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**Naturally-Occurring Declines in Antisocial Behavior from Ages 4
to 12: Relations with Parental Sensitivity and Psychological Processes
in Children**

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by

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Supervisor: Theodore Dix

Although common in toddlerhood, for most children, antisocial behavior declines with age. The current study examined whether changes in maternal sensitivity, children's social skills, emotion regulation, and hostile attributions account for these declines. Data from 1022 participants, (52% female; 87% Caucasian) from the NICHD SECCYD were examined from 54 months through 6th grade. Analyses revealed that increases in sensitivity, social skills, and emotion regulation predicted decreases in antisocial behavior. Increases in sensitivity predicted declines because they promoted social skills and emotion regulation. Decreases in antisocial behavior predicted subsequent increases in sensitivity, children's social skills, emotion regulation, and decreases in hostile attributions. Increasing sensitivity, children's social skills, and emotion regulation, appear to be critical factors for naturally-occurring declines in antisocial behavior.

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Chapter 1

Introduction

Antisocial behavior is a stable pattern of disordered conduct that creates serious problems for individuals, families, schools, and society. It is associated with violence, alcohol abuse, academic failure, and disturbances in social relationships (Moffitt, 1993). Antisocial behavior has serious negative effects on the well-being of both perpetrators and victims, on the neighborhoods in which antisocial individuals reside, on teachers and other students in classrooms, and on the economic state of families and society (Scott, 2001; Greenberg, Domitrovich, & Bumbarger, 2001; Trentacosta & Shaw, 2009; Moffitt, 2005). Given these consequences, it is critical to understand why across development antisocial behavior emerges and, once present, why for most children, it declines. The current study addresses these declines.

Parenting is often implicated in the onset and naturally-occurring declines in antisocial behavior. Four parenting factors have been emphasized: low harshness, and high sensitivity, monitoring, and involvement (e.g., Pearce, Jones, Schwab-Stone, & Ruchkin, 2003; Pardini, Lochman, Powell, 2007; Laird, Pettit, Bates, & Dodge, 2003). The current study focuses on one component of parenting – sensitivity. Research has examined parental sensitivity in the development of antisocial behavior, but why high sensitivity, or whether improvements in sensitivity, contribute to naturally-occurring declines in antisocial behavior is not well understood. Research also demonstrates that sensitive parenting is related to psychological processes in children – attributions, social skills, emotion regulation, – but whether these processes account for the relation of

sensitive parenting to naturally-occurring declines in antisocial behavior is largely unknown. It is clear that in severe, clinical populations of antisocial children these processes can be improved with trained clinicians and structured therapeutic programs; yet, whether these processes are responsible for naturally-occurring developmental reductions in antisocial behavior without intervention is largely unknown. To address these issues, we evaluated three principal questions: First, does sensitivity, or do increases in sensitivity, predict naturally-occurring declines in antisocial behavior across childhood? Second, do effective social skills, attributions, and emotion regulation, or improvements in these processes, predict these declines? Third, do social skills, attributions, and emotion regulation mediate the relation of sensitive parenting to naturally-occurring declines in antisocial behavior?

Developmental Course of Antisocial Behavior

Antisocial children are destructive and insensitive to the rights of others. They violate norms about how persons and property should be treated (Gardner, 1992). They lie, steal, destroy property, and are chronically disobedient (Gardner, 1992). Although to a degree normative in toddlerhood (Spieker, Larson, Lewis, Keller, & Gilchrist, 1999), antisocial behavior often reflects a behavioral disorder when exhibited later (Gardner, 1992). It is relatively stable across childhood (Pevalin, Wade, & Brannigan, 2003) and adolescence (Fontaine, Yang, Dodge, Bates, & Pettit, 2008), and its stability increases with age, particularly when it is extreme (Pevalin et al., 2003).

Despite this stability, for most children antisocial behavior declines with age (Gilliom & Shaw, 2004). It peaks at approximately 2 years of age (Gilliom & Shaw,

2004) and declines across childhood (e.g., Miner & Clarke-Stewart, 2008; Gilliom & Shaw, 2004; Bongers, Koot, van der Ende, & Verhulst, 2004). Reports from both mothers and teachers demonstrate that for most children it decreases from 2 to 9 years (Gilliom & Shaw, 2004; Keiley, Bates, Dodge, & Pettit, 2000; Spieker et al., 1999). Even in those who display initially high antisocial behavior, studies of naturally-occurring declines demonstrate that without intervention approximately 48% of children reduce their antisocial behavior between 4 and 9 (Pevalin et al., 2003; Campbell, Spieker, Burchinal, Poe, & NICHD, 2006). During this period, children acquire a number of basic skills at regulating emotions, relating to others cooperatively, and understanding other's motives and intentions. Some research has proposed that these skills may be involved in regulating declines in antisocial behavior, but for the most part, these ideas are untested. What promotes the changes occurring in children and thus naturally-occurring declines in antisocial behavior? A principal determinant of these may be maternal sensitivity.

Naturally-Occurring Declines and Maternal Sensitivity

Maternal sensitivity is a diverse construct that has been variously labeled across studies. Some of these terms include "warmth," "support," "responsiveness," "positive parenting," and "positive involvement." In some studies mothers' ability to remain calm when children express distress is emphasized (Irvine, Biglan, Smolkowski, Metzler, & Ary, 1999; Moretti & Obsuth, 2009). Others characterize it as mothers' ability to interact positively with children, correctly interpret children's needs, and respond in ways that minimize distress (Calkins & Keane, 2009). It has also been defined as mothers' ability to accept and be supportive of children's emotions (Eisenberg, Zhou, Spinrad, Valiente,

Fabes, & Liew, 2005). In this study, sensitivity is conceptualized as mothers' ability to cooperate with children, respect children's autonomy, and respond to children's wants and needs in a supportive manner.

Maternal sensitivity is a key component of parenting that is implicated in naturally-occurring declines in antisocial behavior. Interventions that increase maternal sensitivity reduce antisocial behavior over time (e.g., Eames, Daley, Hutchings, Whitaker, Jones, Hughes, et al., 2009; Breuk, Sexton, van Dam, Disse, Doreleijers, Slot, et al., 2006; Henggeler & Sheidow, 2003; Mesman, Stolk, van Zeijl, Alink, Juffer, Bakermans-Kranenburg, et al., 2007). Functional family therapy, for example, works with mothers to increase positive communication with their children (Kazdin, 1997; Alexander & Parsons, 1973; Alexander, Barton, Schiavo, & Parsons, 1976; Sexton & Turner, 2011; Klein, Alexander, & Parsons, 1977). Reductions in antisocial behavior among youth who receive functional family therapy are greater than those who receive client-centered group therapy, psychodynamic therapy, or no treatment (Alexander & Parsons, 1973; Klein et al., 1977). Attachment-based therapy helps parents empathize with children and respond to children's antisocial behavior calmly (Keiley, 2002; Mesman et al., 2007; Moretti & Obsuth, 2009; Holland, Moretti, Verlaan, & Peterson, 1993). Therapies developed from this perspective focus on improving attachment by increasing parents' sensitivity (Mesman et al., 2007). The Response Program, for example, attempts to improve parenting by helping parents understand that their children do not misbehave to be disrespectful or malicious, but rather because they are anxious about the security of their relationships with parents (Holland et al., 1993). Altering these

perceptions is thought to reduce hostility and aggression, increase mothers' and children's feelings of connection, and make children's internal representations of the relationship more positive (Keiley, 2002). Both therapies have demonstrated that improvements in maternal sensitivity account in part for reductions in children's severe antisocial behavior.

Various forms of maternal sensitivity also are thought to predict naturally-occurring declines in antisocial behavior. Sensitivity defined as mothers' ability to cooperate with children and be attuned to their needs (Kochanska, 2002; Maccoby & Martin, 1983), and to remain calm when reacting to and discussing children's destructive or violent behaviors (Prinzle, Onghena, & Hellinckx, 2006), has been proposed to predict declines in antisocial behavior over time. Research demonstrates that, without intervention, sensitivity predicts naturally-occurring declines in antisocial behavior. Eleven longitudinal studies have demonstrated that, when no intervention is present, maternal sensitivity at one point in time predicts subsequent reductions in antisocial behavior. In community samples sensitive parenting predicts declines in antisocial behavior in children from 2-to-14 years old (Mesman, Stoel, Bakermans-Kranenburg, van IJzendoorn, Juffer, Koot, et al., 2009; Denham, Workman, Cole, Weissbrod, Kendziora, & Zahn-Waxler, 2000; Miner & Clarke-Stewart, 2008; Gilliom & Shaw, 2004; NICHD, 2004; Wang, Dishion, Stormshak, & Willett, 2011; Pardini et al., 2007; Pevalin et al., 2003; Vazsonyi & Huang, 2010). Gilliom and Shaw (2004) found that sensitive parenting differentiated groups of increasing and decreasing antisocial trajectories when the two groups had similar initial levels. Although some studies report data on changes in

parenting over time (Miner & Clarke-Stewart, 2008; Vazsonyi & Huang, 2010; Denham et al., 2000), no studies have examined whether increases in sensitivity predict declines in antisocial behavior across childhood. Collectively, these studies show that, at one point in time, global measures of maternal sensitivity predict subsequent naturally-occurring declines in children's antisocial behavior.

Despite this evidence, methodological shortcomings leave important questions unanswered. Most studies use an across-dyad approach, measuring sensitivity as a prospective predictor, which identifies early parenting as a marker for later change. Because changes in parenting over time are not examined, a large number of stable characteristics related to parenting that differentiate parents, children, and families could be responsible for the prospective relation of parenting to subsequent declines in antisocial behavior. Non-parenting variables linked to competent parenting at Time 1, such as genetics, parents' personality, or children's temperament, could be responsible for declines in antisocial behavior at Time 2 if these variables were also associated with antisocial behavior. Although it is known that parents who are consistently sensitive have children whose antisocial behavior declines over time, it is unclear how *changes* in sensitivity over time may affect subsequent antisocial behavior.

Increases in sensitivity may be explained in part by children's entry into elementary school. As children spend increasing hours at school, apart from parents, mothers may become increasingly sensitive because they have more time for themselves and fewer opportunities to engage in conflict with children. Additionally, school entry is associated with increased demands for self-regulation and social skills (Trentacosta,

Criss, Shaw, Lacourse, Hyde, & Dishion, 2011). If teachers are successful at fostering these skills in children, parents may become more sensitive, which may then contribute to reduced antisocial behavior. Although studies demonstrate that related types of parenting – physical discipline, monitoring – change across childhood (Herrenkohl, Hill, Hawkins, Chung, & Nagin, 2006; Laird, Criss, Pettit, Bates, & Dodge, 2009; Lansford, Criss, Dodge, Shaw, Pettit, & Bates, 2009; Luyckx, Tildesley, Soenens, Andrews, Hampson, Peterson, et al., 2011), whether sensitivity changes during this period and contributes to naturally-occurring declines in antisocial behavior is, for the most part, unclear. Two studies have examined changes in sensitivity or components of parenting closely related to sensitivity. One study found that changes in sensitivity from ages two to four were unrelated to changes in antisocial behavior (NICHD, 2004). A second study found that positive parenting decreases slightly from ages 6 to 18, and decreases were associated with increases in antisocial behavior (Luyckx et al., 2011). Taken together, these studies suggest that, for many families, sensitivity may change over time. Whether increases in sensitivity occur across childhood (e.g., from ages 4 to 12) and are related to subsequent decreasing antisocial behavior, however, is unknown.

The current study extends existing research by examining whether increasing sensitivity predicts naturally-occurring declines in antisocial behavior during childhood. Using latent growth curve modeling, increases in maternal sensitivity from ages four to twelve were used to predict naturally-occurring declines in antisocial behavior over the same period. A within-subjects method, this approach holds constant stable differences in children, parents, and families, including important factors such as genetics, parents’

personalities, and child temperament. By controlling for these factors, this approach eliminates a large number of alternate hypotheses and increases confidence that declines in antisocial behavior are predicted by the measured parenting variables.

Naturally-Occurring Declines and Children's Socio-Affective Cognitive Processes

Although antisocial behavior tends to decline across childhood (Fearon & Belsky, 2011; Miner & Clarke-Stewart, 2008; Grimm & Ram, 2009; Bongers et al., 2004; Keiley et al., 2000; Leve, Kim, & Pears, 2005; Campbell et al., 2006), changes in socio-affective cognitive processes in children that might account for these declines are largely unstudied. Aggression is common in toddlerhood, but the development of emotion regulation and conflict-resolution strategies might allow children to replace these aggressive tendencies with prosocial behaviors (e.g., negotiation; Campbell et al., 2006). For most children, the normal development of attributions, social skills, and emotion regulation may explain why antisocial behavior declines over time. The current study examined this proposal.

Children's attributions and naturally-occurring declines in antisocial behavior.

The development of benign attributions may enable antisocial children to develop successful social relationships and adapt to environmental demands (e.g., dealing with authority, increased demands with age for self-control). Dodge's widely supported social information processing model proposes that antisocial children attribute hostile intent to peers' behavior (Dodge, 1980; Dodge & Frame, 1982; Crick & Dodge, 1994; Spotts, Neiderhiser, Hetherington, & Reiss, 2001; Matthys & van Engeland, 1992; Fontaine, 2006). These attributions contribute to stable (Fontaine, 2006) and increasing antisocial

behavior (Godleski & Ostrov, 2010; Dodge, Pettit, Bates, & Valente, 1995). In contrast, prosocial children tend to attribute benign intent to peers in potentially provocative situations (Wardle, Hunter, & Warden, 2011). When children interpret peer's intentions as hostile, they are likely to experience negative emotions (e.g., anger or anxiety; Crick & Dodge, 1994). These emotions may enhance a child's motivation to pursue retaliatory goals and enact aggressive responses (Crick & Dodge, 1994). Conversely, if children reframe their thinking about peers intentions such that they become more benign, negative emotions are less likely, and antisocial behavior may not occur. Thus, antisocial children who reduce their hostile attributions over time may reduce corresponding antisocial behavior (Spotts et al., 2001; Oliver, Barker, Mandy, & Skuse, 2011; Gomez, Gomez, DeMello, & Tallent, 2001).

Interventions that work directly with children, rather than with parents, demonstrate that when professionals work to improve children's attributions, reductions in antisocial behavior can occur (Frey, Nolen, Edstrom, & Hirschstein, 2005; Conduct Problems Research Prevention Group, 2002, 2004). For example, when children are taught the difference between benign and hostile intent, they are more cooperative and less coercive during prisoner's dilemma and prize negotiation tasks (Frey et al., 2005). These programs demonstrate that reducing hostile attribution biases is associated with declines in children's severe antisocial behavior (Frey et al., 2005; Eargle, Guerra, & Tolan, 1994).

Interventions that involve parents also attempt to reduce antisocial behavior by changing children's cognitions (Moretti & Obsuth, 2009). One intervention demonstrated

that supportive parenting decreased children's hostile views of relationships and decreased the likelihood of children engaging in violence (Simons, Simons, Burt, Drummond, Stewart, Brody, et al., 2006). A second intervention found that when parents reduced harsh discipline practices, children reduced their hostile attributions and antisocial behavior (Conduct Problems Research Prevention Group, 2002). In fact, reductions in hostile attributions achieved with a clinical intervention mediated the relation of reduced harsh discipline practices to reductions in antisocial behavior (Conduct Problems Research Prevention Group, 2002).

Without intervention, what promotes normative developmental improvements in children's attributions? Maternal sensitivity may be critical. Children's representation of themselves, events, and others is influenced by interactions with their parents. Children may learn to reduce hostile attributions because sensitive mothers model benign attributions (Bandura, 1986; Bickett, Milich, & Brown, 1996; Costanzo & Dix, 1983). Sensitive parents tend to consider others' perspectives, for example, which predicts children's consideration of other's perspectives and engagement in prosocial behavior (Farrant, Devine, Maybery, & Fletcher, 2012). Additionally, sensitive parenting might influence children's attributions because children develop the expectation that others are supportive (Ainsworth, 1982). This may allow children to refrain from antisocial acts when they encounter ambiguous, negative events because they think that the aversive act was an accident, and unintended.

Research supports the notion that, in the natural-world, sensitivity is related to benign attributions and low antisocial behavior. Sensitive parents have children who

make benign attributions and are less likely to engage in antisocial behavior (Gomez & Gomez, 2000). In fact, children's benign attributions mediate the relation of maternal support to low antisocial behavior at one point in time (Gomez & Gomez, 2000).

Unfortunately, no study has examined whether attributions mediate the relation of sensitivity to naturally-occurring declines in antisocial behavior across development. The current study will examine whether normative declines in antisocial behavior occur in children because they have sensitive mothers (or mothers who increase sensitivity) and, as a result, acquire benign attributions.

Children's social skills and naturally-occurring declines in antisocial behavior. A second mechanism that may account for naturally-occurring declines in antisocial behavior is social skill. Learning to interact with and respond to others without using violence is a key developmental task (Rudolph, Abaied, Flynn, Sugimura, & Agoston, 2011). Antisocial children often have poor social skills (Campbell et al., 2006). They tend to react to conflict by retaliating with aggression, disobedience, or destructive behavior (Rudolph et al., 2011). In contrast, socially skilled children react to conflict by problem-solving, seeking information, or asking for advice (Rudolph et al., 2011). Dealing with conflict by engaging in calm discussion predicts fewer subsequent social problems, whereas behaving violently predicts future conflicts (Rudolph et al., 2011). Children whose social skills increase over time may reduce their antisocial behavior.

Social skills interventions that work directly with children (not with parents) to increase children's assertion and cooperation with peers and adults reduce antisocial behavior (Ducharme, Folino, & DeRosie, 2008; Ang & Hughes, 2001; Conduct Problems

Prevention Research Prevention Group, 1999, 2002, 2004; Dumas, 1989). One program, for example, taught children how to be flexible to the needs and will of their peers (Ducharme et al., 2008), while others taught children to cooperate, negotiate, and participate fairly in play with peers (Conduct Problems Research Prevention Group, 1999; Eargle et al., 1994). At least 38 studies demonstrate that these interventions improve social skills and reduce antisocial behavior (Ang & Hughes, 2001).

Parenting interventions that emphasize social skills also lead to reductions in antisocial behavior (Henggeler, Cunningham, Pickrel, Schoenwald, & Brondino, 1996; Borduin, Mann, Cone, Henggeler, Fucci, Blaske, et al., 1995; Curtis, Ronan, Heiblum, & Crellin, 2009; Eames et al., 2009; Andrews, Soberman, & Dishion, 1995; Mann, Borduin, Henggeler, & Blaske, 1990; Breuk et al., 2006; Alexander et al., 1976; Henggeler & Sheidow, 2003; Moretti & Obsuth, 2009; Tolan, Gorman-Smith, & Henry, 2003; Conduct Problems Prevention Research Group, 2004). These interventions help parents teach children to cooperate with their requests rather than resist with noncompliance and aggression (Tolan, Hanish, McKay, & Dickey, 2002; Taylor & Biglan, 1998; Andrews et al., 1995; Kazdin, Siegel, & Bass, 1992; Alexander et al., 1976). Although not assessing sensitivity directly, two intervention studies demonstrated that related constructs, reduced harshness and increased consistency, predict reductions in antisocial behavior because they predict children's social skills (Conduct Problems Research Prevention Group, 2002; Tolan et al., 2002).

Although these relations were found in intervention research rather than in the natural world, they provide preliminary evidence that sensitivity may promote reductions

in antisocial behavior without intervention because it promotes social skills. Children's interactions with caregivers are important for learning social skills (e.g., Blandon, Calkins, & Keane, 2010). It is largely through their relationships with parents that children learn how to communicate effectively and relate to others. Children with insensitive parents lack opportunities to acquire social skills, have low social competence, and develop poor quality interpersonal relationships (Suveg, Jacob, & Payne, 2010). Conversely, children whose parents discuss social and familial problems calmly may become socially adept because they imitate adaptive interactive skills (e.g., cooperation, negotiation), appreciate contrasting perspectives, and believe that disputes can be resolved without rancor (Hart, DeWolf, Wozniak, & Burts, 1992).

At least ten studies demonstrate that, without intervention, sensitive parenting predicts social skills and low antisocial behavior (Zhou, Eisenberg, Losoya, Fabes, Reiser, Guthrie, et al., 2002; Bates, Luster, & Vandenberg, 2003; Criss, Shaw, Moilanen, Hitchings, & Ingoldsby, 2009; Lengua, Honorado, & Bush, 2007; Masten, Hubbard, Gest, Tellegen, Garmezy, & Ramirez 1999; Pettit, Bates, & Dodge, 1997; Roberts, 1999). For example, supportive parenting at 36 months predicted high social skills and low behavior problems in 1st grade (Bates et al., 2003). This relation has also been found with older children (Criss et al., 2009; Pettit et al., 1997); when children experience supportive parenting, they display high social skills and exhibit fewer externalizing problems in sixth grade, even when externalizing problems in kindergarten are controlled (Pettit et al., 1997). Unfortunately, these studies do not address the question of whether social skills

mediate the relation of change in sensitivity to naturally-occurring declines in antisocial behavior across childhood. The current study is the first to examine this proposal.

Children's emotion regulation and naturally-occurring declines in antisocial behavior. A third mechanism that may explain why antisocial behavior naturally declines across childhood is emotion regulation. Emotion regulation is children's ability to manage or modify their emotional expressiveness or reactivity (Helmsen, Koglin, & Petermann, 2012). The development of emotion regulation is a key developmental task, and problems in its development increase the likelihood of antisocial behavior (Helmsen et al., 2012). Antisocial children lack emotion regulation; they are easily frustrated (Shields & Cicchetti, 1998), experience intense anger, and react to negative emotions with aggression, destruction of property, disobedience, and tantrums (Helmsen et al., 2012). Additionally, children who are low in self-control and empathy, constructs closely related to emotion regulation, are likely to engage in criminality later in life (Gottfredson & Hirschi, 1990; Jolliffe & Farrington, 2007, 2004). Improving emotion regulation may be critical in order for children to reduce their antisocial behavior.

Interventions that do not involve parents, which are aimed at improving children's emotion regulation, reduce antisocial behavior (Conduct Problems Prevention Research Group, 1999, 2004; Frey et al., 2005; Eargle et al., 1994; Jagers, Morgan-Lopez, Howard, Browne, Flay, & Aban Aya Coinvestigators, 2007). Such programs teach children about empathic understanding, anger-management, and recognizing and labeling emotions (Frey et al., 2005; Conduct Problems Prevention Research Group, 1999; Eargle et al.,

1994; Jagers et al., 2007). These studies demonstrate that when clinical interventions increase emotion regulation, antisocial behavior decreases.

Parenting interventions also demonstrate that increases in emotion regulation predict reduced antisocial behavior (Simons et al., 2006; Moretti & Obsuth, 2009). These programs teach affect regulation and help parents to remain calm when children misbehave (Irvine et al., 1999; Moretti & Obsuth, 2009). This research suggests that by increasing parental sensitivity, antisocial behavior may decrease because children's ability to regulate their emotional states improves. However, no explicit mediational tests have been conducted to confirm this proposal.

Without intervention, might maternal sensitivity promote normative development of children's emotion regulation, and in turn, naturally-occurring declines in antisocial behavior? Children who have sensitive parents are likely to develop emotion regulation skills (Helmsen et al., 2012). Sensitive parents respond consistently and appropriately to children's emotions, help children minimize distress (e.g., teach child to take time-out from conflict to collect thoughts; Calkins & Keane, 2009), and guide them in coping with negative emotions (e.g., expressing emotions with words rather than with hitting; Eisenberg, Valiente, Morris, Fabes, Cumberland, Reiser, et al., 2003). By being sensitive to children's frustration, children acquire adaptive methods for dealing with intense, negative emotions (e.g., distraction, reflecting on thoughts before reacting impulsively; Eisenberg et al., 2005; Prinzie et al., 2006; Maughan, Cicchetti, Toth, & Rogosch, 2007).

Research demonstrates that, without intervention, sensitivity at one point in time promotes subsequent emotion regulation and low antisocial behavior (e.g., Berlin &

Cassidy, 2003; Gottman, Katz, & Hooven, 1997; Eisenberg et al., 2003). Studies that examine self control, effortful control, and self-regulation – constructs related to, but distinct from emotion regulation, imply that emotion regulation may mediate the relation of sensitivity to naturally-occurring declines in antisocial behavior. At least three studies find that self-control, self-regulation, and effortful control mediate the relation of parenting to antisocial behavior (Lengua et al., 2007; Eisenberg et al., 2005; Vazsonyi & Huang, 2010). Two of those found that at one point in time, effortful control mediated the relation of scaffolding, limit setting (Lengua et al., 2007), and positive parenting (Eisenberg et al., 2005) to low antisocial behavior. A third study extended the first two by examining *changes* in self-control and antisocial behavior over time (Vazsonyi & Huang, 2010). Specifically, increases in self control from 4.5 to 10.5 years mediated the relation of parental warmth and security to decreases in deviant behavior (Vazsonyi & Huang, 2010).

Although related to emotion regulation, self-control, effortful control, and self-regulation represent separate constructs (Eisenberg et al., 2005). These types of behavioral regulation may at times be involved in emotionally-charged situations, but often they are not. Self-regulation, for example, has been operationalized as strategies used to sit still, follow directions, wait (e.g., to eat dessert), or avoid distraction (Helmsen et al., 2012). Emotion regulation, on the other hand, is one component of a complex set of processes related to self-regulation. It applies only to the ability to control, alter, and manage strongly-charged emotions and modulate emotion-related actions (Lotze, Ravindran, & Myers, 2010; Jimenez, Niles, & Park, 2010; Garner & Hinton, 2010). The

role of emotion regulation, as distinct from effortful control, self-control, and self-regulation, in sensitivity and naturally-occurring declines in antisocial behavior is unclear, and it has not been isolated from other components of self-regulation. The current study is the first to examine whether children of sensitive mothers acquire emotion regulation and, as a result, reduce their antisocial behavior across childhood.

Bidirectional Phenomena

A plausible alternative to sensitivity, attributions, social skills, and emotion regulation influencing change in antisocial behavior across age is that children's antisocial behavior primarily drives these factors. The current study examines these issues.

Child effects model. Changes in parental sensitivity may occur as a reaction to the onset, increases, or decreases in children's antisocial behavior. Bell (1977) challenged the notion that parents are the sole causes of children's behavior and posited that children also make significant contributions to parenting. Bell's control systems theory posits that when children's antisocial behavior reaches its upper limit of parents' tolerance, parents' control is activated (Lytton, 1990). A number of studies have documented this effect. Children's antisocial behavior increases harsh parenting and disrupts consistent discipline and positive parenting (Hawes, Dadds, Frost, & Hasking, 2011; Olweus 1980). Mothers of conduct disordered children and mothers of "normal" children react more negatively to conduct disordered children than to "normal" children (Anderson, Lytton, & Romney, 1986). Other studies find support for child effects by demonstrating that parents become less controlling when children are given stimulant drugs to control their noncompliant

behavior (Lytton, 1990). That children's characteristics influence parenting behavior supports the notion that improvements in children's behavior, namely declines in antisocial behavior, might promote increases in maternal sensitivity. Given this possibility, the current study examined the hypothesis that naturally-occurring declines in children's antisocial behavior predict increases in maternal sensitivity.

Antisocial behavior driving socio-affective cognitive processes. Antisocial behavior may also influence child socio-affective cognitive processes that regulate it – i.e., attributions, social skills, and emotion regulation. That is, in addition to these three processes leading children to react to frustration with destructive and aggressive behavior, antisocial behavior may influence these processes.

Antisocial behavior elicits negative attributions and aggressive responses from peers. Both aggressive and nonaggressive children respond to antisocial children with retaliatory aggression (Dodge, 2006). These behaviors and attitudes toward antisocial children, which occur as a result of the antisocial behavior, may lead antisocial children to make increasingly negative attributions about peers. That is, antisocial children may recognize that peers treat them unfairly and aggressively on purpose (Dodge, 2006). In fact, when peers' actual intent is hostile, aggressive children are more accurate in recognizing the intent than nonaggressive peers (Dodge, 2006). Thus, this research implies that naturally-occurring declines in antisocial behavior may also promote declines in children's hostile attributions.

Antisocial behavior is also likely to influence emotion regulation and social skills. Aggression elicits negative evaluations and responses from others, which increase arousal

and emotional reactivity in antisocial children (Vasta, 1982). These negative evaluations of and responses are likely to lead to further antisocial behavior, rather than controlled emotional responses, negotiation, and other conflict-resolution skills (e.g., acquiescence; Dodge, 2006). Thus, it is possible that when children reduce their antisocial behavior over time, they also experience improvements in emotion regulation and social skills.

In summary, it is plausible that the relation of these three socio-affective cognitive processes (i.e., attributions, social skills, emotion regulation) to antisocial behavior is bidirectional rather than unidirectional. Although one study demonstrated that decreases in antisocial behavior predict improvements in social competence and emotion regulation, it did not examine the effects of social competence and emotion regulation on antisocial behavior in the same model. This precludes conclusions about bidirectional relations among these variables (Campbell et al., 2006). The current study extends this research by examining whether naturally-occurring declines in antisocial behavior across childhood predict subsequent improvements in children's attributions, social skills, and emotion regulations, while simultaneously examining these variables as predictors of naturally-occurring declines in antisocial behavior.

Previous Research with NICHD Data

Given that a variety of studies on antisocial behavior have been published using the NICHD dataset, the same data used in the current study, I briefly review components of these studies which are relevant to the current study's hypotheses. At least 8 studies have used the NICHD dataset to examine the developmental course of antisocial behavior across childhood (Spieker, Campbell, Vandergrift, Pierce, Cauffman, Susman, et al.,

2012; Campbell, Spieker, Vandergrift, Belsky, Burchinal, & NICHD ECCRN, 2010; Campbell et al., 2006; Arsenio, 2004; Arsenio & NICHD ECCRN, 2004; Fearon & Belsky, 2011; Roisman, Monahan, Campbell, Steinberg, Cauffman, & NICHD ECCRN, , 2010; Vazsonyi & Huang, 2010; Grimm & Ram, 2009). Overall, the research demonstrates that antisocial behavior tends to decline across childhood and that maternal sensitivity at one point in time is associated with declining antisocial behavior. As with non-NICHD studies, these studies fail to examine whether sensitivity changes over time and whether such changes might be associated with corresponding declines in antisocial behavior. Additionally, for the most part, the work is not process-oriented; most do not examine what is developing in children that might account for the relation of sensitivity to naturally-occurring declines. However, one study examined a child process closely related to emotion regulation – self-control (Vazsonyi & Huang, 2010). Yet, as noted above, rather than isolating the emotional component of children’s regulatory abilities, the study examined children’s general behavioral control. Thus, the current study expands on this previous work by examining whether improvements in sensitivity from 54 months through 5th predict naturally-occurring declines in children’s antisocial behavior and whether the development of children’s emotion regulation skills mediate the relation of increasing sensitivity to these declines.

The Current Study

The current study had five goals. It attempted to replicate previous research in demonstrating that mean levels of sensitivity predict naturally-occurring declines in antisocial behavior across childhood. Second, it examined whether increases in sensitivity

account for these declines. Third, it addressed whether benign attributions, social skills, and emotion regulation, or improvements in these processes, predict naturally-occurring declines in antisocial behavior across childhood. Fourth, it examined whether attributions, social skills, and emotion regulation mediate the relation of parental sensitivity to developmental reductions in antisocial behavior. Fifth, it examined whether naturally-occurring declines in antisocial behavior across childhood predict improvements in maternal sensitivity, children's attributions, social skills, and emotion regulation.

Chapter 2

Methods

Participants

Participants were children in the NICHD Study of Early Child Care and Youth Development. They were evaluated at 54 months, and each year from 1st through 6th grades (except 2nd grade). From the original 1364 children in the NICHD sample, 1022 remained at the sixth grade assessment. Although diverse, the NICHD sample is somewhat more advantaged and well-functioning than the population of the United States as a whole. Mothers tended to be employed full time (76%) and average family income was approximately \$80,000. The biological father lived in the home for 68% of these families. At the time of the child's birth, mothers who had severe mental illness or significant birth complications were excluded. The sample was 87% Caucasian, 4% African-American, 5% Hispanic-American, 3% Asian American, and 2% other. Participants were recruited from 10 sites across the United States. Males (48%) and females were approximately equally represented.

Measures

Maternal Sensitivity

Sensitivity was assessed with observational data from the mother-child interaction at 54 months, 1st, 3rd, and 5th grades (Egeland & Hiester, 1993). Mothers and children participated in a 15-minute interaction during which they discussed one to two areas of disagreement (e.g., homework, chores, use of free time) chosen by the child from a list of possible choices. Videotapes of the structured interactions were coded by trained

observers who followed rating scales ranging from 1 (“very low”) to 7 (“very high”), in assessing sensitivity. Sensitivity represents a composite of supportive presence, respect for autonomy, and reversed hostility. Scores ranged from a possible 3 to 21. Maternal sensitivity’s internal reliability was .84, .82, .80, and .85 (α , at 54 months, in 1st, third and fifth grades, respectively). Descriptive statistics for the sum score at each time point are as follows: 54 months $M = 16.5$, ($SD = 2.42$, range = 14); Grade 1 – $M = 16.34$, ($SD = 2.49$, range = 17); Grade 3 – $M = 16.95$, ($SD = 2.91$, range = 17); Grade 5 – $M = 16.88$, ($SD = 3.02$, range = 16).

Children’s Attributions

Children’s attributions were measured in 1st, 3rd, and 5th grades. In first grade, attributions were measured with the *Attribution Bias Questionnaire* (Dodge & Pettit, 1986; Feshbach, 1990; Howes, Hamilton, & Matheson, 1994). Interviewers presented children with ambiguous stories involving a child taking one of their toys away, being hit by a ball, being tripped, and having juice spilled on them. Children were asked how they interpreted the peer’s intent. For example, the child was asked, “Why do you think Todd hit you in the back?” Based on responses given to these questions, children received an average attribution score. Higher scores were indicative of hostile attributions. Inter-rater reliability ranged from .77-.93 (Kappa).

Children’s attributions were measured in 3rd grade and 5th with the *Intent Attributions and Feelings of Distress Questionnaire* (Crick, 1995). Children answered questions regarding five stories about provoking situations during which the provocateur’s intentions are ambiguous. Three stories dealt with instrumental aggression

(e.g., breaks peer's radio) and two dealt with relational aggression (e.g., friend is playing with someone else). Children rate each story according to the provocateur's intentions. Items ranged from 0 ("not trying to mean") to 1 ("trying to be mean"). Thus, higher scores indicated hostile intentions. A total hostile intent score was calculated, which consisted of the hostile intent instrumental provocation score and the hostile intent relational provocation score. Reliability for total hostile intent scores was $\alpha = .75$ and $\alpha = .79$ for third and fifth grades, respectively. Because the response scale changed from 1st to 3rd and 5th grades (e.g., 5-point rating scale at 1st grade and 7-point rating scale at 3rd and 5th grades), the measures were equalized by dividing the scales by the maximum score (e.g., dividing by 5 at 1st grade and by 7 at 3rd and 5th grades). Descriptive statistics for the sum score at each time point are as follows: Grade 1 – M = .59, (SD = .25, range = 1); Grade 3 – M = .29, (SD = .22, range = 1); Grade 5 – M = .33, (SD = .27, range = 1).

Children's Social Skills

Children's social skills were measured using teachers' reports on a subset of questions from the Social Skills Rating System at 1st, 3rd, and 5th grades (SSRS; Gresham & Elliot, 1990). The subscales used from the questionnaire consisted of 20 items, which ranged on a 3-point scale from 0 ("never") to 2 ("very often"). Higher scores indicated more sophisticated social skills. Sample items included, "participates in games or group activities," "makes friends easily," and "initiates conversations with peers." Items that overlapped with the emotion regulation measure were removed to keep from measurement overlap. These items included, "controls temper in conflict situation with adults" and "controls temper in conflict situation with peers." A factor analysis was run

to confirm that the remaining items correlated as expected. The Kaiser-Meyer-Olkin measure of sampling adequacy was .92, .93, and .93 for 1st, 3rd, and 5th grades, respectively, above the recommended value of .6, and Bartlett's test of sphericity was significant ($\chi^2(190) = 7976.40, p < .05$ for 1st grade; $\chi^2(190) = 8201.05, p < .05$ for 3rd grade; $\chi^2(171) = 7228.90, p < .05$ for 5th grade). The communalities were all above .3, confirming that each item shared common variance with other items. Descriptive statistics for the sum score at each time point are as follows: Grade 1 – $M = 7.70$, ($SD = 2.14$, range = 10, $\alpha = .82$); Grade 3 – $M = 7.59$, ($SD = 2.30$, range = 10, $\alpha = .83$); Grade 5 – $M = 7.65$, ($SD = 2.37$, range = 10, $\alpha = .85$).

Children's Emotion Regulation

Children's emotion regulation was measured in 1st, 3rd, and 5th grades using the teachers' reports on a subset of questions from the Social Skills Rating System (SSRS; Gresham & Elliot, 1990). Because this measure includes questions that are not directly related to regulating emotions (e.g., "invites others to join in tasks," and "finishes class assignments within limits"), a new emotion regulation scale was created. It included five items that related specifically to regulating emotions: "controls temper in conflict situation with adults," "controls temper in conflict situation with peers," "receives criticism well," "responds appropriately when pushed or hit," and "responds appropriately to teasing by peers." Items ranged on a 3-point scale from 0 ("never") to 2 ("very often"). Higher scores indicated better emotion regulation. To ensure that items on the new measure correlated as expected, a factor analysis was conducted. The Kaiser-Meyer-Olkin measure of sampling adequacy was .81, .84, and .84 for 1st, 3rd, and 5th

grades, respectively, above the recommended value of .6, and Bartlett's test of sphericity was significant ($\chi^2(10) = 1623.68, p < .05$ for 1st grade; $\chi^2(10) = 1678.64, p < .05$ for 3rd grade; $\chi^2(10) = 1753.68, p < .05$ for 5th grade). The communalities were all above .3, confirming that each item shared common variance with other items. Descriptive statistics for the sum score at each time point are as follows: Grade 1 – $M = 27.11$, ($SD = 6.33$, range = 33, $\alpha = .90$); Grade 3 – $M = 28.41$, ($SD = 6.88$, range = 36, $\alpha = .90$); Grade 5 – $M = 28.26$, ($SD = 6.97$, range = 33, $\alpha = .91$).

Antisocial Behavior

Mothers' reports on the *Child Behavior Checklist* (CBCL; Achenbach, 1991) were used to measure children's antisocial behavior at 54 months, kindergarten, 1st, 3rd, 4th, 5th, and 6th grades. Antisocial behavior consisted of children's scores on the Externalizing scale, which is a composite of the Delinquency subscale and Aggressive Behavior subscale. There were 33 items that range on a 3-point scale from 0 ("not true of the child") to 2 ("very true of the child"). Raw scores were used and total possible scores range from 0-66. Higher scores indicated higher levels of antisocial behavior. Sample items for delinquency questions include, "steals outside the home," "runs away from home," and "destroys things belonging to his/her family or others." Sample items for aggression questions include, "cruelty, bullying, meanness to others," "threatens people," and "temper tantrum or hot temper." Reliability for this measure was high, ranging from .85 to .90 ($\alpha = .88$ at 54 mths, kindergarten, and 1st grade, .90 in 4th, .89 in 5th, and .89 in 6th grades). Descriptive statistics for the sum score at each time point are as follows: 54 months $M = 51.69$, ($SD = 9.39$, range = 52); Grade 1 – $M = 48.64$, ($SD = 9.79$, range =

53); Grade 3 – $M = 47.40$, ($SD = 9.82$, range =48); Grade 4 – $M = 46.5$, ($SD = 10.09$, range = 49); Grade 5 – $M = 45.80$, ($SD = 10.09$, range = 48); Grade 6 – $M = 45.90$, ($SD = 10.15$, range = 49).

Demographic Variables

Nine demographic factors were controlled in all analyses: Mothers' marital status, whether fathers lived at home, whether mothers received public assistance, maternal and paternal employment, income to needs ratio, the number of children in the home, child ethnicity, and child gender.

Chapter 3

Results

Preliminary Analyses

Bivariate analyses were conducted to examine relations among the principal variables (i.e., parenting, socio-affective cognitive processes, antisocial behavior). Table 1 displays correlations among parental sensitivity and antisocial behavior. Table 2 displays correlations among parental sensitivity and process variables (i.e., attributions, social skills, emotion regulation). Table 3 displays correlations among process variables and antisocial behavior. Relations among variables were as expected. Antisocial behavior was associated negatively with high sensitivity, social skills, emotion regulation, and positively with hostile attributions. High sensitivity was associated positively with social skills, emotion regulation, and associated negatively with hostile attributions. Social skills and emotion regulation were positively correlated with each other and negatively correlated with hostile attributions.

Missing data were analyzed to determine whether they differed systematically. Except for child gender (Little's MCAR Chi-square 180.7, $p < .01$), participants who were missing data on antisocial behavior and those who reported antisocial behavior did not differ systematically on any variables – child race, maternal or paternal employment, whether the father lived in the home, mothers' marital status, mothers' occupation, public assistance, income-to-needs ratio, or number of children who lived in the home. Missing data were dealt with in *Mplus* with Full Information Maximum Likelihood (FIML), which uses all available data to estimate models.

Principal Analyses

Overview

Latent growth curve modeling was used because it allows for the examination of change in the dependent variable over time as predicted by change in the independent variable across the same period (Muthen, 2004). Cross-lagged path models were also examined because they allow for the examination of bidirectional relations of variables and indicate at which particular time point the independent variable yields its effect on the outcome. Paths between predictor and outcomes were allowed to vary across time in order to determine whether effects differed during development. In addition, for all but three models (i.e., Fig. 6 - social skills and antisocial behavior, Fig. 8 - attribution mediation model, Fig. 10 - emotion regulation mediation model) autoregressive paths were allowed to vary across time. Parents' employment, public assistance, income to needs ratio, number of children in the home, mother's marital status, whether father lives in home, child gender, and child race were controlled in all analyses. All models report the unstandardized parameter estimates.

Growth Model of Antisocial Behavior

A latent growth curve model was estimated to determine the general growth curve of antisocial behavior for the entire sample from 54 months to 6th grade (Fig. 1). Results demonstrated that antisocial behavior decreased from 54 months to 6th grade. The model was first run with slopes fixed across time to be linear and results revealed an adequate fit (CFI .95, TLI .95, RMSEA .11, SRMR .15; M of $i = 48.29$, M of $s = -.71$). The model was then run allowing slopes between initial and final time point to vary and

revealed an improved fit (CFI .99, TLI .98, RMSEA .07, SRMR .04; Chi-square difference test = 181.05, $df = 4$, $p < .0001$; M of $i = 51.76$, M of $s = -1.15$). The variances of the intercept and slope in both models were significant (model with fixed slope $i = 65.09$, $p \leq .001$, $s = 1.27$, $p \leq .001$; model with slopes varying $i = 67.99$, $p \leq .001$, $s = 1.54$, $p \leq .001$) indicating that maternal sensitivity, children's attributions, social skills, and emotion regulation could be examined as predictors of the variance in initial level and change over time in antisocial behavior.

Change in Sensitivity Predicting Declines in Antisocial Behavior

To answer address whether change or improvements in maternal sensitivity predicted declines in antisocial behavior across the same period, a latent growth curve models was examined. Initial level and increases in sensitivity from 54 months to 5th grade were examined as predictors of initial level and declines in antisocial behavior from 54 months to 6th grade (Fig. 2). The model fit well (CFI .99, TLI .99, RMSEA .03, SRMR .02, 10.2% variance in intercept, 11.3% variance in slope). The model revealed that high initial sensitivity predicted low initial antisocial behavior and declines in antisocial behavior over time. The model also demonstrated that increases in sensitivity from 54 months to 6th grade were associated with corresponding declines in antisocial behavior from 54 months to 6th grade.

Cross-lagged Bidirectional Models

To examine bidirectional relations among predictor variables (i.e., sensitivity, attributions, social skills, emotion regulation) and antisocial behavior, cross-lagged path models were examined (each independent variable tested in separate models). Like the

mediation models, each model examined the auto-regressive relations across consecutive time points for antisocial behavior and for the predictor variable. Every model examined earlier predictor variables predicting subsequent antisocial behavior controlling for earlier predictor and antisocial behavior. The models also examined earlier antisocial behavior as a predictor of subsequent sensitivity, attributions, social skills, and emotion regulation, after controlling for earlier antisocial behavior and earlier sensitivity, attributions, social skills, and emotion regulation.

First, the cross-lagged relations of sensitivity and antisocial behavior were examined (Figs. 3 & 4). Specifically, sensitivity at each time point was examined as a predictor and outcome of antisocial behavior at each time point. A model that examined the differential effects for males versus females was examined because results indicated that sensitivity may affect males' and females' antisocial behavior differently. The model that allowed paths for males and females to vary had a significantly better fit (Chi-square difference test $T = 89.03$, $df 35$, $p \leq .0001$). One path differed significantly for males and females: Sensitivity in 1st grade predicted antisocial behavior in 3rd grade for females only. Models revealed significant bidirectional relations for both males and females. For both males and females, sensitivity at 3rd and 5th grades predicted reduced antisocial behavior at 5th and 6th grades, respectively. For both males and females, antisocial behavior in 1st grade predicted sensitivity in 3rd grade. The model fit well (CFI .93, TLI .91, RMSEA .06, SRMR .05). Although antisocial behavior affects sensitivity at one subsequent time point, sensitivity drives antisocial behavior at two time points for males

and three time points for females. Thus, sensitivity appears to have a stronger effect on antisocial behavior than antisocial behavior has on sensitivity.

Attributions at each time point were then examined as predictors and outcomes of antisocial behavior at each time point (Fig. 5). The model fit well (CFI .95, TLI .94, RMSEA .04, SRMR .08). It revealed that antisocial behavior predicted subsequent attributions at all subsequent time points, but attributions did not predict antisocial behavior at any subsequent time point. Thus, antisocial behavior appears to drive children's attributions.

Social skills at each time point were then examined as predictors and outcomes of antisocial behavior at each time point (Fig. 6). The model revealed bidirectional relations. Social skills at 5th grade predicted reduced antisocial behavior at 6th grade. Antisocial behavior predicted social skills at all subsequent time points. The model fit well (CFI .96, TLI .95, RMSEA .04, SRMR .05). Thus, bidirectional paths indicated that antisocial behavior and social skills influence each other. That social skills influence antisocial behavior at only one subsequent time point, and antisocial behavior predicts social skills at all time points suggests that antisocial behavior appears to primarily drive children's social skills.

Emotion regulation at each time point was then examined as a predictor and outcome of antisocial behavior at each time point (Fig. 7). The model revealed bidirectional relations. Emotion regulation predicted subsequent antisocial behavior at all time points except from 3rd grade emotion regulation to 5th grade antisocial behavior. Antisocial behavior at 54 months predicted emotion regulation at 1st grade. The model fit

well (CFI .93, TLI .89, RMSEA .06, SRMR .06). Thus, it appears that emotion regulation has a stronger influence on antisocial behavior than antisocial behavior has on emotion regulation.

Thus, except for attributions, significant bidirectional relations were evident for antisocial behavior and all predictor variables. Although sensitivity, social skills, and emotion regulation affect subsequent antisocial behavior, children's antisocial behavior also drives parents' behavior (i.e., maternal sensitivity), children's ability to understand others intentions (attributions), their cooperation skills during conflict (i.e., social skills), and their ability to regulate negative emotions.

Mediation Models

To address whether attributions, social skills, and emotion regulation accounted for the relation of maternal sensitivity to naturally-occurring declines in antisocial behavior, a set of cross-lagged path models were examined. Each model examined the auto-regressive relations across consecutive time points for antisocial behavior and for the predictor variable. Every model examined earlier predictor variables predicting the subsequent process variable (e.g., attributions) and antisocial behavior controlling for earlier predictor and antisocial behavior.

First attribution was tested as a mediator of sensitivity and naturally-occurring declines in antisocial behavior from 54 mths to 6th grade (Fig. 8). The model fit adequately (CFI .92, TLI .91, RMSEA .05, SRMR .09, 62.0% variance in antisocial behavior in 6th grade), but did not reveal significant mediation via indirect paths.

Next, social skill was examined as a mediator of sensitivity to naturally-occurring declines in antisocial behavior from 54 mths to 6th grade (Fig.9). Mediation occurred through a number of paths: Sensitivity at 54 months predicted naturally-occurring declines in antisocial behavior from 54 mths to 6th grade because it predicted sensitivity at 1st and 3rd grade, which then predicted social skills at 5th grade (estimate -.008, $p \leq .05$). Sensitivity at 54 months also predicted naturally-occurring declines in antisocial behavior from 54 mths to 6th grade because it predicted social skills at 1st grade, which then predicted social skills at 3rd and 5th grades (estimate -.003, $p \leq .05$). Sensitivity at 3rd grade predicted naturally-occurring declines in antisocial behavior from 54 mths to 6th grade because it predicted social skills at 5th grade (estimate -.113, $p \leq .05$). This fit was acceptable but not excellent (CFI .56, TLI .53, RMSEA .09, SRMR .15, 60.5% variance in antisocial behavior in 6th grade). Thus, although the fit statistics were not excellent, the multiple significant paths are consistent with the proposal that social skills account for the relation of sensitivity and naturally-occurring declines in antisocial behavior across childhood.

Finally, emotion regulation was examined as a mediator of sensitivity to naturally-occurring declines in antisocial behavior (Fig. 10). The model fit well (CFI .94, TLI .91, RMSEA .04, SRMR .05, 60.0% variance in antisocial behavior in 6th grade), and revealed significant mediation via one path. Sensitivity predicted naturally-occurring declines in antisocial behavior from 54 mths to 6th grade because sensitivity at 54 months predicted emotion regulation at 1st grade, which predicted emotion regulation at 3rd grade and then 5th grade (estimate -.69, $p \leq .05$). Thus, sensitivity accounts for naturally-

occurring declines in antisocial behavior in part because they promote children's emotion regulation.

Chapter 4

Discussion

Using national longitudinal data from the NICHD Study of Early Child Care, this article examined factors that might account for declines in antisocial behavior commonly observed across childhood. Given the importance of maternal sensitivity, children's attributions, social skills, and emotion regulation to antisocial behavior, we expected that antisocial behavior might decline naturally for most children because of increases in maternal sensitivity, and in these socio-affective cognitive processes. Additionally, we expected that antisocial behavior would decline because maternal sensitivity promotes the emergence of these skills. Although maternal sensitivity (Wang et al., 2011; NICHD, 2004; Miner & Clark-Stewart, 2008; Grimm & Ram, 2009), and children's attributions (Godleski & Ostrov, 2010; Dodge et al., 1995), social skills (Campbell et al., 2006), and emotion regulation (Helmsen et al., 2012) are known to predict antisocial behavior, to date research has not examined whether changes in these factors account for maternal sensitivity's relation to declines in antisocial behavior over time.

The findings suggest several viable paths that may help explain naturally-occurring declines in antisocial behavior across childhood. First, consistent with research demonstrating that at one point in time sensitivity predicts low antisocial behavior, the current study found that increases in maternal sensitivity predicted declines in antisocial behavior. Second, the development of children's regulatory processes had direct effects: Increases in social skills and emotion regulation predicted declines in antisocial behavior. Third, social skills and emotion regulation mediated the effect of maternal sensitivity on

declines in antisocial behavior. Finally, results supported bidirectional models; when children reduced their antisocial behavior, at subsequent assessments parents became increasingly sensitive, and children improved their social skills, increased their emotion regulation, and reduced their hostile attributions. Such bidirectional relations demonstrate the transactional nature of parenting, child processes, and antisocial behavior across childhood.

Maternal Sensitivity and Declines in Antisocial Behavior

The data demonstrate that increases in maternal sensitivity account for naturally-occurring declines in antisocial behavior across childhood over and above numerous control variables. Although previous research has demonstrated that sensitivity at one point in time predicts declines in antisocial behavior, the current study verifies that increases in sensitivity over time predict naturally-occurring declines in antisocial behavior. This finding provides convincing evidence that sensitivity plays an instrumental role in declines in antisocial behavior, rather than static variables such as personality or SES that covary with sensitivity and antisocial behavior at one point in time.

The data are consistent with relationship-oriented proposals concerning the importance of parental sensitivity to declines in antisocial behavior. Mutual responsive orientation theory, for example, emphasizes that sensitive parenting predicts a positive parent-child relationship and children's identification with parental values, beliefs, and standards (Maccoby & Martin, 1983; Kochanska, Barry, Stellern, & O'Bleness, 2009). Children in mutually responsive relationships refrain from antisocial behavior because

they are motivated to conform to parental rules about appropriate behavior and adopt standards of behavior that recognize the reciprocal and cooperative nature of social relationships (Maccoby & Martin, 1983; Kochanska et al., 2009; Shaw & Bell, 1993). Similarly, attachment theory stresses that, when parenting is sensitive, consistent, and predictable, children develop secure attachments to parents and mental models of social relationships that can promote cooperation and prosocial behavior (Ainsworth, Bell, & Stayton, 1974; Symons & Moran, 1987; Belsky, 2006). These mental representations appear to reflect the positive parent-child relationship, which facilitates reductions in antisocial behavior over time. The current study is in line with these proposals. The results imply that by cooperating with children and being attuned to their needs, parents promote naturally-occurring declines in antisocial behavior because children respect their parents' rules, yearn to maintain a positive relationship, and develop positive expectations and perceptions of their parents (e.g., belief that parents are invested in their well-being; Spinrad, Eisenberg, Silva, Eggum, Reiser, et al., 2012; Kochanska, 2002; Maccoby & Martin, 1983).

In addition, the finding that increases in sensitivity contribute to declines in antisocial behavior may be due to sensitivity's influence on children's empathy and perspective-taking skills. When parents respond contingently to children's signals and structure the environment in accordance with children's needs, children develop the ability to take another person's perspective (Raikes & Thompson, 2008; Symons & Clark, 2000). Furthermore, increased abilities at differentiating among and identifying others' affective states should allow children to bring their antisocial behavior under

control because they promote empathy and lead to harmonious interpersonal relationships (Anastassiou-Hadjicharalambous & Warden, 2008). In fact, intervention research has demonstrated that increases in both empathy and perspective-taking skills contribute to clinically-significant declines in antisocial behavior (Lochman, Powell, Boxmeyer, & Jimenez-Camargo, 2011). Thus, sensitivity may promote naturally-occurring declines in antisocial behavior because it increases these cognitive and emotional processes in children.

That sensitivity at 54 months was more important in predicting subsequent declines in antisocial behavior for females than males was somewhat surprising and not predicted a priori. Parent-child relationships may be more important for girls than boys in reducing antisocial behavior (Wang et al., 2011). One study demonstrated that positive parenting at one point in time had no influence on male children but for female children, increased the likelihood that their antisocial behavior would decline across childhood (Pevalin et al., 2003). Sensitive parenting that is necessary to regulate male's antisocial behavior may be critical in discipline scenarios, but the current study's measure of sensitivity did not assess sensitivity during discipline episodes. Although sensitivity had stronger effects on female's antisocial behavior than males only at 54 months (rather than at all assessments), the data are consistent with previous research.

Attributions and Antisocial Behavior

Previous research demonstrates that when assessed at one point in time hostile attributions predict high antisocial behavior and benign attributions predict low antisocial behavior (e.g., Crick & Dodge, 1994). However, no study has examined whether

normative developmental changes in attributions across time account for naturally-occurring declines in antisocial behavior. The data demonstrate that increases in hostile attributions are associated with corresponding declines in antisocial behavior, but this relation appears to be driven primarily by antisocial behavior's effects on attributions. That is, antisocial behavior predicts subsequent increases in hostile attributions, but declines in hostile attributions do not promote naturally-occurring declines in antisocial behavior. This finding was contrary to predictions. It may be that changes in cognitive processes do in fact lead to declines in antisocial behavior, but that cognitive factors other than attributions are central to those declines. Specifically, Dodge's social information processing model proposes that multiple cognitive steps are involved in regulating antisocial behavior. Children must encode and attend to relevant information concerning social situations, generate and evaluate potential response options, and finally select and enact a response. Antisocial children attend to hostile cues, engage in self-defensive and hostile goal setting, generate aggressive response repertoires, and evaluate favorably the outcomes they expect from aggressive behavior (Crick & Dodge, 1994; Dodge, Pettit, McClaskey, & Brown, 1986; Dodge & Frame, 1982). These cognitive processes then predict retaliatory aggression in response to peers' ambiguous behavior (Dodge, 1980). Thus, antisocial children may reduce hostile attributions, but until they also improve abilities at encoding relevant social cues, perspective-taking skills, or generating and evaluating prosocial responses favorably, declines in antisocial behavior may not occur. Attributions are one of many important cognitive processes, and changes in other steps may be critical to bring antisocial behavior under control across childhood.

Social Skills and Antisocial Behavior

The current study demonstrates that antisocial behavior declines because children develop social skills that enable cooperative interaction and the resolution of conflict with minimal distress, opposition, and aggression. Although intervention studies demonstrate that improvements in social skills reduce antisocial behavior (Ang & Hughes, 2001), this is the first study to demonstrate that in a community sample, the emergence of social skills across age contributes to naturally-occurring declines in antisocial behavior during childhood.

Skills at sharing, helping, cooperating, and resolving conflict increase dramatically across the preschool and elementary school years (Rudolph et al., 2011; Campbell et al., 2006; Eisenberg & Fabes, 1998; Hastings, Utendale, & Sullivan, 2007). This is the same period during which antisocial behavior declines for most children. Improvements in these complex skills may lead to declines in antisocial behavior because of children's abilities at regulating social interactions (Paleari, Regalia, & Fincham, 2003; Malti, Gasser, & Buchmann, 2009). Increased conflict resolution skills, for example, may enable children to deescalate arguments before they feel anger, frustration or the need to react with aggression (Pakaslahti, Karjalainen, & Keltikangas-Jarvinen, 2002). By controlling negative emotions and eliciting positive responses from their interaction partner, children practice cooperation, negotiation, and other skills in a benign context. Thus, an improved set of adaptive social behaviors may enable children to maintain a positive emotional climate, which reduces anger, disagreements, and subsequent antisocial behavior.

The current finding also may be due to children's peer acceptance. As children learn to cooperate, share, and negotiate, they increase their likeability by peers. Socially skilled children are more popular and more often preferred by their peers (Gulay, 2011). Peer acceptance is associated with positive interactions, and in turn, reduced anger and motivation to aggress against peers (Gulay, 2011). Thus, normative development across childhood of skills related to cooperating, sharing, and negotiating appear to set in motion a number of potential processes (e.g., peer acceptance, emotional development) that enable children to reduce their antisocial behavior over time.

Emotion Regulation and Antisocial Behavior

The current study also demonstrates that antisocial behavior declines in part due to the acquisition of emotion regulation skills. Although interventions that improve emotion regulation reduce clinically-significant antisocial behavior (Conduct Problems Prevention Research Group, 2004; Simons et al., 2006; Moretti & Obsuth, 2009), this is the first study to demonstrate that in a community sample developmental increases in emotion regulation account for naturally-occurring declines in antisocial behavior across childhood.

Children develop nascent abilities to regulate emotions early in development, and these abilities improve dramatically across childhood (Bridges & Grolnick, 1995; Eisenberg, Fabes, Murphy, Karbon, Maszk, Smith, et al., 1994; Underwood, Coie, & Herbsman, 1992; Saarni, Campos, & Camras, 2006). Improvements in emotion regulation may promote age-related reductions in antisocial behavior because of their influence on children's socio-emotional cognitive processing skills. Emotion theories

stress that the activation of emotions sets in motion emotion-specific orientations towards events (Dix, 1991). Upon experiencing an emotion, people perceive and evaluate the situation, are motivated to attain certain outcomes, communicate their emotions, and prepare response tendencies (Dix, 1991). By remaining calm during conflict, children experience low arousal, are able to understand the effect of their behavior on others, develop an improved ability to understand the emotional experience of the other, and are unlikely to engage response tendencies associated with impulses to act aggressively (Bell & Song, 2005; Swartz & McElwain, 2012; Dix, 1991). These socio-emotional cognitive processing skills are associated with sharing and cooperative behaviors (Bell & Song, 2005), and they should reduce children's tendencies to react with aggression and violent behavior (Swartz & McElwain, 2012). In other words, controlling negative emotion should allow children to coordinate interactions with others such that mutually satisfying outcomes result (Dix, 1991). Thus, when children control negative affect, they should experience fewer negative emotions, an increased understanding of relevant social cues, and reduced aggressive response tendencies known to promote antisocial behavior (Bell & Song, 2005, Dix, 1991).

Emotion regulation may also predict naturally-occurring declines in antisocial behavior because it leads to more positive reactions and social feedback. As children express or refrain from expressing strong emotions, they affect their interaction partners (Dix, 1991; Swartz & McElwain, 2012). Experiencing emotions activates changes in facial muscles, tone of voice, and other bodily movements that indicate to the interaction partner how they feel and are likely to act (Dix, 1991). When children express anger or

other negative emotions, they tend to elicit negative emotions and aggressive behaviors from others. In contrast, if children control expressions of negative emotion, such negative reactions from others are less likely (Swartz & McElwain, 2012). Thus, if children express joy or other positive emotions, they are likely to prime interaction partners to approach, positively engage, and praise rather than avoid or criticize (Dix, 1991). In summary, normative development of emotion regulation across childhood may promote positive reactions from interaction partners which enable children to reduce their antisocial behavior over time.

Bidirectional Phenomenon

In addition to evidence that maternal sensitivity, children's social skills, and emotion regulation may promote declines in antisocial behavior, antisocial behavior appears to play a significant role in regulating these variables. The current study demonstrated that naturally-occurring declines in antisocial behavior predicted increases in maternal sensitivity, children's social skills, emotion regulation and declines in children's hostile attributions.

Although previous research demonstrates that parents are less harsh in response to prosocial children than antisocial children (Anderson et al., 1986), this is the first study to demonstrate that as antisocial behavior declines naturally across childhood, maternal sensitivity increases. When children increasingly comply, cooperate, and refrain from aggressive behaviors, it may become easier for parents to contingently and positively respond such that dyadic synchronicity should ensue (Deater-Deckard & Petrill, 2004; Beaver & Wright, 2007). Additionally, children who are attentive and smile when

interacting with others elicit positive evaluations, praise, help, rewards, and other positive reactions (Bell & Chapman, 1986). Thus, children who become easier to manage may evoke in their parents a set of behaviors that optimize opportunities for the reciprocal and positive interactions that reflect sensitivity (Deater-Deckard & Petrill, 2004).

The current study also demonstrated that naturally-occurring declines in antisocial behavior predict increases in children's socio-affective cognitive competencies (i.e., social skills, emotion regulation, attributions). One explanation for these effects is that children who reduce their antisocial behavior elicit positive feedback from others. Such feedback provides them with opportunities to learn and practice effective social skills, regulate emotions, and understand other's motives and intentions (Crick & Dodge, 1994; Dodge et al., 1986). These findings are consistent with Dodge's social information processing model (SIP; Dodge, 1980). Non-aggressive peers tend to make hostile attributions about known-aggressive children's behavior than non-aggressive children's behavior. Peers are likely to recall more hostile cues displayed by aggressive children and say that they would be more likely to act aggressively toward aggressive children than toward nonaggressive children. These recall cues, hostile attributions, and aggressive response tendencies by peers represent a series of cognitive mechanisms that may explain the perpetuation of aggression in antisocial children.

Furthermore, when children engage in interactions characterized by cooperation, negotiation, and positive affect, they gain acceptance in the peer group (Pedersen et al., 2007). Acceptance from others is likely to influence children's self-evaluations such that they believe that they are effective interaction partners (Pakaslahti et al., 2002). Repeated

positive interactions and social feedback should modify and reinforce their social skills, emotion regulation, and positive views of self and others (Pakaslahti et al., 2002).

Additionally, social learning theorists emphasize that through positive interactions, children learn adaptive behaviors by modeling general positive affect, cooperation, and other prosocial behaviors of peers, parents, and others (Ardelt & Day, 2002). Children observe these behaviors, learn that they are effective, and imitate them rather than use aggression to meet their needs.

Social Skills as Mediators

The results demonstrated that social skills mediate the relation of maternal sensitivity to naturally-occurring declines in antisocial behavior. Intervention research with clinical populations demonstrates similar findings, (Conduct Problems Research Prevention Group, 2002; Tolan, Gorman-Smith, & Henry, 2003; Vazsonyi & Huang, 2010), but the current study is the first to demonstrate in a community sample that maternal sensitivity contributes to naturally-occurring declines in antisocial behavior because it promotes the development of children's social skills.

Sensitivity is important to the acquisition of social skills and thereby to naturally-occurring declines in antisocial behavior. During countless interactions, sensitive parents demonstrate for children how to cooperate, negotiate, communicate and respond effectively to others (Kanngiesser & Warneken, 2012; Kuczynski & Kochanska, 1990). Sensitive parents engage in mutually-responsive communication (e.g., joint attention, gesturing) with children, which increases children's prosocial behaviors (Gulay, 2011) and positive engagement of others (Vallotton, 2009). Sensitivity displayed when children

are in conflictual interactions may be particularly important (Thompson, 1997). When children experience conflicts with peers, siblings, or adults, for example, sensitive parents are likely to explain the consequences of children's behavior on others, communicate their expectations regarding kindness, and convey their message without rancor or accusation (DeHart, Sroufe, & Cooper, 2000). Although the current study does not specify exact behaviors in which sensitive parents engage, it is consistent with proposals that suggest that naturally-occurring declines in antisocial behavior may occur because during challenging interactions, parents teach children to cooperate, negotiate, and resolve conflict without aggression.

Emotion Regulation as a Mediator

The current study demonstrates that maternal sensitivity predicts naturally-occurring declines in antisocial behavior because it promotes the emergence of children's emotion regulation. In distressing situations sensitive parents "view children's negative emotions as intimate moments and opportunities to teach children how to manage and express emotions," (Swartz & McElwain, 2012, p. 206). Naturally-occurring declines in antisocial behavior might result because these views encourage parents to engage in supportive responses including labeling emotions, problem-solving, and validating (Swartz & McElwain, 2012). Such responses model for children adaptive strategies for managing difficult emotions and thus bring antisocial behavior under control.

Sensitive parenting may also contribute to emotion regulation by enhancing children's ability to control and redirect their attention away from stressors that incite aggression (Graziano, Calkins, & Keane, 2011). Often sensitive parents promote

children's attentional control and redirection by asking questions and describing calmly emotional aspects of situations (Graziano, Calkins, & Keane, 2011; Morales, Mundy, Crowson, Neal, & Delgado, 2005). These reactions should keep children's arousal from escalating, and thereby reduce the likelihood of antisocial behavior. It seems likely that sensitive parents employ a number of strategies (e.g., labeling emotions, redirection) that teach children to control negative emotions and reduce their antisocial behavior.

Attributions as Mediators

Contrary to prediction, declines in hostile attributions did not account for the relation of maternal sensitivity to naturally-occurring declines in antisocial behavior. This finding is inconsistent with studies that demonstrated that sensitive parenting predicts benign attributions and low antisocial behavior (e.g., Gomez & Gomez, 2000). The discrepancy may be due to differences in measures of sensitivity. In the current study, sensitivity was observed in brief interactions (i.e., 15-minutes). Although sensitivity predicted social skills, emotion regulation, and declines in antisocial behavior, the conditions under which sensitivity is necessary to reduce hostile attributions and antisocial behavior may not have been captured. Sensitivity during discipline episodes is critical, and sensitivity may predict declines in hostile attributions and antisocial behavior only when parents effectively modify children's aversive behavior. The current study did not examine discipline. Gomez and Gomez (2000), on the other hand, measure sensitivity in the context of discipline. Specifically, maternal sensitivity moderated the effects of maternal discipline on hostile attributions such that low sensitivity exacerbated the effects of harsh discipline on hostile attributions and antisocial behavior. In summary, parenting

may play a significant role in the reductions of hostile attributions and naturally-occurring declines in antisocial behavior, but the current study was unable to verify this relation.

Limitations

The current study is not without limitations. First, there were no data on parents' own antisocial behavior. This precludes the exploration of passive gene-environment correlations. Second, families were excluded from the sample if there were birth complications or a history of parental drug abuse or incarceration. This limits generalizability to at-risk populations. Children whose parents have a history of incarceration or children who are born with biological insults are thought to be at risk for particularly extreme forms of antisocial behavior (Moffitt, 1993, 2005). Thus, the processes that may contribute to declines in antisocial behavior for these children may be unique from the processes that led to declines in antisocial behavior in the study's sample. Third, although the data elucidate processes that appear to be critical in regulating antisocial behavior across development, the models generally accounted for only a modest percentage of variance in children's antisocial behavior (e.g., 11% in antisocial slope). Thus, peer relations, empathy, or many other untested psychological factors might account for naturally-occurring declines across childhood. Fourth, although the CBCL is advantageous in that it allows for the examination of serious antisocial behavior, it may be somewhat insensitive to normative developmental changes in antisocial behavior that is less severe. Because the CBCL cannot generalize to more common behavior problems seen during childhood, researchers interested in less severe

problem behaviors may benefit by using other measures. Fifth, although the measure of sensitivity was an observed interaction rather than self-report, it was a general, global measure, which fails to capture specific behaviors in which parents engage to promote socio-affective cognitive skills in children.

Implications and Conclusions

Although antisocial behavior is common in young children (Spieker et al., 1999), for most children, it declines across childhood (Gilliom & Shaw, 2004). The current study highlights three mechanisms by which these declines may occur. First, the findings suggest that over the course of childhood antisocial behavior decreases in part because mothers become increasingly sensitive. Second, antisocial behavior declines when children's socio-affective processes improve, namely their social skills and emotion regulation. Third, maternal sensitivity appears to be important because it leads to improved social skills and emotion regulation in children. The findings support five conclusions.

First, the results begin to specify the changes in parenting across childhood that may be linked to naturally-occurring declines in antisocial behavior. A great deal is known about parenting that leads to clinically-significant antisocial behavior and about interventions that reduce it when it is extreme, but the field has yet to adequately examine normative changes in parenting that in most children enable antisocial behavior to decline across development. Although the current study provided a starting point by highlighting the importance of increasing maternal sensitivity, discipline, monitoring, and other forms of parenting that have been stressed in the onset of antisocial behavior may also be

relevant to its decline. Understanding other parenting factors that promote its decline may be a necessary issue for researchers to examine.

Second, the findings specify a set of developmental processes that appear to play an instrumental role in regulating antisocial behavior. It is unclear what exactly is changing in children that enables them to bring their antisocial behavior under control. To date, process-approaches to understanding naturally-occurring declines in antisocial behavior are lacking. The current study specifies socio-affective processes in children that explain why antisocial behavior declines and why parenting promotes these declines. As children navigate challenges commonly present in childhood, learn to control negative emotions, and relate to others cooperatively and without rancor, antisocial behavior is suppressed and replaced over this period.

Third, the data demonstrate that naturally-occurring declines in antisocial behavior affect the development of socio-affective cognitive processes. These findings suggest that theories of antisocial behavior need to recognize the role that behavior plays in shaping these processes, rather than simply the processes that affect subsequent behavior. It appears to be only after children learn to control their antisocial behavior, that they improve their thinking about others' motives and intentions (attributions). In addition, as children regulate their antisocial behavior they increase the frequency of positive interactions and, as a result, develop critical social skills and emotion regulation. By incorporating the interdependent relations of antisocial behavior patterns and regulatory skills, current conceptions of antisocial behavior may gain a more

comprehensive perspective on normative development and the role that dyadic interpersonal relations play in such development.

Fourth, the findings suggest specific points of focus for educational and intervention efforts. Knowledge of parenting that promotes normative developmental processes (e.g., emotion regulation, social skills) and contributes to naturally-occurring declines, might inform general educational efforts and policies on how to improve parenting quality. Rather than promoting diffuse parenting programs aimed at increasing positivity, programs might focus on parenting that is necessary to improve children's social skills and emotion regulation, processes that should be targeted if naturally-occurring declines in antisocial behavior are to be more common.

Fifth, the current findings support the notion that antisocial behavior declines as children replace patterns of feeling, thinking, and acting acquired during prior developmental periods. These data suggest that current conceptions of antisocial behavior need to incorporate a developmental focus if naturally-occurring declines across childhood are to be understood. Children reduce their antisocial behavior by acquiring skills at regulating emotions, relating to others cooperatively, and understanding other's plans, motives, and intentions. To a considerable degree, the development of these skills depends on particular inputs from parents. The ways in which parents promote these skills and subsequent declines in antisocial behavior remains somewhat unclear.

Although a few studies examine the role that parenting and related processes play in developmental reductions of antisocial behavior, most lack a process-orientation. In addition to studying why some children display high antisocial behavior and which

interventions reduce this behavior in clinical populations, it is important to study why it declines naturally during typical development. By understanding the parenting and the underlying child processes that lead to commonly observed naturally-occurring declines, researchers will better understand the full range of mechanisms by which these important behaviors are regulated and changed at different periods in development.

Table 1. Correlations among antisocial behavior and sensitivity.

	ASB54	ASB1	ASB3	ASB5	ASB6	SENS54	SENS1	SENS3	SENS5
ASB54	1.00	.69**	.59**	.57**	.55**	-.15**	-.15**	-.17**	-.16**
ASB1		1.00	.74**	.69**	.66**	-.18**	-.16**	-.20**	-.20**
ASB3			1.00	.75**	.70**	-.19**	-.18**	-.27**	-.24**
ASB5				1.00	.79**	-.16**	-.17**	-.21**	-.23**
ASB6					1.00	-.18**	-.18**	-.22**	-.24**
SENS54						1.00	.49**	.39**	.38**
SENS1							1.00	.46**	.43**
SENS3								1.00	.47**

*Significantly different than zero at $p < .05$.; ** Significantly different than zero at $p < .01$

“SENS” = Maternal Sensitivity; “ASB” = Antisocial Behavior; “54” = 54 months; “1, 3, 5” = grades

Table 2. Correlations Among Antisocial Behavior and Socio-Affective Cognitive Processes.

	ASB54	ASB1	ASB3	ASB5	ASB6	ATT1	ATT3	ATT5	SOC1	SOC3	SOC5	EMO1	EMO3	EMO5
ASB54	1.00	.69**	.59**	.57**	.55**	.06*	.14**	.16**	-.16**	-.15**	-	-.18**	-.16**	-.18**
ASB1		1.00	.74**	.69**	.66**	.08*	.13**	.19**	-.20**	-.20**	.15**	-.26**	-.24**	-.27**
ASB3			1.00	.75**	.70**	.10**	.12**	.18**	-.22**	-.25**	.20**	-.27**	-.30**	-.29**
ASB5				1.00	.79**	.10**	.11**	.17**	-.16**	-.22**	.24**	-.23**	-.24**	-.27**
ASB6					1.00	.09**	.09**	.15**	-.16**	-.22**	.24**	-.22**	-.23**	-.29**
ATT1						1.00	.10**	.13*	-.14**	-.11**	.25**	-.13**	-.10**	-.10**
ATT3							1.00	.37**	-.12**	-.05	.12**	-.14**	-.14**	-.10**
ATT5								1.00	-.16**	-.18**	.10**	-.18**	-.18**	-.13**
SOC1									1.00	.40**	.14**	.34**	.64**	.26**
SOC3										1.00	.34**	.42**	.32**	.67**
SOC5											1.00	.26**	.33**	.67**
EMO1												1.00	.40**	.38**
EMO3													1.00	.42**
EMO 5														1.00

* significantly different than zero at $p < .05$, ** significantly different than zero at $p < .01$; “ASB” = antisocial behavior, “ATT” = hostile attributions, “SOC” = social skills, “EMO” = emotion regulation, “54” = 54 months, “1, 3, 5” = grades

Table 3. Correlations Among Sensitivity and Socio-Affective Cognitive Processes.

	SENS54	SENS1	SENS3	SENS5	ATT1	ATT3	ATT5	SOC1	SOC3	SOC5	EMO1	EMO3	EMO5
SENS54	1.00	.49**	.39**	.38**	-.12**	-.10**	-.15**	.20**	.20**	.20**	.19**	.20**	.25**
SENS1		1.00	.46**	.43**	-.12**	-.11**	-.12**	.15**	.15**	.18**	.12**	.20**	.23**
SENS3			1.00	.47**	-.11**	-.12**	-.13**	.24**	.21**	.26**	.21**	.23**	.23**
SENS5				1.00	-.11**	-.10**	-.15**	.24**	.20**	.21**	.19**	.22**	.23**
ATT1					1.00	.10**	.13*	-.14**	-.11**	-.12**	-.13**	-.10**	-.10**
ATT3						1.00	.37**	-.12**	-.05	-.10**	-.14**	-.14**	-.10**
ATT5							1.00	-.16**	-.18**	-.14**	-.18**	-.18**	-.13**
SOC1								1.00	.40**	.34**	.64**	.26**	.30**
SOC3									1.00	.42**	.32**	.67**	.33**
SOC5										1.00	.26**	.33**	.67**
EMO1											1.00	.40**	.38**
EMO3												1.00	.42**
EMO 5													1.00

* significantly different than zero at $p < .05$, ** significantly different than zero at $p < .01$; “SENS” = sensitivity, “ATT” = hostile attributions, “SOC” = social skills, “EMO” = emotion regulation, “54” = 54 months, “1, 3, 5” = grades

Table 4. Models' R² and Fit Indices

Model	Variable	R ² Value
Fig. 1. Latent growth curve of antisocial behavior	ASB	--
	intercept	
	ASB slope	--
<i>Model fit:</i> CFI=.99, TLI=.98, RMSEA = .07, SRMR=.04		
Fig. 2. Latent growth curve sensitivity predicts antisocial behavior	ASB	--
	intercept	
	ASB slope	--
<i>Model fit:</i> CFI=.99, TLI=.98, RMSEA=.03, SRMR=.02		
Fig. 3. Sensitivity for males	SENS1	--
	SENS3	7.5%
	SENS5	8.0%
	ASB54	4.9%
	ASB1	42.2%
	ASB3	50.8%
	ASB5	52.5%
	ASB6	60.5%
<i>Model fit:</i> CFI=.98, TLI=.91, RMSEA=.06, SRMR=.05		
Fig. 4. Sensitivity for females	SENS1	9.6%
	SENS3	20.7%
	SENS5	--
	ASB54	2.8%
	ASB1	54.6%
	ASB3	59.8%

Table 4. Continued

ASB5	60.4%
ASB6	65.7%

Model fit: CFI=.98, TLI=.91, RMSEA=.06,
SRMR=.05

Fig. 5. Attributions and ASB

ATT1	.5%
ATT3	2.6%
ATT5	18.7%
ASB54	2.1%
ASB1	--
ASB3	31.9%
ASB5	51.8%
ASB6	59.2%

Model fit: CFI=.95, TLI=.94, RMSEA=.04,
SRMR=.08

Fig. 6. Social Skills and ASB

SOC1	11.6%
SOC3	17.4%
SOC5	21.5%
ASB54	2.5%
ASB1	46.5%
ASB3	56.9%
ASB5	58.3%

ASB6	62.3%
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Model fit: CFI=.96, TLI=.95, RMSEA=.04,
SRMR=.05

Fig. 7. Emotion regulation and ASB

EMO1	--
EMO3	19.1%
EMO5	20.9%
ASB54	2.1%
ASB1	47.3%
ASB3	51.4%
ASB5	56.3%

Table 4. Continued

Model fit: CFI=.93, TLI=.89, RMSEA=.06,
SRMR=.06

Fig. 8. Attributions as mediator

ASB6	63.4%
ATT1	1.7%
ATT3	2.7%
ATT5	8.2%
ASB54	1.8%
ASB1	49.0%
ASB3	57.0%
ASB5	53.0%
ASB6	62.0%

Model fit: CFI=.92, TLI=.91, RMSEA=.05,
SRMR=.09

Fig. 9. Social Skills as mediator

SOC1	10.4%
SOC3	17.7%
SOC5	20.9%
ASB54	3.1%
ASB1	47.7%
ASB3	55.1%
ASB5	56.1%
ASB6	63.2%

Model fit: CFI=.56, TLI=.53, RMSEA=.09,
SRMR=.15

Fig. 10. Emotion Regulation as mediator

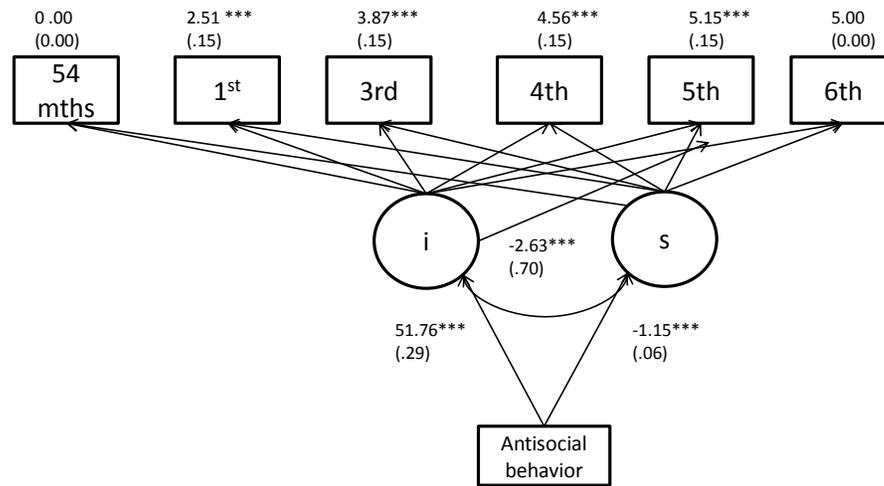
EMO1	--
EMO3	18.2%
EMO5	23.7%
ASB54	4.8%
ASB1	54.8%
ASB3	58.5%
ASB5	53.7%
ASB6	61.6%

Table 4. Continued

Model fit: CFI=.94, TLI=.91, RMSEA=.04,
SRMR=.05

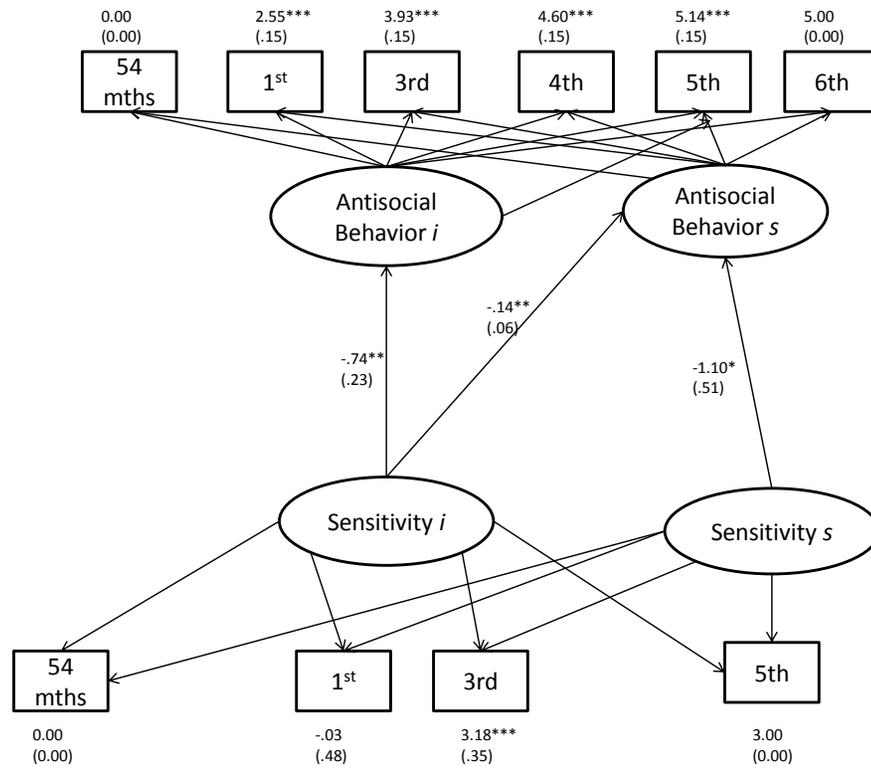
* Significantly different than zero at $p < .05$; ** Significantly different than zero at $p < .01$; *** Significantly different than zero at $p < .001$. “SENS” = sensitivity, “ASB” =antisocial behavior,” “ATT” = attributions, “SOC” = social skills, “EMO” = emotion regulation; “54” = months, “1,3,5,6” = grades; CFI=Comparative Fit Index; TLI= Tucker-Lewis Index RMSEA=root mean square error of approximation; SRMR= standardized root mean square residual. Covariances were included among study variables at the same time point in all models.

Figure 1. Basic Growth Model of Antisocial Behavior.



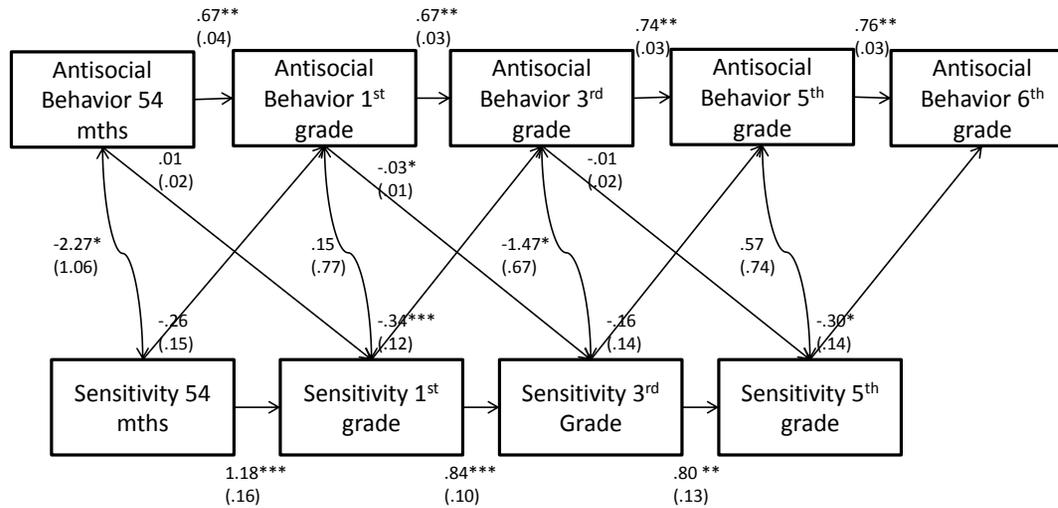
*Significantly different than zero at $p < .05$.; ** Significantly different than zero at $p < .01$; *** Significantly different than zero at $p < .0001$

Figure 2. Intercept and Slope of Sensitivity Predict Intercept and Slope of Antisocial Behavior.



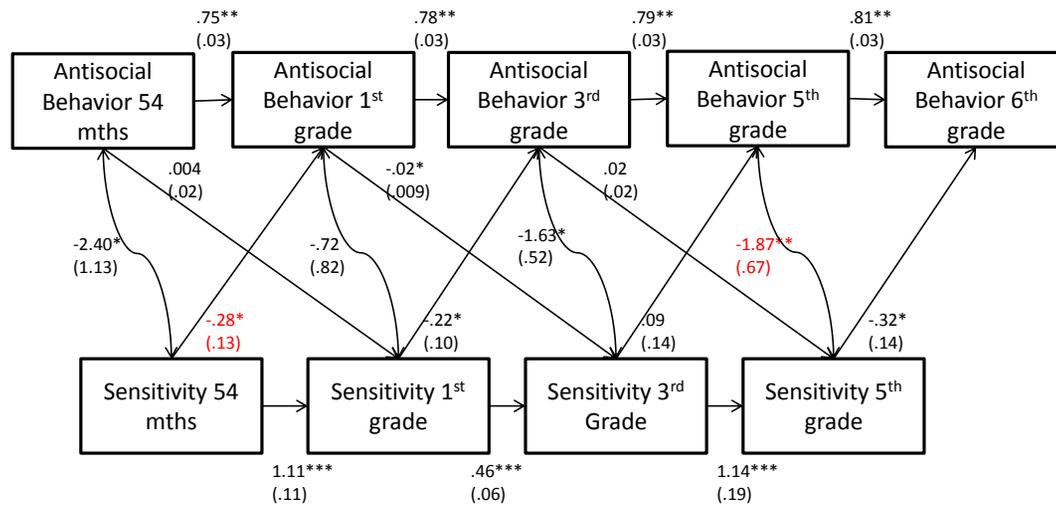
*Significantly different than zero at $p < .05$.; ** Significantly different than zero at $p < .01$; *** Significantly different than zero at $p < .0001$

Figure 3. Cross-Lag Relations of Sensitivity and Antisocial Behavior for Males.



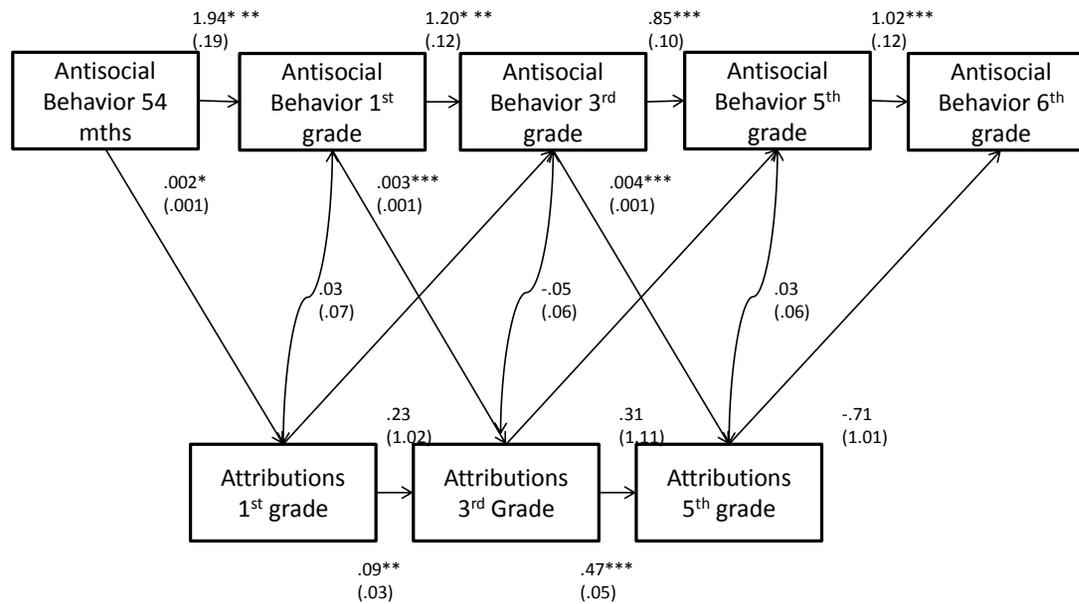
*Significantly different than zero at $p < .05$.; ** Significantly different than zero at $p < .01$; *** Significantly different than zero at $p < .0001$

Figure 4. Cross-Lag Relations of Sensitivity and Antisocial Behavior for Females.



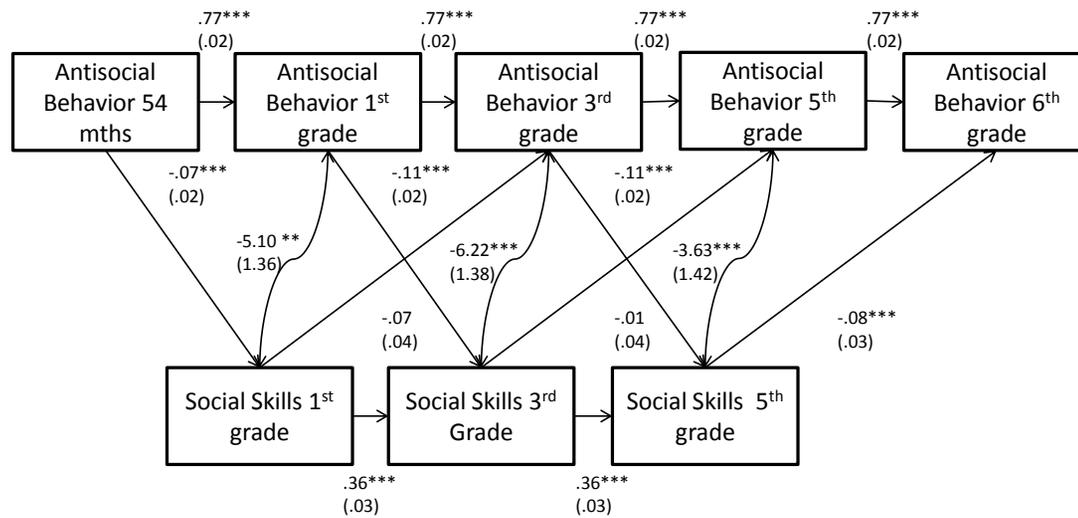
Note: paths in red highlight paths that are significant for females but not males. *Significantly different than zero at $p < .05$; ** Significantly different than zero at $p < .01$; *** Significantly different than zero at $p < .0001$

Figure 5. Cross-Lag relations of Attributions and Antisocial Behavior.



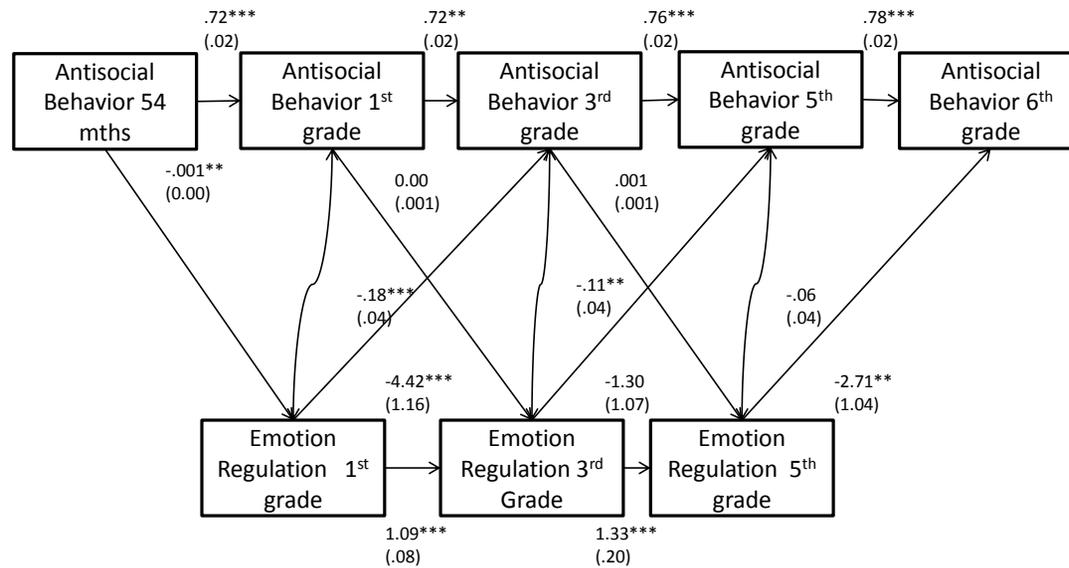
*Significantly different than zero at $p < .05$.; ** Significantly different than zero at $p < .01$; *** Significantly different than zero at $p < .0001$

Figure 6. Cross-Lag Relations of Social Skills and Antisocial Behavior.



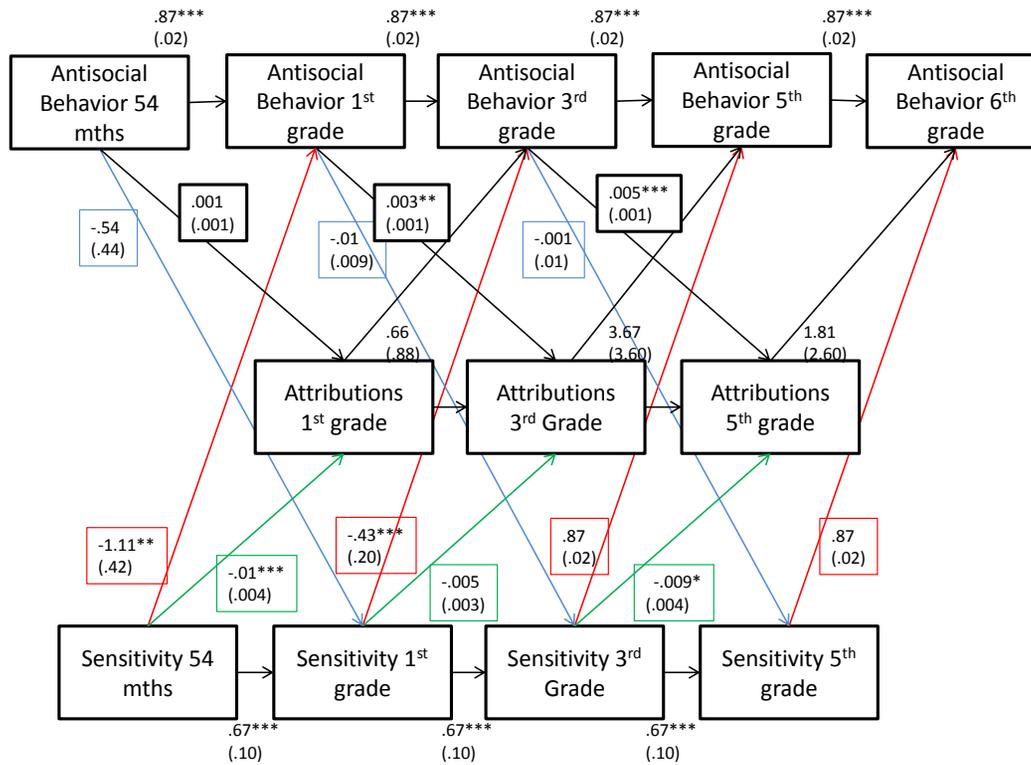
*Significantly different than zero at $p < .05$.; ** Significantly different than zero at $p < .01$; *** Significantly different than zero at $p < .0001$

Figure 7. Cross-Lag relations of Emotion Regulation and Antisocial Behavior.



*Significantly different than zero at $p < .05$.; ** Significantly different than zero at $p < .01$; *** Significantly different than zero at $p < .0001$

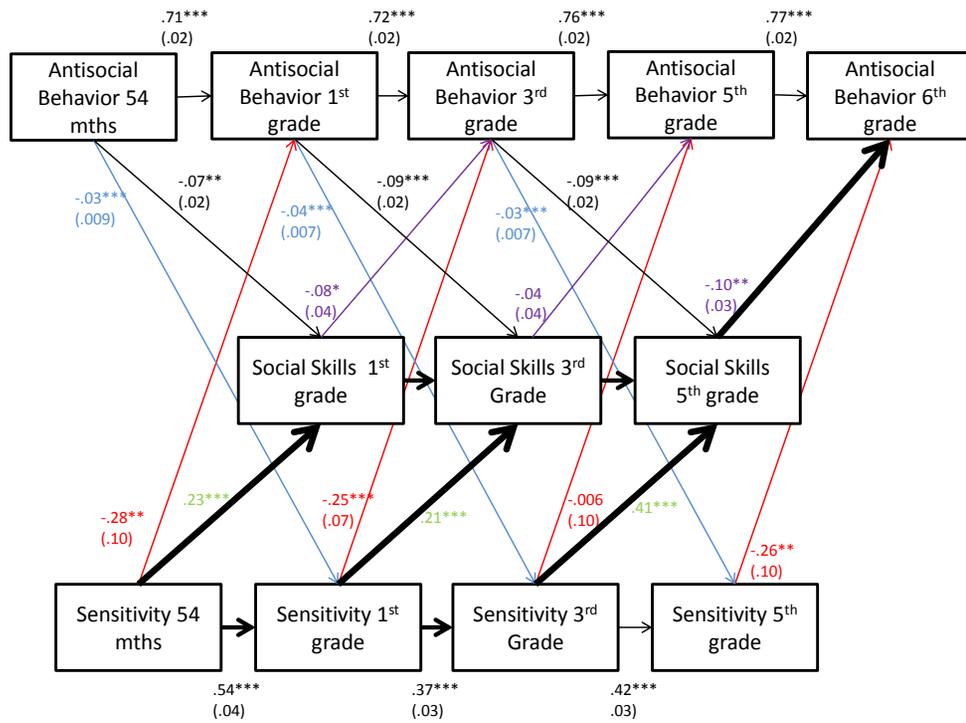
Figure 8. Attributions as Mediating Sensitivity and Antisocial Behavior.



*Significantly different than zero at $p < .05$; ** Significantly different than zero at $p < .01$; *** Significantly different than zero at

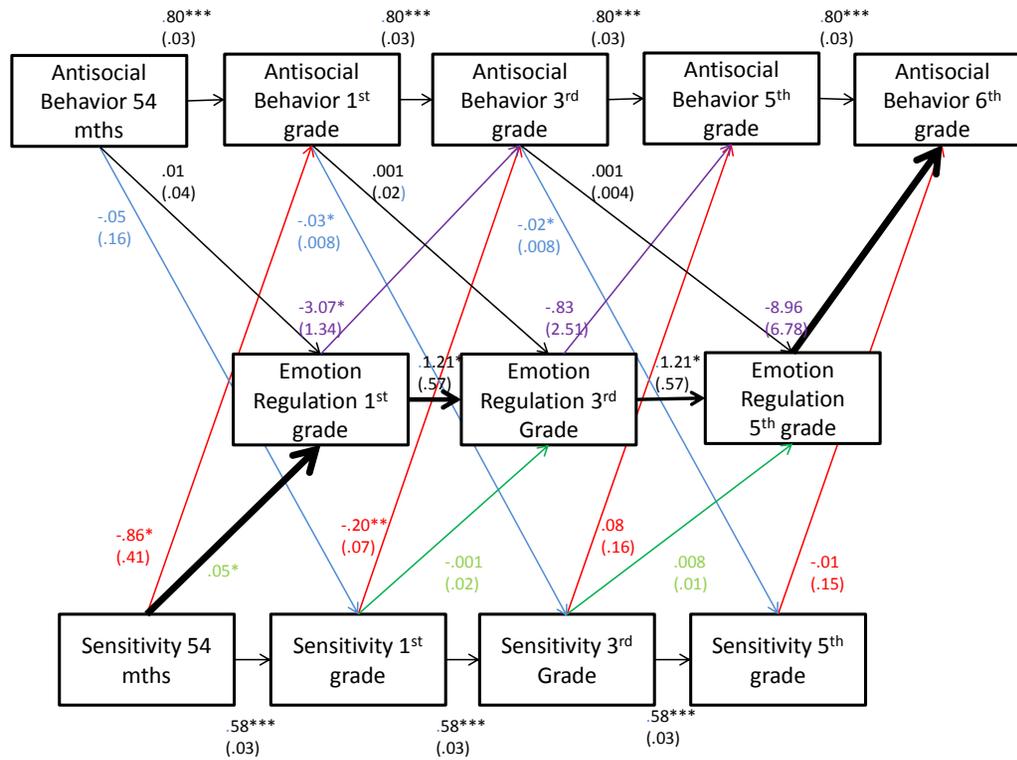
$p < .0001$

Figure 9. Social Skills as Mediating Sensitivity and Antisocial Behavior.



Note: Bold black paths indicate indirect mediational paths. *Significantly different than zero at $p < .05$.; ** Significantly different than zero at $p < .01$; *** Significantly different than zero at $p < .0001$

Figure 10. Emotion Regulation as Mediating Sensitivity and Antisocial Behavior.



Note: Bold black paths indicate indirect mediational paths. *Significantly different than zero at $p < .05$.; ** Significantly different than zero at $p < .01$; *** Significantly different than zero at $p < .0001$

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