching | .072 | .160* | .240** | .172** | .231** | --- | | | | |
| 7. Voting for Judges | .032 | .170* | .124 | .077 | .158 | -.080 | --- | | | |
| 8. Payment for Judges | .136 | .091 | .127 | .073 | .119 | .055 | .524** | --- | | |
| 9. Comments About Judges | .240* | -.202 | -.103 | -.138 | -.197 | .099 | -.690** | -.460** | --- | |
| 10. Age (years) | .190* | -.091 | -.012 | .002 | -.047 | -.229** | -.031 | .053 | .220* | --- |

*Table 2.* Mean, SD, Skewness, and Kurtosis of major predictor and outcome variables.

| | Mean | Std. Dev | Range | Skewness | SD | $Z_S$ | Kurtosis | SD | $Z_K$ |
|---|---|---|---|---|---|---|---|---|---|
| Peer Prosocial Behaviors | 0.69 | 0.21 | 0.13-1.00 | -0.45 | 0.20 | -2.29 | -0.46 | 0.39 | -1.19 |
| Activation | 3.30 | 0.79 | 1.50-5.00 | 0.13 | 0.19 | 0.64 | -0.46 | 0.39 | -1.19 |
| Attention | 3.52 | 0.65 | 1.67-5.00 | -0.09 | 0.19 | -0.05 | -0.04 | 0.39 | -0.11 |
| Inhibition | 3.87 | 0.58 | 2.00-5.00 | -0.47 | 0.19 | -2.40 | 0.24 | 0.40 | 0.61 |
| Effortful Control | 3.56 | 0.55 | 1.97-4.94 | 0.09 | 0.19 | 0.45 | -0.05 | 0.39 | -0.12 |
| Voting for judges | 2.08 | 1.46 | 0.00-4.00 | .016 | 0.20 | 0.08 | -1.38 | 0.40 | -3.52 |
| Payment for Judges | 2.87 | 0.77 | 1.00-5.00 | -0.05 | 0.19 | -0.26 | 1.10 | 0.39 | 2.78 |
| Comments About Judges | 0.97 | 1.28 | 0.00-4.00 | 1.11 | 0.26 | 4.25 | 0.03 | 0.51 | 0.05 |

*Table 3.* Percent total distribution of Ethnicity and Gender

| | Percent Total (%) |
|---|---|
| Ethnicity | |
| African American | 2.6 |
| Asian/Pacific Islander | 4.6 |
| Hispanic/Latino | 9.2 |
| White/Caucasian | 81.7 |
| Other | 1.3 |
| Total | 99.3 |
| Gender | |
| Male | 47.1 |
| Female | 52.9 |

Gender and age had no significant association with all three aggressive outcomes. Ethnicity significantly related to two aggression variables, payments for judges $t(147)= 2.24.$, $p= .027$) and votes for judges ($t(147)= 2.60$, $p= .010$), such that non-Caucasian participants provided more payment and more votes to the judges compared to Caucasian participants. Age had a restricted range (11-14) and thus, we did not expect it to have a linear relationship with predictor variables. Therefore, a one-way analysis of variance (ANOVA) was used to test for differences. Age was significantly associated with comments about the judges, ($F(3, 82)= 2.75$, $p=.048$). Tukey's HSD post hoc analyses indicated that a significant mean difference between 11- and 14-year-old participants (-.9762, $p= .05$) was obtained, suggesting that 14-year-old participants reported significantly more negative comments about the judges on average than 11-year-old participants. Finally, age, gender, and ethnicity had no significant relationship with effortful control (activation, inhibition, attention). Given these results, I controlled for age, gender, and ethnicity in all subsequent analyses.

**Manipulation checks**

Given the experimental nature of the current study, several manipulation checks were initiated to ensure the integrity of the participants' responses across the experimental and control groups. These checks are comprised of different questions to determine whether the two groups responded in different ways as a result of the experimental manipulation. They allow the researcher more confidence in concluding that any differences they see between the groups can be attributed to this manipulation rather than chance. The current experimental manipulation involved a change in the

*Table 4.* Independent-samples t-tests for major variables grouped by Ethnicity (0= Non-white, 1= White)

| | *df* | *t* | *p* |
|---|---|---|---|
| Peer Prosocial Behaviors | 149 | .506 | 0.61 |
| Activation | 150 | 1.79 | 0.07 |
| Attention | 150 | 1.08 | 0.28 |
| Inhibition | 150 | 0.98 | 0.32 |
| Judge Comments | 83 | -1.19 | 0.23 |
| Voting for judges | 147 | 2.60 | 0.01 |
| Payment for Judges | 147 | 2.24 | 0.02 |

*Table 5.* Independent-samples t-tests for major variables grouped by Gender.

| | *df* | *t* | *p* |
|---|---|---|---|
| Peer Prosocial Behaviors | 150 | -2.40 | 0.02 |
| Activation | 151 | -1.52 | 0.13 |
| Attention | 151 | -0.04 | 0.96 |
| Inhibition | 151 | -0.45 | 0.65 |
| Judge Comments | 84 | -1.43 | 0.15 |
| Voting for judges | 148 | 0.82 | 0.41 |
| Payment for Judges | 148 | 0.87 | 0.38 |

*Table 6.* One-way ANOVA for major variables grouped by Age.

| | *df* | *F* | *p* |
|---|---|---|---|
| Peer Prosocial Behaviors | 3, 148 | 1.97 | 0.12 |
| Activation | 3, 149 | 0.66 | 0.57 |
| Attention | 3, 149 | 0.06 | 0.97 |
| Inhibition | 3, 149 | 0.43 | 0.72 |
| Judge Comments | 3, 82 | 2.75 | 0.04 |
| Voting for judges | 3, 146 | 1.17 | 0.32 |
| Payment for Judges | 3, 146 | 2.01 | 0.11 |

valence of comments provided to the participant. Participants in the experimental condition received more negative comments whereas participants in the control condition received more neutral comments. The two manipulation check questions (See Method section) assessed the extent to which participants recognized that their comments were either negative or neutral. If there are significant differences between the groups on their responses to those questions, we can be confident that participants adequately understood the valence of the comments that they received (i.e., negative or neutral) and conclude that the experimental manipulation provided a generally valid effect. Results yielded a significant difference between the groups on two questions -- participants in the experimental group rated the judges' comments as less positive ($t(147)= 10.81$, $p< .001$) and more negative ($t(147)= -6.72$, $p< .001$) compared to the control group. In addition, a frequency distribution found that 80% of participants in the control group responded with *completely agree*, or *agree* to the statement, "The judges had mostly positive things to say about me," compared to 16% of participants in the experimental group. In response to the question, "Most of the judges did not seem to like my profile," 10.7% of participants in the control group responded with *completely agree*, or *agree*, compared to 57% of participants in the experimental group. This pattern of results suggested that the manipulation of program feedback in the experimental paradigm (negative vs. neutral) was adequately distinguished among participants assigned to these groups.

**Primary Analyses**

**Main effect of group.** Participants in the experimental group were significantly more likely to (i) vote judges out of the second round ($t(147)= -8.26$, $p< .001$), (ii) award less money to judges ($t(147)= -4.11$, $p< .001$), and (iii) write more comments with

negative/aggressive content on the judges profiles ($t(147)= 5.55$, $p< .001$) compared to participants in the control group.

These results were not significant when looking at responses directed at non-judge children (i.e., children who had not previously written comments about the participant). Participants in both the experimental and control groups made similar voting, payment, and commentary decisions for those profiles. This pattern was expected given that the non-judge profiles were identical across the two groups. Thus participants discriminated between negative and neutral comments within the game.

**Measurement model.** The three subscales of effortful control (attention, activation, and inhibition) and the switching condition of the Color-Word Interference test (Condition 4) were used as indicators of the latent construct, self-control. The latent variable of aggression was constructed using aggregate payments, comment ratings, and voting decisions made about each of the judges during the Survivor game. Factor loadings for the observed variables are displayed in Figure 1. Observed variables significantly loaded onto each of their respective latent constructs for both self-control ($\beta= .25$- $.70$ respectively) and aggression (judge payment $\beta= .65$, judge comments $\beta = -.72$, judge votes $\beta=.76$). The measurement model yielded an excellent fit to the data ($X^2(13)= 8.94$, $p= 0.77$) and fit indices were excellent (CFI= 1.00, TLI= 1.05, RMSEA< .001).

I then examined whether the relationships between observed indicator variables and the latent constructs significantly differed across the control and experimental conditions of the laboratory aggression paradigm. This was conducted by systematically allowing each of the factor loadings to vary across the control and experimental groups

and then computing a chi-square difference test to determine if the difference between the two groups was significant. If a loading was determined to be significantly different across the groups, the more complex model (different loadings across groups) was selected and the next factor loadings were compared. If there were not significant differences between the two models, the more parsimonious model (same loadings across groups) was selected. For the latent construct of self-control, systematic comparisons across the two groups were not significantly different for the three subscales of effortful control (activation: $X^2(1)= 1.74$, $p= 0.18$; attention: $X^2(1)= .001$, $p= 0.97$; inhibition: $X^2(1)= 0.38$, $p= 0.53$) or the switching condition of the Color-Word test ($X^2(1)= 0.61$, $p= 0.43$), indicating that these loadings did not significantly vary across the experimental and control groups. For the latent construct of aggression, systematic comparisons across the two groups were not significant for judge payments ($X^2(1)= 2.34$, $p= 0.12$) or judge votes ($X^2(1)= 1.65$, $p= 0.19$), indicating that those loadings did not significantly differ across groups. Taken together, this pattern of results suggests that the more parsimonious model (same loadings across groups) should be selected. In summary, the measurement model did not differ across the experimental and control groups (See Figure 2).

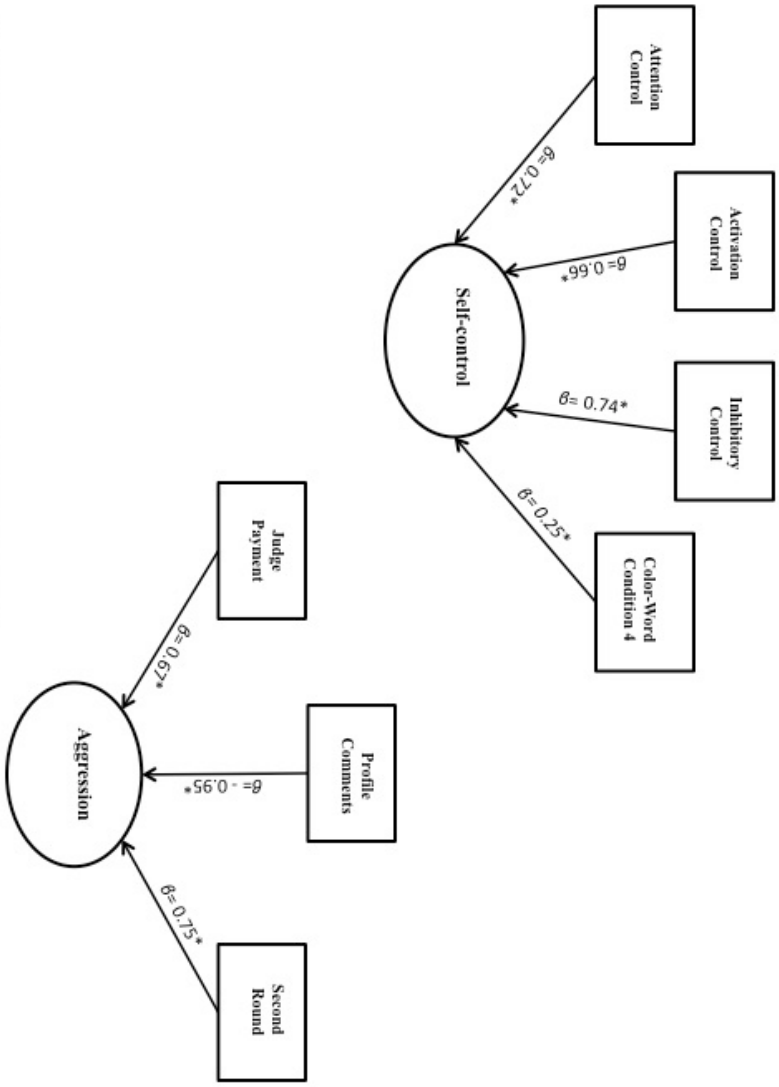


*Figure 1*. Measurement model loadings collapsed across study conditions. * $p < .01$.

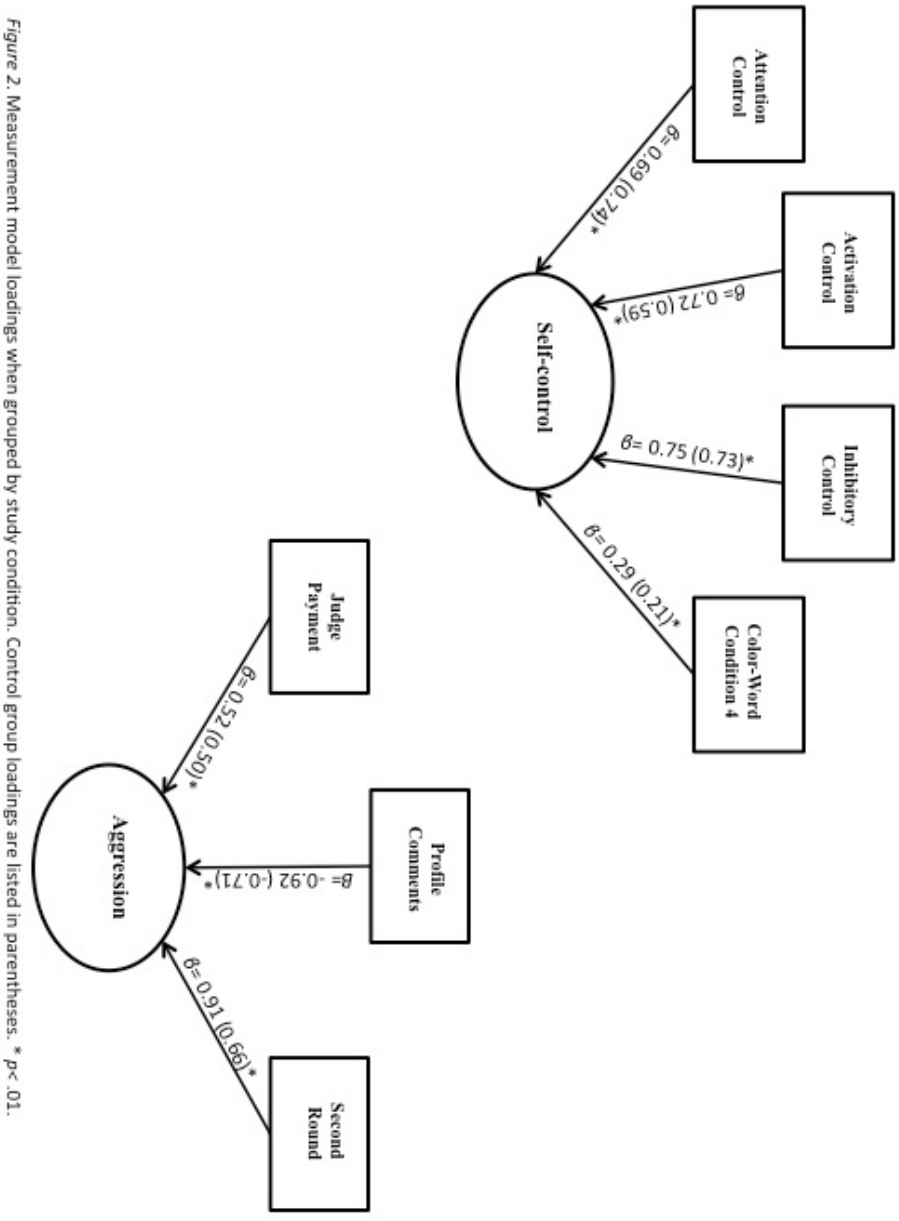


*Figure 2.* Measurement model loadings when grouped by study condition. Control group loadings are listed in parentheses. * $p < .01$.

**Structural Model.** The initial structural model included gender, age, and ethnicity as control variables. However, no demographic variables significantly predicted aggression (Gender: $\beta$= -0.17, $p$= .08, Age: $\beta$= -0.04, $p$= .78, Ethnicity $\beta$= -0.21, $p$= .26) or self-control (Gender $\beta$= 0.004, $p$= .96, Age $\beta$= -0.14, $p$= 0.12, Ethnicity $\beta$= -0.16, $p$= .10). Therefore, no demographic variables were included in the final structural model.

Multiple-groups analyses were conducted to determine whether the structural relationships were the same across the experimental and control groups. Due to our theoretical understanding of the relationship between the study variables, I began this analysis with the statistical assumption that all of the pathways were different (see Plan of Analysis). This was conducted by systematically constraining each of the regression paths across the two groups and then computing a chi-square difference test to determine if the difference between the two groups was significant (Kline, 2010; Schumacker & Lomax, 2010). If a regression path was significantly different across groups, the more complex model was selected (i.e., different strength in betas across the groups). If there were not significant differences between the two models, the more parsimonious model (equal regression paths) was selected. All regression paths were compared using this method. Results indicated that the relationship between peer prosocial behavior and self-control ($X^2(1)$= 1.85, $p$= 0.17), peer prosocial behaviors and aggression ($X^2(1)$= 1.63, $p$= 0.20), and self-control and aggression controlling for peer prosocial behavior ($X^2(1)$= 0.65, $p$= 0.42) were the same across groups. Therefore, the model that constrained the relations to be the same (most parsimonious) was selected. Fit of the hypothesized model to data was good ($X^2(49)$= 58.90, $p$= 0.15, CFI= 0.94, TLI= 0.93, RMSEA= .05).

Given that there were no significant group differences, I collapsed data across the experimental and control groups and reanalyzed the structural model. In the final model, the direct relationship between peer prosocial behaviors and aggression was not significant ($\beta$= -0.48, $p$= .64). However, peer prosocial behaviors did significantly predict self-control ($\beta$ = 3.95, $p$< .001) such that higher reports of peer prosocial behavior predicted higher scores on measures of self-control. Self-control also significantly predicted aggression while controlling for peer prosocial behavior ($\beta$ = 2.14, $p$= .03). Holding peer prosocial behavior constant, higher levels of self-control predicted lower levels of aggression. A calculation of the 95% asymmetric confidence interval indicated that the mediated effect was significant (.009 to .177, $p$ < .05). Fit of the model was excellent ($X^2(48)$= 49.7, $p$= 0.40, CFI= 0.98, TLI= 0.98, RMSEA= .02; See Figure 3).

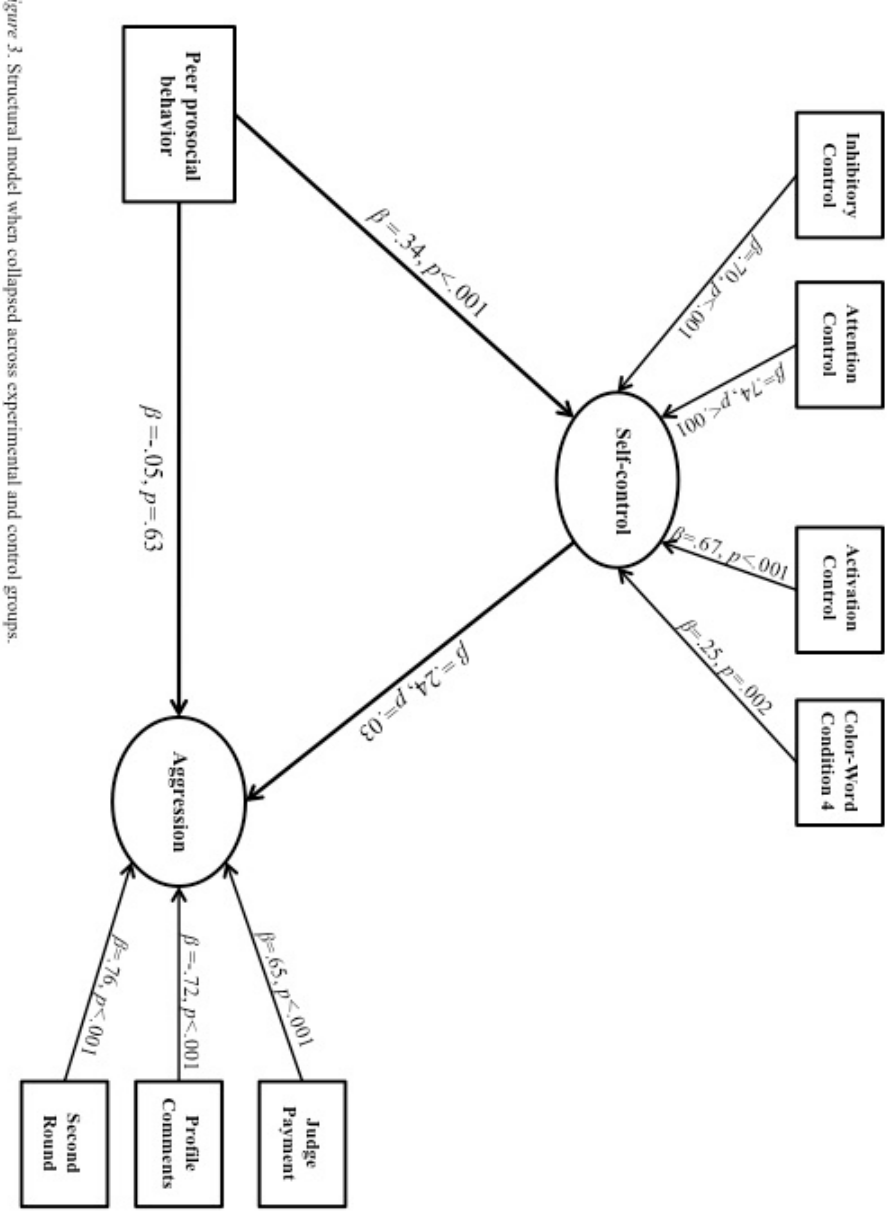


*Figure 3.* Structural model when collapsed across experimental and control groups.

# Chapter 4

# Discussion

The purpose of this study was to further understand the relationships among peer prosocial behavior, self- control and aggressive behavior by using an experimental paradigm to manipulate aggression. Another goal of the study was to expand the current literature on peer influences by examining the impact of prosocial peers on aggressive behavior.

## Main Findings

**Hypothesis 1.** *The main effect of condition was expected to be significant such that participants in the experimental condition would respond more aggressively toward the judges compared to participants in the control condition.*

The first hypothesis was supported. Participants who were randomly assigned to the experimental (negative feedback) group engaged in significantly higher rates of aggression toward the judges compared to participants in the control group. This pattern was consistent across three different measures of aggression such that participants in the experimental group withheld more money, provided fewer votes, and wrote more aggressive comments than participants in the control group. The experimental group was adequately provoked by the negative feedback from judges during the study, which is consistent with past research using the Survivor Game paradigm (Reijntjes et al., 2006, 2011a, 2011b, 2013). Furthermore, this finding is consistent with developmental research showing a positive relationship between social provocation and subsequent aggressive or retaliatory behavior (Hurley & Underwood, 2002; Underwood, 2005). A more remarkable component of this finding relates to participants' differential responding

across provoking and non-provoking players in the game. While participants in the experimental group responded more aggressively to players who had previously judged them negatively (i.e., "judges"), they did not respond as aggressively toward players who had not previously judged them (i.e., "non-judges"). In contrast, participants in the control group exhibited similar patterns of responding (neutral or positive comments) to both judges and non-judges. This pattern bolsters the conclusion that these strong and significant differences in responding between the experimental and control groups can be in part attributed to the feedback they received from the game.

From a social and clinical standpoint, these results have the following implications. First, the participants' tendency to aggress against those players who had harshly judged them suggested a pattern of relational and hostile aggression targeted at retribution toward a provoking stimulus (Berkowitz, 1988). Even though rescinding money, voting other players out of the game, and writing damaging comments would not in any way affect participants' own standing within the game (as they had already been "voted out"), they still engaged in those behaviors. Relational aggression is demarcated by an intention to socially and interpersonally harm another individual, as in the case of gossiping, spreading rumors, or withholding social resources from another individual (Berkowitz, 1988; Dishion et al., 2004). Although these actions may be used as a means of claiming resources on the part of the aggressor, they can also be committed from a retributive standpoint (e.g., getting revenge, an eye for an eye) in an attempt to "get even" with those who are seen as responsible for being excluded from a group. Participants in the experimental group might have engaged in a similar pattern of responding as a way to

avenge their own exclusion from what was presented as a desirable social activity (i.e., moving on to the second round of the game).

Beyond relational aggression, the difference in responding between the two study groups also highlights the impact of hostile aggression. While the decision to not vote for certain players or provide negative comments can be understood as an exhibition of relational aggression, experimental participants' tendency to award less money to judges compared to other children can also be conceptualized as a hostile response pattern. Unlike instrumental aggression, hostile aggression is considered a behavior perpetuated with the sole intention to harm another individual (Berkowitz, 1998; Schmid, 2005). Within the current study, there was no potential social benefit for withholding money from another player as it did not have any effect on that player's ability to move forward in the game, therefore suggesting that participants may have chosen to revoke monetary funds for a purpose other than social retribution. This finding, that the aggressive response toward the judges was generalized across all possible opportunities for causing harm (i.e., financial and social domains), is particularly interesting to consider. Schmid (2005) discussed the construct of vengeance as a mixture of hostile and instrumental aggression in which the individual attempts to not only communicate that the transgressors actions were wrong or incorrect, but also to cause them pain, as would be the case in awarding less money.

This pattern of results could provide several important insights for socially aggressive responding in adolescence. First, the current paradigm measured relational and indirect forms of aggression rather than physical or overt actions, which have been thoroughly explored in previous literature (Dishion, Patterson, Stoolmiller & Skinner,

1991; Gillaspy, 2005; Masten, Juvonen & Spatzier, 2009; Murphy & Eisenberg, 1997; Shin, Daly & Vera, 2007). When focusing on relational aggression expressed indirectly via social media, we found that a significant proportion of adolescents chose to engage in aggressive actions when they felt that they had been excluded from the game. While base rates of physical aggression in this age group are fairly low (BJS, 2012; CDC, 2013), in the current study, many participants retaliated in a more indirect manner toward their target (i.e., judges). As social media continues to grow as a popular medium for interpersonal interaction, the anonymity and physical separation it provides may also increase the likelihood that children will use these tools as a platform for aggressive behavior more frequently. Recent reports suggest that instances of cyber bullying have continued to increase over the past several years (Ševčíková et al., 2015), with some sources concluding that this shift toward the use of technology for enacting social aggression has unique consequences for both the victim and perpetrator (Davison & Stein, 2014; Ševčíková et al., 2015). Although the effects of relational aggression may be subtler than those of physical outbursts, social ostracism and exclusion from social circles during adolescence can have myriad damaging effects on self-esteem, future interpersonal effectiveness, and emotion regulation (Cardoos & Hinshaw, 2011; Wölfer & Scheithauer, 2013). Understanding the characteristics that differentiated those adolescents who aggressed toward the judges as compared to those who did not could be an important step in creating more effective prevention and intervention efforts regarding social ostracism within a cyber-social framework. For example, providing adolescents with effective problem-solving skills for navigating hostile interactions online could be

one potential way to reduce reactive aggression, thereby increasing the adolescent's own sense of perceived self-control over the situation.

**Hypothesis 2.** *The direct relationship between peer prosocial behavior and laboratory aggressive behavior was expected to be non-significant.*

The second study hypothesis was supported. There was no direct relationship between peer prosocial behaviors and aggressive behavior. Although in line with results from my Master's thesis project, this finding is still surprising given the extensive empirical link between peer behaviors (both prosocial and delinquent) and aggression in adolescence (Chung, 2010; Prinstein et al., 2001; Shin, Daly & Vera, 2007). This finding may be due to several different mechanisms. First, there may be no relationship between prosocial peers and aggression in adolescence. While prosocial peers impact adolescent functioning in other ways (e.g., increasing physical health safety, increasing individual prosociality), those behaviors may not specifically target the likelihood that an adolescent will act out aggressively in the same way that antisocial peer behaviors have been established. However, results from my master's thesis and later hypotheses in the current study (see discussion on Hypotheses 3 & 4) indicate that self-control significantly mediated the relationship between peer prosocial behavior and aggression. Specifically, those who reported more peer prosocial behavior were also more likely to report higher self-control, which predicted lower aggression. Without taking into account the impact of self-control, there was no relationship between peer prosocial behavior and aggression. Statistically, the alpha path of the current model yielded a positive relationship (i.e., as peer prosocial increases, self-control increases), whereas the beta path yielded a negative relationship (i.e., controlling for peer prosocial behavior, as self-control increases,

aggression decreases), thus creating an inconsistent mediation (MacKinnon, 2008). The combination of those positive and negative pathways could also result in a seemingly non-significant direct relationship between the predictor and outcome variables without taking into account the mediator.

A final consideration involves recognizing the complexity of peer group actions. Although there is some empirical basis that prosocial and antisocial behaviors are inversely related (Carlo et al., 2014; Nantel-Vivier, Pihl, Cote, Tremblay, 2014), peer groups could exhibit both prosocial and delinquent behaviors on a day-to-day basis. This could in turn affect our ability to detect a relationship between prosocial peers and aggressive responding if that link is clouded by the impact of other delinquent peer group behaviors. From a Social Learning perspective, these conflicting models of social behavior could contribute to the lack of a clearly defined relationship between the peer groups and responses of the individual. For instance, the peer group may be heavily involved in school organizations and philanthropy while also engaging in harmful social behaviors such as teasing or gossiping about other children. This behavioral juxtaposition could wash out any protective effect that those prosocial actions may have. Therefore, future research should explore the simultaneous impact that both prosocial and delinquent peer behaviors have on adolescent aggression to tease apart the complexities of that social system.

**Hypothesis 3.** *The relationship between peer prosocial behavior and self- control was expected to be significant (alpha path), such that higher levels of peer prosocial behavior would relate to higher levels of self- control.*

The third hypothesis was also supported in that higher peer prosocial behaviors predicted higher levels of self-control. Consistent with findings from my master's thesis, this pattern suggests that there is indeed a link between the external behaviors of salient social models (peers) and the internal restraint of the adolescent. Although the current study made use of cross-sectional data and therefore cannot definitively comment on the directionality of that relationship, our theoretical model coupled with this pattern of findings provides evidence that these two constructs are linked.

Social Learning Theory proposes that the peer group can serve as a salient model for appropriate or inappropriate social behavior (Bandura, 1977; Bandura et al., 2003). It is possible that the extent to which adolescents watch their immediate peer group engage in prosocial reactions could increase their own sense of control over their emotions, thoughts, and behaviors. While the temperamental component of effortful control, reactivity, is considered to be stable over time, the self-control component is theoretically capable of changing based on environmental circumstances, such as those encountered when interacting with the peer group. Not only did the current study establish a link between peer prosocial behaviors and the adolescent's self-report of effortful control, but it also established a significant relationship between those reported peer behaviors and their performance on an objective measure of inhibitory self-control.

This finding is noteworthy for several reasons. First, it establishes the importance of considering the significance of the peer group with regard to individual self-control, assessed by both subjective reports and an objective measure of executive functioning. Second, the relationship between peer prosocial behavior and inhibitory control is not well documented in the current literature. It could suggest that the social interactions

encountered in adolescence might have an impact on the individual's ability to exert specific self-control skills (e.g., inhibition) in other contexts. While this single finding does not provide definitive support for the relationship between peer pro-sociality and inhibitory control, it does provide fodder for additional research exploring the link between these variables in adolescence.

Moreover, the current study did not assess causality between these variables. It is therefore not possible to conclude with any degree of certainty that peer behaviors directly affected or changed self-control. It could be that those children with high levels of self-control self-selected a peer group with similar values and behaviors. From this standpoint, the exhibition of increased prosocial behavior by the peer group could simply be a correlate of higher overall self-control capabilities, a link that has been well-established in the literature (Panfile & Laible, 2012; Rydell et al., 2007). For example, a study by Robinson, Jones, Christiansen and Field (2015) found that trait self-control significantly moderated the relationship between peer alcohol consumption and problematic drinking in adolescence. However, as with any developmental process, it is relatively unlikely that the causal relationship is unidirectional. Rather, peer group influences may lead to changes in individual regulatory skills, which may in turn affect the selection of peers. Future research exploring the longitudinal relationship between those variables could provide additional insight into the temporal relationship between peer group selection, influence, and subsequent self-control abilities.

**Hypothesis 4.** *Self- control was expected to significantly mediate the relationship between peer prosocial behavior and aggression, such that higher self- control would be*

*associated with lower aggressive behavior while controlling for peer prosocial behavior (beta path).*

The fourth hypothesis was also supported in that the latent variable of self-control significantly mediated the relationship between peer prosocial behaviors and aggression. Specifically, higher peer prosocial behaviors was associated with higher self-control. Holding peer prosocial behavior constant, higher self-control predicted lower levels of aggressive responding during the Survivor game. This indicates that the adolescent may use their peers as role models to create socially appropriate problem-solving strategies (e.g., self-control), which would therefore lower the probability of engaging in aggressive behavior.

While there is extensive literature linking the peer group to behavioral outcomes in adolescence, the mechanisms behind that relationship are less clear. The construct of self-control may serve as a potential mechanism for understanding the impact of external social events on individual behaviors. For example, by observing the peer group engaging in prosocial interactions and socially appropriate problem-solving (e.g., collaborating with authority figures, helping other kids in need), the adolescent may internalize those response strategies over other more immediate albeit a-/anti-social methods of problem-solving (e.g., bullying, stealing, etc.), and therefore be more likely to employ those prosocial responses in future provoking situations. While peer group behaviors are essential to this model, it is indeed the individual's own ability to internalize and adhere to that social model that in turn affects their behavior in later situations. There would appear to be a seemingly non-significant relationship between peer prosocial behaviors and adolescent aggression without taking self-control into account.

**Hypothesis 5.** *There was expected to be a significant difference in the hypothesized mediation model across the experimental and control groups.*

The hypothesis regarding expected differences between the structural relationships across the experimental and control groups was not supported. Specifically, it was expected that both the direct path (c') between peer prosocial behaviors and aggression, and the beta path between self-control and aggression would be different across the two groups. Multiple-groups analysis yielded non-significant results with regard to those pathways suggesting that the two groups did not differ. Although contrary to the stated hypothesis, there are several possible explanations for this finding. It is possible that the impact of peer group behaviors and self-control on aggression are similar regardless of the feedback provided to a participant. In both the experimental and the control group, peer prosocial behaviors had a significant relationship with self-control, and self-control was significantly related to aggression when controlling for peer pro-sociality. This implicates the importance of both peer and individual level factors as they relate to aggressive responding within a discrete analog task. Some research suggests that there may be a threshold of provocation the can elicit aggressive responding in a majority of individuals, despite any preexisting factors (e.g., social values, ecological influences; Anderson & Bushman, 2007; Gottfredson & Hirschi, 1993). However, the current finding indicates that even with high levels of social provocation the degree of aggressive responding continued to be related to the internal and external control variables reported by participants. It is also possible that our provocation paradigm was simply not effective enough to elicit a strong aggressive response in the experimental

group; however, this is unlikely given the statistical differences highlighted through the use of manipulation checks in this study.

Another explanation for those findings relates to the statistical power in the current study and the ability to detect true differences between groups with the available sample. Given the demands of structural equation modeling and the complexity of model estimates involved in multiple-groups analysis, conventional practice advocates for a larger sample size (MacCallum et al., 2003). The current study used an N of 153, which is at the lower end of the suggested sample size provided earlier in this manuscript (range: 150-200). As a result, the multiple-groups analysis was computed with approximately 75 subjects per group cell, which could have restricted my ability to detect actual differences between the groups. Therefore, it is possible that there are true differences in the relations across the experimental and control groups that are masked by a lack of statistical power. Obtaining a larger sample size would provide more definitive evidence toward this explanation.

**Hypothesis 6**. *Performance on the executive functioning task and effortful control measure were used to create a composite latent variable of self-control which was hypothesized to mediate the relationship between peer prosocial behavior and laboratory aggressive behavior.*

The final study hypothesis was supported in that self-reported effortful control and performance on an executive function task significantly loaded onto a single latent construct of self-control. This pattern has been inconsistently supported within the existing literature base on self-control and executive functioning (Drabick et al., 2011; Mischel et al., 2011; Moffit et al., 2011; Towse, Hitch, & Hutton, 1998). By establishing

a common latent factor underlying these observed variables, it can be concluded with more confidence that these tasks are indeed measuring a similar psychological construct. This finding implicates the utility of using both behavioral and self-report measures to ascertain an individual's current level of self-control. It also provides additional support for the validity of this self-report measure for assessing effortful control. Self-report measures are often criticized for their high level of subjectivity and lack of identifiable construct validity (Kirk, 2006). By identifying the convergence of this subjective measure with an objective behavioral task measuring a component of self-control we can be more confident in our use of such self-report measures in the future. While more objective tasks such as the Color-word test continue to be superior in terms of validity and reliability (Dellis, Kaplan, & Kramer, 2001; Weibe, Epsy, & Charak, 2008; Zhou, Chien, & Main, 2011), they also require increased participant and experimenter effort and are thus less feasible for use in larger scale community-based research. Future research should consider the use more accessible and efficient self-report measures that correlate with objective tasks of self-control. Additional research on self-report measures and executive functioning is needed to further understand their convergent validity.

**Study Implications**

The current study found support for all but one of the major hypotheses. Collectively, the findings establish three major conclusions: i) adolescents who were provoked by same-aged peers were more likely to respond in a relationally aggressive manner targeted at revoking social status and privilege, ii) the extent to which adolescents engaged in that aggressive response was related to their preexisting reports of prosocial peer behavior and levels of self-control, and iii) the influence of peer group behavior and

self-control appeared to be related to aggressive responding regardless of the feedback provided to adolescents (i.e., neutral versus negative). These findings replicated the results of my master's thesis project while improving upon the measurement of aggressive behavior by implementing a laboratory-based experimental analog task. Prior to conducting these two projects, there was very limited research exploring the relations between prosocial peers, aggression, and self-control within adolescents. By replicating this pattern across two studies and two different outcome measures of aggression (i.e., YSR and the Survivor Game), it can be concluded with more confidence that these relationships are meaningful with regard to understanding behavioral outcomes in adolescence. These findings highlight the importance of considering an often underutilized social construct, peer prosocial behavior, in the conceptualization of socially aggressive behavior. This replicative pattern also implicates the need for continued research to fully understand how peer prosocial behaviors may reduce aggression.

Despite the generally provocative content of the negative feedback condition, the extent to which adolescents endorsed more prosocial peer connections and higher self-control related to decreased aggressive responses. This pattern could have implications for many adolescent-based interventions, which have traditionally focused on eliminating exposure to potentially harmful feedback (e.g., avoidance of negative friendships). While this approach is certainly valid, these findings illustrate the potential resilience of the adolescent in the face of negativity when they are given effective tools to manage those social encounters. In the context of practical applications, clinicians, teachers, and parents should not only be focused on the elimination of antisocial peer influences, but also on

exposure to prosocial peer groups and education on healthy coping skills. For example, skills-based interventions such as Dialectical Behavior Therapy for Adolescents focus on similar processes and target not only individual regulatory capabilities (e.g., Mindfulness, Emotion Regulation, Distress Tolerance), but also intervene on the interpersonal interactions that have a propensity to elicit aggressive or ineffective responses (i.e., Interpersonal Effectiveness skills; Apsche, Bass, & Houston, 2006; Rathus & Miller, 2015).

Intervention efforts focused on the social context of adolescent peer support may also help to change less observable individual characteristics, such as self-control, that could contribute to risky behaviors (e.g., delinquency, substance use, aggression). Certain intervention methods outlined within the school psychology literature support this conclusion. Methods such as the "Buddy System" approach and increased involvement in structured extracurricular activities (e.g., Boy scouts, school clubs, 4-H, etc.) that promote team-based, positive collaboration with one's peers have some empirical support for decreasing behavioral dysfunction in children (Witvliet, van Lier, Cuijpers, & Koot, 2009) and map onto the strong relationships established within this study.

These findings also have implications for continued research within the field of self-control and aggression, especially from a developmental perspective. The significant relationship between self-reported effortful control and performance on an objective response inhibition task illustrates the importance of including various methods of measurement for a construct as complex as self-control. Although the current study only focused on two aspects of self-control through the use of a behavioral measure (inhibitory and switching control), future research could focus on various components of self-control

such as attention and activation skills through more objective measures (e.g., Continuous Performance Test-2). A multi-method and multi-modal approach is necessary to fully understand a complex construct such as self-control.

Finally, the use of the Survivor game as a method of measurement for relational aggression should be considered. During the construction and proposal of the current project, I reviewed several existing experimental approaches for assessing aggression within adult and adolescent populations. Although research with adult populations has established several valid methods of assessment across physical, relational, and hostile aggression domains, the ability of researchers to effectively measure that construct within a developmental model has been much more limited. While a handful of studies used confederate peer paradigms and computer analogs to mimic provoking stimuli, their feasibility within common laboratory settings remains low due to the high effort required (e.g., recruiting, training, and caring for child actors to serve as confederates). The Survivor game has been widely used by Albert Reijntjes and colleagues in the Netherlands for several years and by a handful of collaborators internationally. However, its use with the current population of 11-14 year-old North American adolescents was novel. The current results suggest that the Survivor game served as a useful tool for measuring relational aggression within this sample as evidenced by significant differences across manipulation checks and response patterns for the two groups. Obtaining this consistency with previous research using the analog task highlights the Survivor game as a hopeful avenue for continued experimental assessment of aggression within a developmental model. It further contributes to the generalizability of this task for different subsamples of children across age and nationality. Given that it was relatively

simple to implement while still meeting conventional qualifications for a valid method of aggression assessment (see review of aggression measures on page 25), future research should consider this method.

**Limitations**

The conclusions drawn from these findings should be considered within the context of the project's limitations. First, this study primarily relied on self-report measures for information regarding behaviors of the peer group and perceptions of self-control. Self-report methodology bears a host of limitations including recall bias, subjective estimations of events, and potential limits to the reliability of those reports over time. The current project did bolster the findings of self-reported effortful control by including an executive functioning task as an additional measure of self-control. However, determining alternative methods for assessing peer behaviors in an efficient yet valid manner continues to be a challenge. For instance, research by Dodge and colleagues (2003, 2008) has employed the use of ecological methods of interpersonal observation to deduce interactional patterns of the peer group. Work from Thomas Dishion (1996, 1997, 2004) has implemented a peer nomination protocol useful for gathering more accurate data regarding peer behaviors and friendship quality within a group setting. While the current study relied upon the report of the individual participants, future research conducted within school settings could consider these alternative methods to enhance the quality of their social relationship data. Finding a balance between feasibility of administration and valid/reliable data yield is imperative.

Second, the study design was cross-sectional in nature and therefore precluded any exact conclusions about the temporal relationships of variables. The current results

are based on a theoretical framework outlined in the introduction and the conclusions are conceptualized within that structure. However, they represent only one possible way in which these variables could be related. While recognizing that the directionality among variables offers a certain level of utility in understanding psychological phenomenon, identifying the overall existence of these relationships is tantamount for informing general intervention efforts and later empirical exploration. From these results stricter and more controlled research endeavors can emerge. It is important that future research focus on expanding its scope to include a longitudinal focus on the relation between peer behaviors and social outcomes in adolescence. This approach would also potentially offer a more complete image of the directionality of these socio-behavioral relationships, thus informing the validity of our current theoretical paradigms.

The current study also measured the expression of social/relational aggressive aggression. It is important to recognize that the current results and conclusions pertain specifically to the expression of these socially aggressive behaviors, which are topographically different from other aggressive actions (e.g., physical, psychological, etc.). It is unclear whether results in the current study would generalize to other forms of aggression. Additional research exploring the relationships among multiple domains of aggression is necessary to address this issue.

The sample size was relatively small in comparison to other developmental projects focused on adolescents. I accrued a smaller sample size for several reasons. First, the study design was more complex than most community-based projects and therefore required more time and resources to collect a smaller, albeit richer amount of data from participants. Second, the study drew from a smaller pool of potential subjects

(adolescents aged 11-14 in a rural town) coupled with a limited incentive budget, which contributed to a lower overall target sample. Taking these factors into account, the final sample of 153 adolescents was sufficient for conducting my univariate analyses (e.g., descriptive statistics, regressions, t-tests), but not ideal for exploring hypotheses using multiple groups analysis in SEM, which usually requires a larger sample for adequate power. This smaller sample could have impacted our statistical power and thus, the ability to detect true differences between our groups.

The sample was also limited in its diversity. Participants were primarily Caucasian and lived within the same geographical region (Southeastern Idaho). Taking diversity factors into account, it is unclear the extent to which these findings may generalize to other cultural groups. When evaluating the impact of culture on these social processes, it is important to consider not only on race and ethnicity, but the intersectionality of many different cultural statuses to include gender, age, socioeconomic status (SES), rurality, sexual orientation, geographic location, religion, etc. For instance, research has discovered differences between Hispanic and Caucasian groups with regard to collectivistic versus individualistic attitudes and expectancies including differential reliance on group attitudes (Mills & Caetano, 2010). Varying levels of socioeconomic status (SES) have also been linked to differences in agency (a construct tied to self-efficacy and esteem; Wiederkehr, Darnon, Chazal, Guimond, & Martinot, 2015), which may impact the extent to which the individual internalizes feelings of mastery and control over their own behaviors. Each of these factors represent some of the ways in which culture could impact the strength and direction of the current results. Therefore,

additional research pulling from a larger and more diverse sample pool would provide increased power and generalizability of the findings.

The current study did not explore the impact of negative peer group behaviors on self-control or aggressive behavior. While extensive research has confirmed the link between peer delinquency and behavioral problems in adolescence, very little research has explored the simultaneous impact of both prosocial and antisocial peer behaviors on behavioral outcomes. Such information could provide a better understanding of the way in which the peer group affects social and emotional development during teenage years.

Finally, while the Survivor game was able to elicit differential responses across the experimental and control groups, there are also limitations. The Survivor game was originally created in the 1990's and has gone through limited updates since that time. As such, the general appearance of the game does not look as "high-tech" as other games that our study population would typically use, which could have limited the extent to which participants were engaged, invested, and attentive to the study materials. The Survivor game has also not been normed within the current study sample (e.g., North-American early adolescents) and therefore, it is unclear how generalizable findings from this study may be to other children in the United States. Additional research using this analog approach is important for considering how diversity factors such as nationality, geographic location, and Western cultural norms may intersect to impact these outcomes over time.

**Future Directions**

Taken together, findings from this dissertation project provide a broad foundation for continued research within the field of peer dynamics, self-control, and aggressive

behavior in adolescence. Future projects should take into consideration both the implications of these results and its limitations. Suggestions for expanding that research are discussed below.

The current study provided initial, albeit limited support for the importance of considering peer prosocial behavior in the context of adolescent outcomes. Research focusing on peer prosocial behavior is needed to enhance our understanding of how different group dynamics may affect the impact of those prosocial actions. For example, Paek and colleagues (2009) have discussed the peer proximity hypothesis, which posits that the level of intimacy between a child and the peer (e.g., best friends versus acquaintances) directly affects the impact their actions play on future outcomes. Exploring the impact of various relationship factors (e.g., proximity, frequency, longevity) on socio-behavioral outcomes could provide a more comprehensive understanding of peer group influence.

Additional research using behavioral analog tasks of aggression within a juvenile population is needed. At the outset of this project, it was recognized that the use of deceptive or in vivo tasks to assess aggression are often accompanied by strong ethical and legal restrictions that make implementation difficult. As a result, a majority of developmental research focused on aggression has been based on self- and other-reports and behavioral observations, while research with adults have allowed for more leniency in the use of laboratory-based tasks. Based on the literature, it is evident that problematic behaviors, and particularly aggressive behaviors, often manifest during childhood development (Brengden et al., 2000; Huesman et al., 1984). The current study evidenced one approach that took into consideration the legal and ethical bounds of our sample

population while still tapping into the construct of aggression. By expanding the use of more structured and objective analog tasks more generalizable findings may be obtained.

Continuing to build on these findings through the use of longitudinal methods could provide an additional focus for continued research. Specifically, findings from this project indicate a significant relationship between peer and individual behaviors but were unable to pinpoint how that relationship changes over time due to its cross-sectional design. Both longitudinal and sequential designs could offer a clearer understanding of, i) how peer relationships differentially impact the individual across developmental periods, and ii) how the influence of peer relationships might change across the lifespan. While there has been extensive research using longitudinal approaches to assess self-control and delinquent peer groups, very little research has focused on resilience factors stemming from social interactions in childhood over time.

A final area for future research involves the consideration of pertinent mediators and moderators that could affect the relationships among peer behavior, self-regulation and aggression. For example, a large body of research has highlighted gender differences in both peer interactional style and the expression of anger and aggression (Card, Stucky, Sawalani, & Little, 2008). Exploring how gender may permeate the structural relationships highlighted in this study may add additional insight into potential interventions. Another variable of interest may involve other socializing agents (e.g., parents, extended family, teachers) and the extent to which their influence can attenuate or exacerbate the impact of the peer group. Finally, it is important to consider how one's personality and temperament (e.g., frustration tolerance, physiological reactivity) may interact with self-control to mediate the relationship between peer prosocial behavior and

aggression. Through the identification of relevant mediators and moderators, our understanding of peer influence and behavioral outcomes will be enhanced.

In conclusion, this study sought to explore the way in which peer behaviors relate to self-control and subsequent socially aggressive behavior within an early adolescent population. Findings yielded strong support for the implication of prosocial peer behavior and internal self-control skills in the expression of relationally aggressive behaviors within a laboratory-based behavioral analog task. Overall, this study recognized the complex interplay between external socio-behavioral influences and internal skill sets as it impacts a developmentally impressionable population.

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# Appendix A

***Early Adolescent Temperament Questionnaire- Revised*: Directions**

On the following page you will find a series of statements that people might use to describe themselves. The statements refer to a wide number of activities and attitudes.

For each statement, please circle the answer that best describes how true each statement is **for you**. There are no best answers. People are very different in how they feel about these statements. Please circle the first answer that comes to you.

**You will use the following scale to describe how true or false a statement is about you:**

| **Circle number:** | **If the statement is:** |
|---|---|
| **1** | Almost always untrue of you |
| **2** | Usually untrue of you |
| **3** | Sometimes true, sometimes untrue of you |
| **4** | Usually true of you |
| **5** | Almost always true of you |

| | **How true is each statement for you?** | **Almost always untrue** | **Usually untrue** | **Sometimes true, sometimes untrue** | **Usually true** | **Almost always true** |
|---|---|---|---|---|---|---|
| 1) | It is easy for me to really concentrate on homework problems. | 1 | 2 | 3 | 4 | 5 |
| 2) | I have a hard time finishing things on time. | 1 | 2 | 3 | 4 | 5 |
| 3) | It's hard for me not to open presents before I'm supposed to. | 1 | 2 | 3 | 4 | 5 |
| 4) | When someone tells me to stop doing something, it is easy for me to stop. | 1 | 2 | 3 | 4 | 5 |
| 5) | I do something fun for a while before starting my homework, even when I'm not supposed to. | 1 | 2 | 3 | 4 | 5 |
| 6) | The more I try to stop myself from doing something I shouldn't, the more likely I am to do it. | 1 | 2 | 3 | 4 | 5 |
| 7) | If I have a hard assignment to do, I get started right away. | 1 | 2 | 3 | 4 | 5 |
| 8) | I find it hard to shift gears when I go from one class to another at school. | 1 | 2 | 3 | 4 | 5 |
| 9) | When trying to study, I have difficulty tuning out background noise and concentrating. | 1 | 2 | 3 | 4 | 5 |
| 10) | I finish my homework before the due date. | 1 | 2 | 3 | 4 | 5 |
| 11) | I am good at keeping track of several different things that are happening around me. | 1 | 2 | 3 | 4 | 5 |
| 12) | It's easy for me to keep a secret. | 1 | 2 | 3 | 4 | 5 |
| 13) | I put off working on projects until right before they're due. | 1 | 2 | 3 | 4 | 5 |
| 14) | I tend to get in the middle of one thing, then go off and do something else. | 1 | 2 | 3 | 4 | 5 |
| 15) | I pay close attention when someone tells me how to do something. | 1 | 2 | 3 | 4 | 5 |
| 16) | I can stick with my plans and goals. | 1 | 2 | 3 | 4 | 5 |

## Appendix B

***Peer Behavior Inventory:*** **The following questions ask about your closest friends and some of the activities they might engage in. Below, please tell me, using a number, how many CLOSE or BEST friends you have. It does not have to include all of your friends; please only tell me about your *closest* or *best* friends.**

**I have _____ *close* or *best* friends.**

**How many of your *close* or *best* friends…**

1. Have stolen something worth more than $50? _____

2. Ruined or damaged other people's things on purpose? _____

3. Could have gotten into trouble with the police for some of the things they have done? _____

4. Have broken into a place, like a car or building to steal something? _____

5. Have suggested that you do something against the law? _____

6. Have stolen something worth less than $5? _____

7. Have hit or threatened to hit someone without a reason? _____

8. Have cheated on school tests? _____

9. Get good grades? _____

10. Are liked by teachers? _____

11. Have been involved in school clubs/teams? _____

12. Are liked by most other teenagers? _____

13. Have helped other teens who are having problems? _____

14. Have talked about wanting to hurt themselves, or about suicide? _____

15. Have attempted to kill themselves? _____

16. Have gotten drunk? _____

17. Have used marijuana? _____

18. Have smoked cigarettes? _____

19. Disapprove of using drugs or alcohol? _____

## Appendix C

### Demographics Questionnaire

1. What is your age? _____

2. What is your gender? Male/Female

3. What grade are you in? _____

4. What is your ethnicity (circle all that apply)

African American

Asian/ Pacific Islander

Hispanic/Latino

White/Caucasian

Other: _____