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BIDIRECTIONAL RELATIONSHIPS BETWEEN
MATERNAL PARENTING BEHAVIORS AND CONDUCT DISORDER SYMPTOMS IN
PRESCHOOL CHILDREN

A Dissertation Presented

by

BENJAMIN ROLON-ARROYO

Submitted to the Graduate School of the
University of Massachusetts Amherst in partial fulfillment
of the requirements for the degree of

DOCTOR OF PHILOSOPHY

SEPTEMBER 2016

CLINICAL PSYCHOLOGY

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DEDICATION

I want to dedicate my dissertation to my family for their support all these years and to Tam Tran and Cynthia Felix, two women who inspired me to pursue a doctoral degree.

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I would like to thank my advisor, David H. Arnold, for giving me the opportunity to pursue my dream of becoming a clinical psychologist. I would also like to thank Elizabeth A. Harvey for allowing me to use her data set for my dissertation. Lastly, I would like to thank all the research assistants (Melyssa Sweet, Mariajose Paton, Trisha Hurley, LeeAnn Monterverde, Timothy Stager, Cindy Nguyen, Julia Broding, Anashia Nieves Rivera, Stephanie Miller, Elizabeth Singer, and Hillary George) that devoted their time to code the audiotapes used in this study. I would not have been able to complete this piece of work without the help of these individuals.

ABSTRACT

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MATERNAL PARENTING BEHAVIORS AND CONDUCT DISORDER SYMPTOMS IN
PRESCHOOL CHILDREN

SEPTEMBER 2016

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Conduct disorder (CD) symptoms emerge in preschool children, and some evidence for bidirectional effects between maternal parenting behaviors and these symptoms has been found in school-age children and adolescents. However, the strength and pattern of these effects are unknown during the preschool years. The present study examined the bidirectional relationships between several key maternal parenting behaviors (negative affect, warmth, overreactivity, and laxness) and CD symptoms across the preschool years. Participants were 197 preschool children ($M = 44.24$ months, $SD = 3.37$; *Girls* = 92) exhibiting significant behavior problems and their mothers who participated in a 3-year longitudinal study. Maternal parenting behaviors were assessed annually through self-report and observational measures, while mothers reported CD symptoms via structured interviews. As expected, CD symptoms were found to be stable during the preschool years. Only maternal self-reported overreactivity was concurrently correlated with CD symptoms. With regards to bidirectional relationships, CD symptoms only predicted a decrease in maternal warmth, and there was no evidence of mother-to-child effects in our models. The stability of CD symptoms provide support for the validity of early CD and results raise questions about the direct role of maternal parenting in the development of this disorder during the preschool years.

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CHAPTER 1

INTRODUCTION

Conduct disorder (CD) is characterized by a pattern of behavior in which the basic rights of others or major age- appropriate norms or rules are violated (American Psychiatric Association, 2013), estimated to have a lifetime prevalence of 9.5% in the U.S. (Nock, Kazdin, Hiripi, & Kessler, 2006). This condition is of great concern due to the high degree of associated impairment (Lahey, Loeber, Quay, Frick, & Grimm, 1997) and future delinquency and criminal offenses (Loeber & Dishion, 1983). CD is believed to result from a complex interaction between biological predispositions and environmental risk factors (e.g., Lahey, Waldman, & McBurnett, 1999; Patterson, Reid, & Dishion, 1992). Despite the substantial evidence supporting some heritability of antisocial behavior (see Rhee & Waldman, 2002), this line of research has not been able to explain how heritability determines children's outcomes. It has been proposed that many of the identified biological risk factors (as well as contextual risk factors) exert their influence in early childhood through parenting (Frick, 1994; Patterson, 2002). Theoretical models posit that parenting contributes to the development of behavior problems¹ through reciprocal processes in which parenting and child behavior influence one another over time (e.g., Bell, 1977; Patterson, 1982). However, the substantial extant empirical literature has focused largely on parent-to-child effects and not vice versa (Crouter & Booth, 2003). More recently, a small body of empirical research has emerged supporting the bidirectional effects between a range of parenting behaviors and child behavior problems (Lansford et al., 2011; Larsson, Viding, Rijdsdijk, & Plomin, 2008; Pardini, Fite, & Burke, 2008). This literature continues to be limited in answering the question of how CD symptoms first emerge since it generally focuses on older children/adolescents, does not examine CD symptoms specifically, focuses primarily on males, and relies on parent's self-report. The present study offers the opportunity to provide insight on the development of CD symptoms by examining the bidirectional relationships between mothers and CD symptoms in at-risk boys and girls, when they are believed to first emerge (i.e., during the preschool years), using multiple methods to assess parenting.

¹ The present study will primarily use the term *behavior problems* for purposes of consistency when referring to broadly defined measures, such as conduct problems, antisocial behavior, externalizing behavior, etc.

1.1 CD in Early Childhood

Childhood-onset of CD is especially concerning, because it begins before the age of 10 and is associated with higher stability of symptoms and worse clinical outcomes than the adolescent-onset form of the disorder (Lahey et al., 1998; Moffitt, 1993; Robins & Price, 1991). Although studies have clearly documented the stability of early behavior problems measured broadly (Moffitt, 1990), only recently have studies provided insight on early CD specifically. Despite the fact that some CD symptoms are not relevant for preschool children, a number of symptoms emerge at this age, such as physical aggression (e.g., starting fights; Keenan & Wakschlag, 2000). Approximately 3–7% of preschool children are estimated to meet criteria for CD (Egger & Angold, 2006; Kim-Cohen et al., 2005). Cross-sectional research suggests that CD in preschool children can be readily assessed (Keenan, et al., 2007) with concurrent validity (Keenan & Wakschlag, 2004). The few studies that have examined CD longitudinally in young children have found support for its stability from preschool to school-age (Keenan et al., 2011; Kim-Cohen, Arseneault, Caspi, Tomás, Taylor, & Moffitt, 2005; Rolon-Arroyo, Arnold, & Harvey, 2014). In the Environmental Risk Longitudinal Twin Study, children diagnosed with CD at age 5 were significantly more likely to meet CD criteria 2 and again 3 years later, and to exhibit more behavioral, social, and educational difficulties than children with no diagnosis (Kim-Cohen et al., 2005; 2009). In another study, 26% of 3- to 5-year-old children initially diagnosed with CD maintained the diagnosis three years later (Keenan et al., 2011). More recently, in a study of at-risk preschoolers, early CD symptoms predicted CD symptoms three years later, above and beyond oppositional defiant disorder (ODD) and attention-deficit hyperactivity disorder (ADHD; Rolon-Arroyo et al., 2014). However, the processes by which these symptoms emerge and are maintained are not yet known. Examining the development of CD in preschoolers offers theoretical implications and is critical for informing prevention and early intervention programs.

1.2 Coercion Theory

Bell's (1968) revolutionary review of parent-child effects in human and animal research, which suggested bidirectional child-parent effects, provided the foundation for Patterson's (1982) coercion theory to explain the development of behavior problems in children. Patterson believed that the parent-child relationship during preschool years was based on the mutually contingent reactions of the parent and child. In coercion theory, contingency refers to a connection between the child's behavior and the reaction of the

parent, and vice versa. At the core of Patterson's theory is the concept of *coercion*, which refers to the contingent use of aversive behaviors to influence another person. A child predisposed to behavior problems and inept parenting set off the coercive cycle. Patterson proposed a process of gradual escalation in parent-child conflict, when a child is negatively reinforced for responding aversively to behaviors of parents and siblings (e.g., the parent gives up on enforcing a command when the child throws a tantrum), and parents are reinforced, in the short term, for lax or harsh discipline responses (e.g., the child stops tantruming when the parent gives in, or is physically abusive). As these dysfunctional interactions repeat, the pattern of aversive behaviors is strengthened, resulting in reduced positive interactions with parents, who are likely to disengage. More recent models on the development of behavior problems continue to emphasize a circular pattern of bidirectional negative interchanges between parents and children (Eddy, Leve, & Fagot, 2001; Patterson 2002; Snyder & Stoolmiller 2002). Nevertheless, despite these existing theories, the research literature has primarily examined unidirectional associations.

1.3 Parenting Effects

The contribution of parenting to CD development has been of particular interest in the research literature (see Burke, Loeber, & Birmaher, 2002). Negative parenting behaviors with school-age children and adolescents have been associated with CD (Frick et al., 1992) and predictive of future delinquency (Haapasalo & Tremblay, 1994). A review by Loeber and Stouthamer-Loeber (1986) found that two of the strongest correlates of CD in children/adolescents were poor parental supervision and lack of parental involvement in children's activities. In more recent studies, an association between poor parental supervision and CD was found to be similar for boys and girls (Rowe, Maughan, Pickles, Costello, & Angold, 2002). Parental discipline practices have also been associated with behavior problems (Loeber & Stouthamer-Loeber, 1986). Harsh or abusive forms of discipline (Rowe et al., 2002; Stormshak, Bierman, McMahon, & Lengua, 2000), inconsistent discipline (Frick et al., 1992; Haapasalo & Tremblay, 1994), and overreactive and lax parenting practices (Arnold, O'Leary, Wolff, & Acker, 1993; O'Leary, Smith Slep, & Reid, 1999) have also been linked to behavior problems.

Positive parenting practices have been examined less than negative parenting practices in relation to CD (Loeber, Burke, & Pardini, 2009), despite literature suggesting that positive parenting practices are inversely associated with behavior problems (Pettit & Bates, 1989). In particular, a few studies have found

that low parental warmth was associated with behavior problems (Dodge, Pettit, & Bates, 1994; Kruttschnitt, 1996; Patterson, DeBaryshe, & Ramsey, 1989). Some longitudinal research has also found that warmth is associated with decreased behavior problems in school-age children (Patrick, Snyder, Schrepferman, & Snyder, 2005). More longitudinal research is necessary to examine both negative and positive parenting practices in relation to CD in order to better understand their effects.

Parent training studies have also provided experimental support for the importance of parent effects on the development behavior problems by showing how parent training can prevent (e.g., Webster-Stratton, Reid, & Hammond, 2001) and treat behavior problems (Brestan & Eyberg, 1998). Moreover, other parent interventions reduce behavior problems. The Family Check-up (FCU), an empirically validated brief family-centered intervention focused on family-management practices, has been used to effectively reduce children's problem behavior, enhance parenting skills, reduce family conflict, and reduce the growth of substance use in middle-school children (Dishion & Stormshak, 2007; Dishion, Kavanagh, Schneiger, Nelson, & Kaufman, 2002). Moreover, this intervention has been found to be equally effective with young children (Gardner et al., 2009), suggesting that parent effects may be present early in child development as well.

1.4 Child Effects

The literature has examined child effects on parenting significantly less, despite their importance in existing theories (Crouter & Booth, 2003). Nonetheless, these studies are consistent with the idea that child effects exist. In a longitudinal study of Swedish twins, Narusyte, Andershed, Neiderhiser, and Lichtenstein (2007) found that half of the genetic contribution to the association between parental criticism and delinquency was explained by early adolescent aggression. Their results suggest that aggression in children may evoke negative parenting. It has also been demonstrated that parental monitoring is partly dependent on adolescent's disclosure to parents (e.g., Stattin & Kerr, 2000). Findings from the Cambridge Study in Delinquent Development have also supported child-to-parent effects and not vice versa; adolescents' antisocial behaviors were found to negatively affect family functioning (Beaver & Wright, 2007). Similar findings have emerged with school-age children; Eron, Huesmann, and Zelli (1991) found that child aggression was the best predictor of adult aggression towards the child, suggesting that parent behaviors were likely to be a response to the child's aggression. Adoption studies have also contributed

evidence to support child effects on parents. Two studies showed that adoptive children at high genetic risk for behavior problems received more negative parenting from their adoptive parents compared to adopted children at low genetic risk (Ge et al., 1996; O'Connor, Deater-Deckard, Fulker, Rutter, & Plomin, 1998).

Evidence for child-to-parent effects has also been obtained from experimental studies, which suggest that children's behavior problems can elicit negative parenting behaviors (Brunk & Henggeler, 1984) and negative outcomes for parents, such as distress and alcohol consumption (Pelham et al., 1997). However, few studies have been done from the framework of examining the effects of children's CD symptoms on parents (Lytton, 1990). One exception is Anderson, Lytton, and Romney (1986), who examined how mothers of school-age children (6-12 years) with CD and mothers of controls behaved with their own children, unrelated children with CD, and unrelated controls. The authors found that mothers of children with CD and mothers of controls did not differ in their use of positive and negative behavior or commands when interacting with unrelated CD children and unrelated controls, but found that all mothers interacting with children with CD expressed more negative behavior and more commands than when interacting with controls. Moreover, children with CD were less compliant than controls with both types of mothers. Overall, this study suggested that the children can elicit maladaptive mother-child interactions. In sum, the extant research on child effects questions the prominent causal role that has been given to parenting in the development of early CD symptoms and points to the importance of studies that explicitly attempt to separate child and parenting effects.

1.5 Bidirectional Relationships between Parenting Behaviors and CD

Advanced statistical techniques, such as structural equation modeling (Muthén & Muthén, 1998-2010), have allowed researchers to examine bidirectional relationships between parenting behaviors and children's behavior problems. Evidence of bidirectional effects between a range of parenting behaviors and child behavior problems has emerged in adolescent samples (Burt, McGue, Krueger, & Iacono, 2005; Laird, Pettit, Bates, & Dodge, 2003; Stice & Barrera, 1995), and school-age samples (Lansford et al., 2011; Pardini et al., 2008; Pearl, French, Dumas, Moreland, & Prinz, 2014; Sheehan & Watson, 2008; Vuchinich, Bank, & Patterson, 1992). However, a number of other studies have primarily found temporal stability of parenting behaviors and children's behavior problems (Shaffer, Lindhiem, Kolko, & Trentacosta, 2013) or primarily child-to-parent effects (Fite, Colder, Lochman, & Wells, 2006; Huh, Tristan, Wade, & Stice,

2006; Manongdo & Ramírez García, 2011). These mixed findings suggest that this line of research is only in its beginning stages, and a number of important gaps remain, some of which will be addressed by the present study.

First, the research literature on bidirectional parent-child relationships has focused on behavior problems, conflating diagnostic categories [i.e., CD and ODD] (see Pardini, 2008). While it is true that ODD is frequently comorbid with CD (Angold, Costello, & Erkanli, 1999; Maughan, Rowe, Messer, Goodman, & Meltzer, 2004), these conditions are distinct from each other (Burns, Walsh, Owen, & Snell, 1997; Cohen & Flory, 1998; Fergusson, Horwood, Lynskey, 1994; Frick et al., 1994; Hinshaw, Morrison, Carte, & Cornsweet, 1987; Lahey et al., 1997). Moreover, the few studies that have examined these disorders separately suggest different relationships between these conditions and parenting practices. In a cross-sectional study of at-risk first graders that examined the associations between different aspects of parenting and different groups of externalizing behaviors, parental aggression was only associated with children's aggression (a dimension of CD) and low parental warmth was only associated with children's oppositionality (a dimension of ODD; Stormshak et al., 2000). More recently, Burke, Pardini, and Loeber (2008) examined the bidirectional relationships between disruptive behavior symptoms -- i.e., CD, ODD, and ADHD -- and five aspects of parenting (i.e., timid discipline, low involvement, poor supervision, poor communication, and harsh discipline) in a referred sample of school-age boys (7-12 year-olds). After controlling for ADHD and ODD symptoms and parenting variables, CD predicted poor supervision, but parenting variables did not predict CD. Timid discipline predicted ODD, and timid discipline, parental involvement, and poor communication were uniquely predicted by ODD. These findings suggest that CD and ODD have different relationships with parenting behaviors. More specifically, CD symptoms in boys seem, perhaps, to be less susceptible to the influences of negative parenting practices than ODD symptoms. A recent study found bidirectional relationships between parenting behaviors and ODD symptoms in preschool children (Harvey & Metcalfe, 2012). However, it is not known whether these relationships exist in relation to early CD, as there are no studies that have examined the bidirectional relationships between parenting behaviors and CD symptoms in preschool children. Given the dearth of studies that distinguish between these disorders, it is necessary to continue examining the parent-child effects in relation to CD specifically.

Second, only a few studies have examined the bidirectional relationships in parenting behaviors and behavior problems, even broadly defined, in preschool children, despite evidence that these problems emerge early. To my knowledge, five studies have examined the bidirectional relationships between parenting practices and behavior problems prior to school entry (Harvey & Metcalfe, 2012; Larsson et al., 2008; O’Leary et al., 1999; Smith et al., 2014; Verhoeven, Junger, van Aken, Deković, & van Aken, 2010). First, using a combined sample (i.e., non-externalizing and externalizing groups), O’Leary et al. (1999) found no cross-lagged effects across two time points between externalizing behavior problems and overreactive discipline. However, the authors reported a mother-to-child effect at Time 2 in a reciprocal effects model. Second, in a genetically informed longitudinal study of 4-year-old twins, Larsson et al. (2008) investigated the bidirectional relation between children’s behavior problems and parental negativity (i.e., anger, frustration, distance) over a three-year period. The findings supported bidirectional effects across time; the influence of child behavior on parenting was about the same as the influence that parenting had on child behavior. A portion of the effect of parental negativity on child behavior problems was attributed to environmental factors. Conversely, analyses also suggested that children’s genetically influenced behavior problems evoke future changes in parental negativity. Third, in a community sample of low-income intact families, Verhoeven et al. (2010) examined the bidirectional relationships between boys’ externalizing behavior at 17, 23, 29, and 35 months of age and mothers’ and fathers’ support, lack of structure, positive discipline, psychological control, and physical punishment. Parenting behaviors did not predict boys’ externalizing behaviors. Boys’ externalizing behavior at 23, 29, and 35 months of age, predicted parent-reported support, lack of structure, psychological control and physical punishment. Moreover, child-effects were equally strong across time and across mothers and fathers. As previously mentioned, Harvey & Metcalfe (2012) found bidirectional relationships between parenting behaviors and ODD symptoms in preschool children. More recently, using the Early Steps multisite randomized prevention trial sample, Smith et al. (2014) examined the relationships between parent-child coercive interactions and behavior problems in children from age 2-years until school entry. The authors found an effect of coercive parent-child interactions on children’s noncompliance, while child oppositional and aggressive behaviors did not consistently predict increased coercion. Moreover, supporting parent effects, children assigned to an intervention had steeper declines in child oppositional and aggressive behavior and

moderate reductions in oppositional behavior in school. Overall, these studies have been informative, but are few in number and have not been specific enough to significantly contribute to the literature on the development of CD. The present study would be the first study to examine the bidirectional relationships between maternal parenting and CD symptoms in preschoolers.

Third, findings from studies on the development of CD, including the literature on bidirectional relationships, are often limited by same-informant data; usually parents provided information in regards to parenting practices and child's behavior (e.g., O'Leary et al., 1999; Verhoeven et al., 2010). Recent studies on bidirectional parent-child effects have made some effort to address this issue. Pardini et al.'s (2008) bidirectional effects were relatively consistent across parents' and teachers' reports of child behavior problems. Similarly, Burke et al. (2008) utilized parents and teachers as informants of children's symptoms and parents provided information on their own parenting practices. Hipwell et al. (2008) obtained information from mothers on their parenting, and daughters provided information on their CD and depression symptoms. However, despite these attempts to address the issue of same-informant data, only one study has utilized direct observations (Smith et al., 2014), which would strengthen the examination of the relationships. In particular, observations would potentially avoid method and informant variance problems. Additionally, utilizing direct observation data complements the use of self-report measures by assessing the extent to which these different measures converge.

1.6 Bidirectional Relationships between Parenting Behaviors and CD by Sex

Most research on the bidirectional relationships between parenting behaviors and behavior problems has focused on boys; only a few studies have focused on girls (Hipwell et al., 2008; Huh et al., 2006) or examined sex differences in the strength or pattern of relationships (Laird et al., 2003; Larsson et al., 2008; Lansford et al., 2011; Patrick et al., 2005; Smith et al., 2014). This is the case even though research has suggested differences between boys and girls when it comes to behavior problems (Gorman-Smith & Loeber, 2005). Moreover, girls have been found to be more relationally and emotionally oriented than boys (Cross & Madson, 1997; Gabriel & Gardner, 1999) and parents have been found to interpret and react to the same behaviors differently in boys and girls (see Keenan & Shaw, 1997), which suggests that girls may possibly be more vulnerable to the effects of negative parenting than boys. Indirect evidence of this phenomenon exists; maternal depression has been found to be more strongly associated with girls'

externalizing behavior both concurrently (Briggs-Gowan, Carter, & Schwab-Stone, 1996; Stacks & Goff, 2006) and prospectively (Tichovolsky, Arnold, & Baker, 2013) than in boys. Also, Hart, DeWolf, Wozniak, and Burts (1992) examined the relation between mothers' and fathers' disciplinary styles and preschoolers' prosocial and antisocial behavior on the playground. Daughters of mothers who used more inductive strategies engaged in more prosocial playground behavior than daughters of mothers who used more power assertive strategies, while there was no relation between inductive discipline and boys' playground behavior. These findings also suggest that girls may be influenced more by positive parenting behaviors than boys. Consequently, it is possible that findings from studies on the bidirectional relationships between parenting behaviors and CD that focus on boys may not fully apply to girls; this requires empirical examination.

The only study of girls examining the bidirectional relationships between parenting behaviors and CD symptoms examined the relationships between mothers' use of harsh punishment and warmth and their daughters' CD symptoms across six years in a large at-risk community sample of school-age girls (age 7–12 years; Hipwell et al., 2008). In this study, harsh punishment and warmth predicted CD symptoms. In terms of child effects, CD symptoms predicted increases in harsh punishment and had no significant effects on warmth. This study did not compare boys to girls. Consequently, it is not clear whether the results found are specific to girls, which suggests further research is needed on the bidirectional relationships between parenting behaviors and CD as a function of sex.

1.7 Present Study

In the present study, I examined the relationships between maternal parenting behaviors (negative affect, warmth, overreactivity, and laxness) and children's CD symptoms across the preschool years. A sample of families with preschool children exhibiting significant disruptive behavior symptoms was chosen because of their risk for continued problems. Data on maternal parenting practices came from mothers' self-report as well as direct observations, and data on children's symptoms came from mothers' reports via structured interviews. CD symptoms were assessed dimensionally, as evidence suggests that continuous measures of CD symptoms may be better predictors than categorical diagnosis (Fergusson & Horwood 1995; Moffitt, Caspi, Rutter, & Silva, 2001). The following hypotheses were made: (1) temporal stabilities of CD symptoms are expected (Rolon-Arroyo et al., 2014), (2) based on Patterson's coercion model,

bidirectional parent-child effects are expected in the development of CD symptoms, but given the mixed empirical results (Anderson et al., 1986; Burke et al., 2008; Hipwell et al., 2008; Larsson et al., 2008; O’Leary et al., 1999; Verhoeven et al., 2010), specific predictions were not made in regards to the relationships between different parenting behaviors and CD symptoms. Instead, I attempt to add clarity by examining the links with these unique data; (3) lastly, due to differences in between boys and girls with regards to behavior problems, I expected stronger parent-to-child effects for girls than for boys in regards to emotion-related parenting behaviors (i.e., negative affect and warmth; Keenan & Shaw, 1997).

CHAPTER 2

METHOD

2.1 Participants

Participants were 197 children who were 3 years old at screening, averaging 44.24 months ($SD = 3.37$) at the first home visit (Time 1), 56.81 months at Time 2, 69.30 months at Time 3, and 80.72 months at Time 4. The sample included European American (59.90%) children, Latino (24.30%; primarily from Puerto Rican background) children, African American (12.70%) children, and multiethnic (3.10%) children. Their 197 female primary caregivers (biologic mothers = 190; adoptive mothers = 4; grandmothers = 3) also participated in the present study. At Time 1, the average age of mothers was 31.64 years ($SD = 6.95$). Most mothers had high school diplomas (84.8%) and 32.9% of mothers had bachelor's degrees. Both parents lived together in 136 of the families. The average income in this sample was \$54,433 ($SD = \$38,623$; $Median = \$47,108$). All 197 mothers completed at least one measure at Time 1, 179 at Time 2, 155 at Time 3, and 161 at Time 4.

2.2 Procedures

All study procedures were approved by the University of Massachusetts Institutional Review Board. Participants were recruited by distributing questionnaire packets through state birth records, pediatrician offices, childcare centers, and community centers. Children with significant behavior problems and without significant behavior problems were recruited from 1,752 3-year-old children. Parents completed a screening packet containing the Behavior Assessment System for Children – Parent Report Scale (BASC-PRS; Reynolds & Kamphaus, 1992) and a questionnaire assessing for exclusion criteria (i.e., no evidence of mental retardation, deafness, blindness, language delay, cerebral palsy, epilepsy, autism, or psychosis), parental concern about disruptive behaviors, and demographic information. Criteria for the externalizing group were: (a) parent responded “yes” or “possibly” to the question, “Are you concerned about your child’s activity level, defiance, aggression, or impulse control?” and (b) BASC-PRS hyperactivity and/or aggression subscale T scores at or above 65. Eligible families were scheduled for two 3-hour home visits approximately one week apart, and each parent was paid a total of \$200 for both sessions. Bilingual staff conducted home visits for Spanish-speaking families, and all measures were available in Spanish. Similar assessments were conducted approximately once per year for the next three years.

2.3 Measures

2.3.1 Parent diagnostic interview of conduct disorder symptoms.

During every home visit (i.e., Time 1, 2, 3, & 4), the CD section of the Diagnostic Interview Schedule for Children, Fourth Edition (DISC-IV; Shaffer, Fisher, Lucas, Dulcan, & Schwab-Stone, 2000), was administered to parents. At Times 1-3 only eight symptoms were assessed: lying, bullying/threatening others, damaging others' property, initiating physical fighting, stealing without confrontation, cruelty to animals, hurting others/physically cruel, and starting fires. The other seven CD symptoms were judged to be age inappropriate and omitted: use of weapon, stealing while confronting a victim, sexual assault, breaking into private property, staying out at night, running away from home, and truancy. The full DISC-IV was administered at Time 4. Interviews were administered to mothers or jointly to both parents when available. Kuder-Richardson formula 20 (KR-20), the appropriate internal consistency statistic for scales with dichotomous items, was used to assess the internal consistency of CD symptoms (Time 1 = .51; Time 2 = .60; Time 3 = .60; Time 4 = .63). The CD section of the DISC-IV has been found to be able to easily distinguish externalizing preschool children from controls and it converges with a popular behavior checklist for parents (Rolon-Arroyo, Arnold, Harvey, & Marshall, 2015). CD symptoms were positively skewed at each time point, but no transformations were utilized in the present analyses because transforming did not change the results of the proposed analyses.

2.3.2 Audiotaped assessment of maternal warmth and negative affect.

To obtain a naturalistic, less reactive measure of parenting, mothers were asked to use a microcassette player to record 2 hrs of interaction with their children at Time 1 and Time 4, selecting times of day that tended to be challenging for them as parents. A preliminary review of the tapes suggested that 30 minutes of tape was sufficient for capturing a wide variety of behavior that was representative of the entire 2 hrs, and all mothers who took part in this assessment completed at least 30 min. Coders were undergraduate research assistants who were unaware of the children's behavior status. Raters received extensive training, including reviewing their practice coding during weekly meetings for approximately seven weeks. Global ratings of maternal positive and negative affect were made every 5 minutes on frequency and intensity of expressed affect with a Likert-scale ranging from 1 to 7. Negative affect included irritation, annoyance, frustration (i.e., repeated sighing), sadness, and/or anger. Negative affect

that was not expressed directly toward the child also counted towards the global ratings. Frequency was coded from 1 (no instances of negative affect) to 7 (very often expresses negative affect) and intensity was coded from 1 (no negative affect) to 7 (strong negative affect). Maternal positive affect² was coded when mothers expressed positive emotions including happiness, joy, excitement, satisfaction, pleasure, and contentment. Frequency was coded from 1 (no instances of warmth) to 7 (very often expresses warmth) and intensity was coded from 1 (no warmth) to 7 (strong warmth). Each tape was coded by two research assistants independently and scores were averaged. Frequency ratings and intensity ratings for both constructs were averaged because they were highly correlated ($r_s > .90$). Intraclass correlation coefficients (ICCs) at Time 1 were good for negative affect (.89) and for warmth (.86). ICCs at Time 4 were excellent for negative affect (.93) and good for warmth (.82). Tests of normality indicated that warmth was normally distributed at both time points, while negative affect exhibited a positive skew at both time points. Inverse transformations brought distributions of negative affect close to normal distributions but transformed variables were not used in the present analyses, as they did not affect the analyses' outcomes.

2.3.3 Parenting scale.

The Parenting Scale (Arnold et al., 1993) is a 30-item self-report scale that measures parental discipline. Ratings are made using a 7-point Likert scale, and this measure yields scores for laxness (e.g., “When I say my child can’t do something... I let my child do it anyway [7] vs. I stick to what I said [1]”) and overreactivity (e.g., “When my child misbehaves... I get so frustrated or angry that my child can see I’m upset [7] vs. I handle it without getting upset [1]”), which are two types of parenting practices that play a key role in coercive interactions (Patterson, 1982). The Parenting Scale has demonstrated good internal consistency ($\alpha = .83$ for laxness and $.82$ for overreactivity), and has been found to correlate with observations of parenting and child behavior (Arnold et al., 1993). Moreover, the overreactivity factor has been found to predict later child behavior problems among 6-year old children (O’Leary et al., 1999). Mothers completed the Parenting Scale at every time point (i.e., Time 1, 2, 3, & 4). Scores are calculated by averaging across items that loaded on each factor according to the Arnold et al. factor structure, where high scores indicate dysfunctional parenting. Internal consistency for overreactivity was acceptable at

² Positive affect for audiotaped data will be referred to as warmth hereafter in order to be consistent with videotaped data, where warmth was coded.

Times 2-4 (Time 2 = .75; Time 3 = .72; Time 4 = .75) and close to being acceptable at Time 1 (.69).

Internal consistency (i.e., Cronbach's alpha) for laxness was found to be good (Time 1 = .80; Time 2 = .80; Time 3 = .84; Time 4 = .82) for all time points. Tests of normality indicated that overreactivity was normally distributed at Time 1, 3, and 4, and close to normally distributed at Time 2. Laxness was positively skewed; however, it was close to being normally distributed at all time points. Transformations were not utilized for analyses, as they did not influence outcomes.

2.3.4 Videotaped assessment of parenting.

At each time point, children were videotaped interacting with their mothers during a 5-min play task and a 5-min cleanup task. Each tape was coded by two independent raters (whose ratings were averaged) using a coding system developed for the larger study. Global ratings of warmth, negative affect, and laxness were used. Ratings were averaged across the two tasks. Raters were undergraduate research assistants who were unaware of the children's behavior status. Raters received extensive training, including reviewing their practice coding during weekly meetings for approximately 7 weeks. Warmth referred to the extent to which the parent was positively attentive to the child; used praise, encouragement, and terms of endearment; conveyed affection; was supportive and available; was cheerful in mood and tone of voice; and/or conveyed interest, joy, enthusiasm, and warmth in interactions with the child. Warmth was rated from 1 (no warmth) to 7 (high level of warmth). Negative affect ratings indicated irritation, annoyance, frustration, whininess, and/or an angry tone. Negative affect was rated from 1 (no negative affect) to 7 (high level of negative affect). Laxness rating indicated the extent to which the parent gives in to child's requests, sticks to what was initially determined for the child to do, and takes action in disciplining the child. Laxness was rated from 1 (no laxness) to 7 (high laxness). ICCs for warmth were acceptable or better at Time 1-3 (Time 1 = .80; Time 2 = .82; Time 3 = .71) and modest at Time 4 (.62). ICCs for negative affect were acceptable or better at Time 1-2 (Time 1 = .74; Time 2 = .85), but unacceptable at Time 3-4 (Time 3 = .36; Time 4 = .03). ICCs for laxness were acceptable or better at Time 2 and 4 (Time 2 = .87; Time 4 = .79), questionable at Time 1 (ICC = .67), and poor at Time 3 (ICC = .54). It should be noted that the low reliability for videotaped negative affect and videotaped laxness was due to the infrequency of these behaviors (see Table 1). Tests of normality indicated that all three variables were not normally distributed; warmth was close to normally distributed at most time points. Transformations normalized the

distributions of warmth across time points, but did not normalize the distributions of laxness or negative affect (both positively skewed). The present analyses did not utilize transformed variables, as they did not influence the outcomes.

2.4 Analytic Plan

To examine the bidirectional relationships between maternal parenting behaviors and CD symptoms in preschool children, a series of models were created using MPLUS 6 (Muthén & Muthén, 1998-2010) for each maternal parenting behavior separately. Data for audiotaped negative affect and audiotaped warmth were only available for Time 1 and Time 4. For self-reported overreactivity, self-reported laxness, videotaped warmth, videotaped negative affect, and videotaped laxness, there were four annual time points available.

Four different models were created for each parenting variable in order to determine the best model fit to the data. First, a baseline model was created with no cross-lagged pathways (Model A), suggesting no bidirectional relationships in the development of CD symptoms and the maternal parenting behaviors examined. In models with four time points, pathways were first allowed to vary across time to evaluate whether there might be developmentally sensitive periods in the development of CD symptoms or changes in the way mothers parent. That model was compared to a model holding CD symptom pathways constant across time points, then holding parenting variable pathways constant, and then holding both constant. If fixing paths to be equivalent across time did not result in a significantly worse model fit, based on the chi-square fit index, those paths were set to be fixed across time. Second, once a baseline model was established, parent-to-child pathways only (Model B) were added to the baseline model, to test for parent-to-child effects in the development of CD symptoms, and goodness of fit was compared with Model A. In this model, parenting variables were regressed on the preceding parenting variable only and CD symptoms were regressed on the preceding CD symptoms and the parenting variable. Third, child-to-parent pathways only (Model C) were added to the baseline Model A. Model C tests for child-to-parent effects in the development of CD symptoms, a goodness of fit was compared with Model A. In this model, CD symptoms were regressed on preceding CD symptoms only and parenting variables were regressed on the preceding parenting variable and CD symptoms. Within Models B and C for variables with four time points, lagged pathways were first allowed to vary across time points to evaluate whether there might be

developmentally sensitive periods where CD symptoms have a greater influence on parenting behavior and vice versa, then holding them constant across time. If fixing paths across time did not result in a significantly worse model fit, based on the chi-square fit index, those paths were set to be fixed across time. Lastly, if Models B and C resulted in improved fit compared to Model A, we tested our proposed bidirectional relationships model by including paths going both directions (Model D).

Full information maximum likelihood was used to address missing data. In this method, all observed information is used to estimate parameters in all models. CD symptoms and parenting variables were allowed to correlate at each time point in all models. Residuals are allowed to correlate within measures in models with four time points, given the likelihood of method variance. Chi-square fit tests were utilized to determine which model (Model A vs. Model B vs. Model C vs. Model D) represents the best fit to the data for each parenting variable. Model fit was evaluated for the best model of each parenting variable by using four indicators: χ^2/df (< 2 indicates good model fit), Root Mean Square Error of Approximation (RMSEA; values of .08 and lower represent acceptable model fit and values between .08 and one indicate mediocre model fit), Bentler's Comparative Fit Index (CFI; values higher than .90 indicate acceptable model fit), and Standardized Root Mean Square Residual (SRMR; values lower than .08 indicate adequate model fit).

Multi-group analyses were conducted to inferentially test whether the model pathways differed by sex for all maternal parenting variables. The model determined to have the best fit for each parenting measure was utilized for the multi-group analyses. Chi-square tests determined whether the model estimates ought to be constant or allowed to vary by sex.

CHAPTER 3

RESULTS

3.1 Descriptive Statistics

Table 1 presents means, standard deviations, and *ns* for children's CD symptoms and maternal parenting variables at each time point. Descriptively, the average of CD symptoms remained stable during the first three time points and exhibited a decline at Time 4. Parenting variables remained stable over time with the exception of audiotaped warmth. On average, mothers expressed less warmth at Time 4 than at Time 1.

Relationships among maternal parenting measures were found in the expected directions, providing some support for the construct validity of these measures; overall, the relationships between constructs were stronger within measurement approaches (e.g., self-report, see Table 2-5). Audiotaped negative affect and audiotaped warmth were inversely correlated at both time points assessed. Self-reported overreactivity and self-reported laxness were positively correlated at Time 2-4 and approached significance at Time 1, as suggested by past research on these parenting constructs (Arnold et al., 1993). Videotaped warmth was inversely correlated with videotaped negative affect at Times 1-2 and with videotaped laxness at Time 1 and 4. Videotaped negative affect was correlated with videotaped laxness at Time 1. Across measurement approaches, self-reported overreactivity was correlated with audiotaped negative affect and inversely correlated with audiotaped warmth at Time 4. At Time 1, self-reported laxness was correlated with videotaped and audiotaped negative affect and inversely correlated with videotaped warmth. At Time 2 and 4, self-reported laxness was inversely correlated with videotaped warmth and it was correlated with audiotaped negative affect at Time 4. Videotaped warmth was correlated with audiotaped warmth at Time 1, but not at Time 4.

Tables 2-5 present concurrent correlations between children's CD symptoms and all maternal parenting variables available at each time point. Fewer significant relations were found than expected. CD symptoms were significantly correlated with self-reported overreactivity at Time 1 and Time 3 and approached significance at Time 2 and 4. The inverse correlation between CD symptoms and audiotaped warmth at Time 4 also approached significance. There were no other significant correlations between CD symptoms and parenting variables.

3.2 Audiotaped Negative Affect

Model A (i.e., model without cross-lagged pathways) for maternal audiotaped negative affect was created first. All four fit indices indicated that this model had an adequate fit, $\chi^2(2) = .60, p = .29$, RMSEA = .00, CFI = 1.00, and SRMR = .02. CD symptoms at Time 1 predicted CD symptoms at Time 4 and audiotaped negative affect at Time 1 predicted audiotaped negative affect at Time 4 (see Figure 1).

Model B (i.e., Model A plus parent-to-child pathways) tested parent-to-child effects only in the development of CD symptoms. Adding parent-to-child paths did not significantly improve fit over Model A, $\Delta\chi^2(1) = .50, p = .44$. Model C (i.e., Model A plus child-to-parent pathways) tested child-to-parent effects only in the development of CD symptoms. Adding child-to-parent paths did not significantly improve fit over Model A, $\Delta\chi^2(1) = .01, p = .92$. Overall, there was no support for the presence of bidirectional relationships in the development of CD symptoms and maternal audiotaped negative affect (see Table 6).

3.3 Audiotaped Warmth

In Model A for maternal audiotaped warmth, all four fit indices indicated that this model had an adequate fit, $\chi^2(2) = 4.02, p = .13$, RMSEA = .07, CFI = .96, and SRMR = .05. CD symptoms at Time 1 predicted CD symptoms at Time 4 and audiotaped warmth at Time 1 predicted audiotaped warmth at Time 4.

Model B tested parent-to-child effects only in the development of CD symptoms. Adding parent-to-child paths did not significantly improve fit over Model A, $\Delta\chi^2(1) = .03, p = .86$. Model C tested child-to-parent effects only in the development of CD symptoms. Adding child-to-parent paths significantly improved fit over Model A, $\Delta\chi^2(1) = 3.97, p = .05$. All four fit indices indicated that this model had an adequate fit, $\chi^2(1) = .05, p = .82$, RMSEA = .00, CFI = 1.00, and SRMR = .01. An inverse cross-lagged effect was found between CD symptoms at Time 1 and maternal warmth at Time 4 (see Figure 1); CD symptoms at Time 1 were associated with less maternal warmth at Time 4, controlling for Time 1 maternal warmth. Due to the lack of improved fit by Model B, Model D was not likely to improve fit over Model A. Overall, there was support for child effects of CD symptoms on maternal audiotaped warmth (see Table 6).

3.4 Self-reported Overreactivity

In Model A for maternal self-reported overreactivity, holding paths equal across time for CD symptoms did not result in significantly worse model fit, whereas fixing autoregressive parenting paths resulted in worse fit. Therefore, this model was conducted with time invariant autoregressive paths for CD symptoms and time variant paths for maternal self-reported overreactivity. All four fit indices indicated that this model had an adequate fit, $\chi^2(16) = 18.68, p = .29, RMSEA = .03, CFI = .99,$ and $SRMR = .05$. Autoregressive paths for CD symptoms and self-reported overreactivity were significant at each time point. Moreover, CD symptoms and self-reported overreactivity were correlated at Time 1-3 (see Figure 2).

Model B tested parent-to-child effects only in the development of CD symptoms. Adding parent-to-child paths did not significantly improve fit over Model A, $\Delta\chi^2(1) = .60, p = .44$. Model C tested child-to-parent effects only in the development of CD symptoms. Adding child-to-parent paths did not significantly improve fit over Model A, $\Delta\chi^2(1) = 2.01, p = .16$. Overall, there was no support for the presence of bidirectional relationships in the development of CD symptoms and maternal self-reported overreactivity (see Table 7).

3.5 Self-reported Laxness

In Model A for maternal self-reported laxness, holding paths equal across time for CD symptoms did not result in significantly worse model fit, whereas fixing autoregressive parenting paths resulted in worse fit. Therefore, this model was conducted with time invariant autoregressive paths for CD symptoms and time variant paths for maternal self-reported laxness. All four fit indices indicated that this model had an adequate fit, $\chi^2(16) = 12.30, p = .72, RMSEA = .00, CFI = 1.00,$ and $SRMR = .05$. Autoregressive paths for CD symptoms and self-reported laxness were significant at each time point (see Figure 2).

Model B tested parent-to-child effects only in the development of CD symptoms. Adding parent-to-child paths did not significantly improve fit over Model A, $\Delta\chi^2(1) = .33, p = .57$. Model C tested child-to-parent effects only in the development of CD symptoms. Adding child-to-parent paths did not significantly improve fit over Model A, $\Delta\chi^2(1) = 1.40, p = .24$. Overall, there was no support for the presence of bidirectional relationships in the development of CD symptoms and maternal self-reported laxness (see Table 7).

3.6 Videotaped Warmth

In Model A for maternal videotaped warmth, holding paths equal across time for CD symptoms and videotaped warmth did not result in significantly worse model fit. So this model was conducted with time invariant paths for both variables. All four fit indices indicated that this model had an adequate fit, $\chi^2(18) = 15.93, p = .60, RMSEA = .00, CFI = 1.00,$ and $SRMR = .06$. Autoregressive paths for CD symptoms and videotaped warmth were significant at each time point (see Figure 3).

Model B tested parent-to-child effects only in the development of CD symptoms. Adding parent-to-child paths did not significantly improve fit over Model A, $\Delta\chi^2(1) = .56, p = .45$. Model C tested child-to-parent effects only in the development of CD symptoms. Adding child-to-parent paths did not significantly improve fit over Model A, $\Delta\chi^2(1) = .36, p = .55$. Overall, there was no support for the presence of bidirectional relationships in the development of CD symptoms and maternal videotaped warmth (see Table 8).

3.7 Videotaped Negative Affect

In Model A for maternal videotaped negative affect, holding paths equal across time for CD symptoms and videotaped negative affect did not result in significantly worse model fit. So this model was conducted with time invariant paths for both variables. All four fit indices indicated that this model had an adequate fit, $\chi^2(18) = 31.46, p = .03, RMSEA = .06, CFI = .94,$ and $SRMR = .08$. Autoregressive paths for CD symptoms and videotaped negative affect were significant at each time point (see Figure 3).

Model B tested parent-to-child effects only in the development of CD symptoms. Adding parent-to-child paths did not significantly improve fit over Model A, $\Delta\chi^2(1) = .42, p = .52$. Model C tested child-to-parent effects only in the development of CD symptoms. Adding child-to-parent paths did not significantly improve fit over Model A, $\Delta\chi^2(1) = .19, p = .66$. Overall, there was no support for the presence of bidirectional relationships in the development of CD symptoms and maternal videotaped negative affect (see Table 8).

3.8 Videotaped Laxness

In Model A for maternal videotaped laxness, holding paths equal across time for CD symptoms and videotaped warmth did not result in significantly worse model fit. So this model was conducted with time invariant paths for both variables. All four fit indices indicated that this model had an adequate fit, χ^2

(18) = 22.66, $p = .20$, RMSEA = .04, CFI = .98, and SRMR = .06. Autoregressive paths for CD symptoms and videotaped laxness were significant at each time point (see Figure 3).

Model B tested parent-to-child effects only in the development of CD symptoms. Adding parent-to-child paths did not significantly improve fit over Model A, $\Delta\chi^2(1) = .03$, $p = .86$. Model C tested child-to-parent effects only in the development of CD symptoms. Adding child-to-parent paths did not significantly improve fit over Model A, $\Delta\chi^2(3) = 7.17$, $p = .07$. Overall, there was no support for the presence of bidirectional relationships in the development of CD symptoms and maternal videotaped laxness (see Table 8).

3.9 Multi-group Analyses by Sex

Multi-group analyses were conducted to test whether the patterns and strength of the mother-child relations differ by sex for all maternal parenting variables. The model determined to have the best fit for each parenting measure was utilized for the multi-group analyses. So, for example, because Model A was determined to have the best fit for maternal audiotaped negative affect, multi-group analyses were performed comparing boys and girls for that model. Chi-square fit tests compare models in which path estimates are fixed across gender versus allowing the path estimates to vary for boys and girls.

Results of these analyses did not suggest differences by sex for audiotaped warmth, self-reported overreactivity, and videotaped warmth, $ps > .05$. The multi-group model for videotaped negative affect where estimates were allowed to vary for boys and girls did not converge so it was not possible to make a model comparison. However, differences in model fit between boys and girls were found for audiotaped negative affect, self-reported laxness, and videotaped laxness.

Comparing the multi-group model for audiotaped negative affect where estimates were held equal between boys and girls, $\chi^2(8) = 17.49$, $p = .03$, and the multi-group model where estimates were allowed to vary between boys and girls, $\chi^2(4) = 4.66$, $p = .32$, suggested that the latter model had a significantly better fit, $\Delta\chi^2(4) = 12.82$, $p < .05$. The main difference between boys and girls was that audiotaped negative affect at Time 1 predicted audiotaped negative affect at Time 4 for boys, but not for girls.

Comparing the multi-group model for videotaped laxness where estimates were held equal between boys and girls, $\chi^2(42) = 57.92$, $p = .05$, and the multi-group model where estimates were allowed to vary between boys and girls, $\chi^2(28) = 28.35$, $p = .45$, suggested that the latter model had a significantly

better fit, $\Delta\chi^2(14) = 29.57, p < .05$. In this case, the main difference between boys and girls was with regards to how videotaped laxness predicted within measure at the different time points. For boys, videotaped laxness was only predictive from Time 1 to Time 2 and for girls only from Time 3 to Time 4.

Most notably, comparing the multi-group model for self-reported laxness where estimates were held equal between boys and girls, $\chi^2(42) = 52.21, p = .13$, and the multi-group model where estimates were allowed to vary between boys and girls, $\chi^2(28) = 26.32, p = .56$, suggested that the latter model had a significantly better fit, $\Delta\chi^2(14) = 25.89, p < .05$. Boys' CD symptoms were correlated with self-reported laxness at Time 2 and approached significance at Time 1, whereas these relationships were not observed in girls (see Figure 4).

CHAPTER 4

DISCUSSION

Families with preschool children exhibiting significant disruptive behavior symptoms, including CD symptoms, were the focus of the present study due to their risk for continued symptoms (Rolon-Arroyo et al., 2014) and future CD diagnosis (Keenan et al. 2011; Kim-Cohen et al., 2005; Kim-Cohen et al., 2009). The present study was the first longitudinal study to examine the bidirectional relationships between parenting and the development of CD symptoms in preschool boys and girls, using multiple methods to assess parenting behaviors. Moreover, children's CD symptoms were assessed dimensionally, as continuous measures of CD symptoms may be better predictors than categorical diagnosis (Fergusson & Horwood 1995; Moffitt et al., 2001).

The present study found that CD symptoms showed stability across the preschool years; each time point was predictive of the following time point. Furthermore, holding paths constant across time for CD symptoms did not result in worse fit, suggesting consistency in the stability of CD symptoms across the preschool years. These findings provide further support for the validity and importance of CD symptoms in children as young as 3 years of age. Similarly, all maternal parenting variables in the present study were predictive of their respective following time points.

CD symptoms were not concurrently correlated with most maternal parenting variables examined. These findings were surprising, based on the role given to parenting in the development of CD (Keenan & Shaw, 2003; Patterson et al., 2002). It may be possible that CD symptoms during the preschool years are not specifically related to the maternal parenting behaviors examined. The only exception was observed between CD symptoms and maternal self-reported overreactivity, which were correlated at most time points. This finding is consistent with the literature on behavior problems (Arnold et al., 1993; Stormshak, et al., 2000).

With respect to the bidirectional relationships between mothers' parenting behaviors and preschool children's CD symptoms, one cross-lagged effect was found, such that CD symptoms in 3-year-old children predicted less audiotaped maternal warmth when children were 6-years-old. This is an important finding given the dearth of studies examining positive parenting behaviors in the CD literature, and it is consistent with Patterson's (1982; 2002) coercion theory that posits that parents disengage with

time. This finding is also consistent with research that has found associations between broadly defined behavior problems and low warmth (Dodge et al., 1994; Kruttschnitt, 1996; Patterson et al., 1989). Moreover, this finding adds knowledge to the examination of externalizing disorders separately. Previously, a cross-sectional study of at-risk first graders had found that low parental warmth was only associated with children's oppositionality (i.e., a dimension of ODD) and not with children's aggression (i.e., a dimension of CD; Stormshak et al., 2000). However, given the advantages of longitudinal over cross-sectional research, the present study provided insight on the relationship between these two constructs, despite the fact that CD symptoms were not concurrently correlated with maternal warmth.

Overall, the present study did not provide evidence of further cross-lagged effects between CD symptoms in preschool children and the maternal parenting variables examined. Despite the concurrent correlations observed between CD symptoms and self-reported overreactivity, the data did not provide support for cross-lagged effects. This finding is consistent with a past study of at-risk preschoolers, in which concurrent correlations were found between externalizing behaviors and maternal overreactivity, but no cross-lagged effects (O'Leary et al., 1999). Consistent with some of the literature on bidirectional relationships with older children (Burke et al., 2008; Fite et al., 2006), the present findings suggest that CD symptoms may be less susceptible to the influences of negative parenting practices. It may very well be possible that maternal parenting is not causal for these symptoms during the preschool years, when they first emerge (Keenan et al., 2011; Kim-Cohen et al., 2005; Rolon-Arroyo et al., 2014); however, further research is necessary to support this idea.

There are a number of possibilities that could account for the lack of cross-lagged effects detected in our models. First, it may be possible that our data methods were not sensitive enough to detect the bidirectional processes that occur between maternal parenting behaviors and CD symptoms. We relied on annual data collection, and it is possible that different time intervals would have revealed relationships. My assumption was that bidirectional relationships for all maternal parenting behaviors could be detected longitudinally. However, O'Leary et al. (1999) did not find cross-lagged effects in two time points, but found a mother-to-child effect at follow-up between maternal overreactivity and externalizing behaviors by carrying out a reciprocal effects model; however this method requires the assumption that cross-lagged

effects are null. It may thus be possible that different statistical analyses may provide a better look at bidirectional mother-child relationships.

A different possibility to explain the lack of bidirectional effects may be that the processes that initiate CD occur prior to 3 years of age, because CD symptoms were already established by that time in the present sample. The literature on infants and toddlers offers some potential explanations. Research has found that a difficult temperament in toddlers predict future behavior problems (Frick & Morris, 2004; Shaw & Winslow, 1997; Rubin, Burgess, Dwyer, & Hastings, 2003), which could explain the lack of mother-to-child effects in the present study. Moreover, five year-old children with CD have been found to have significantly higher frequency of negative emotionality as infants and conduct problems as toddlers in comparison to non-problem children (Shaw, Owens, Giovannelli, & Winslow, 2001). However, there are no studies that have examined whether temperament predicts CD. We also cannot rule out the possibility of parenting effects prior to the preschool years. Recent research has found that negative parenting behaviors in at-risk infants predicted behavior problems during the preschool years and later (Lahey et al., 2008; Lorber & Egeland, 2011; Rubin et al., 2003; Shaw, Keenan, & Vondra, 1994). However, these studies have only assessed CD symptoms indirectly and do not examine whether infant's behavior problems had an effect on parenting behaviors over time. With regards to our lack of child-to-mother effects on the parenting behaviors assessed, it may be that mothers do not react to CD symptoms during this developmental period as they have been found to react with older children (Anderson et al., 1986). The present sample was composed entirely of children with externalizing problems, which suggests that mothers were likely to exhibit higher levels of negative parenting than mothers of children without these problems would. This could have limited the range of behavior needed to detect child-to-mother effects.

Multi-group analyses comparing models for boys and girls were not aligned with our initial expectations. However, some differences between boys and girls were found for audiotaped negative affect, self-reported laxness, and videotaped laxness. Most notably, maternal audiotaped negative affect was more stable for boys than girls and it was also found that self-reported laxness was associated with CD symptoms in boys during the first two years, while no such relationship was found for girls. Overall, the lack of major differences between boys and girls in their relationships between CD symptoms and maternal parenting behaviors in the present study is consistent with past studies on behavior problems that have found no

major differences (Laird et al., 2003; Lansford et al., 2011; Larsson et al., 2008; Patrick et al., 2005; Smith et al., 2014). The only study on CD in adolescent girls had found that harsh punishment and low warmth predicted CD symptoms and CD symptoms predicted increases in harsh punishment (Hipwell et al., 2008), while Burke et al. (2008)'s study with school-age boys found that CD predicted poor supervision, but parenting variables did not predict CD. It is possible that the bidirectional relationships between parenting and CD symptoms in boys and girls may vary as function of developmental stage. Future studies in this area ought to include both boys and girls in order to examine the generalizability of findings.

The present study raises questions that future research can address in order to better understand the emergence and development of CD symptoms during the preschool years. First, based on the findings of the present study, processes that contribute to the expression of CD symptoms may take place prior to 3 years of age because research has shown that they are already established by this age (Keenan & Wakschlag, 2004). Research with even younger children may provide more insight on the processes leading up to the expression of this condition. Second, research should consider paternal behaviors in the development of CD symptoms because most of the research literature has focused on mothers (Flouri, 2005; Phares, 1996). Examination of other contextual factors, such as single versus two-parent homes could add to the knowledge as well.

Several limitations should be noted. First, the current study relied on parent report only to assess children's CD symptoms; additional assessment sources should be included in future work. Second, the low frequency of videotaped negative affect and videotaped laxness at certain time points, which affected the reliability of these constructs, limited the validity of the models for these variables. Third, despite the strength of observational data, the positively skewed distributions of videotaped negative affect and videotaped laxness in the play and clean-up task suggest that these tasks did not elicit sufficient variability on these variables. More naturalistic observational data methods should be incorporated in future research. Moreover, despite the ethnically diverse sample in the present study, it was not possible to examine whether cultural factors played a role in the development of CD symptoms. Future studies ought to examine this issue given the probability that cultural factors may influence mothers' parenting styles.

Despite these limitations, this study extends knowledge on the relationships between key maternal parenting behaviors and early CD symptoms and points to the importance of assessing early CD symptoms.

This is the first longitudinal study to assess the bidirectional relationships between maternal parenting variables and CD symptoms. Results suggest that early CD symptoms are stable across the preschool years, do not appear to be as susceptible to the influences of negative maternal parenting practices as it has been found to be the case for ODD (Harvey & Metcalfe, 2012), and these symptoms appear to have an inverse effect on mothers' warmth over time. Clinically, results suggest that including CD symptoms in assessments of children as young as 3 years of age may add valid, unique information relevant to the future trajectory of problems. Given the stability of these symptoms, it may be important to intervene early in development rather than waiting to see if children outgrow these symptoms. The lack of parent-to-child effects on the development of CD symptoms suggests the possibility that child-focused components to the treatment of these symptoms could be helpful. In addition, supports for parents with children who exhibit these symptoms may be beneficial as well, given our findings on how CD symptoms appear to have an effect on the mother-child relationship.

Table 1

Descriptives of Child and Mother's Parenting Variables Across Time

| | <i>Time 1</i> | | | <i>Time 2</i> | | | <i>Time 3</i> | | | <i>Time 4</i> | | |
|------------------------------|---------------|----------|-----------|---------------|----------|-----------|---------------|----------|-----------|---------------|----------|-----------|
| | <i>N</i> | <i>M</i> | <i>SD</i> | <i>N</i> | <i>M</i> | <i>SD</i> | <i>N</i> | <i>M</i> | <i>SD</i> | <i>N</i> | <i>M</i> | <i>SD</i> |
| CD symptoms | 197 | 1.63 | 1.46 | 179 | 1.74 | 1.60 | 138 | 1.62 | 1.54 | 161 | 0.76 | 1.26 |
| Audiotaped Negative Affect | 158 | 1.92 | 0.84 | - | - | - | - | - | - | 129 | 1.83 | 0.67 |
| Audiotaped Warmth | 158 | 2.68 | 0.96 | - | - | - | - | - | - | 129 | 2.00 | 0.61 |
| Self-reported Overreactivity | 182 | 2.80 | 0.74 | 175 | 2.76 | 0.79 | 154 | 2.67 | 0.73 | 160 | 2.76 | 0.79 |
| Self-reported Laxness | 181 | 2.96 | 0.97 | 175 | 2.74 | 0.90 | 155 | 2.65 | 0.96 | 161 | 2.69 | 0.91 |
| Videotaped Warmth | 170 | 4.33 | 1.15 | 163 | 4.19 | 0.99 | 120 | 4.45 | 0.62 | 132 | 4.22 | 0.56 |
| Videotaped Negative Affect | 170 | 1.20 | 0.44 | 163 | 1.15 | 0.44 | 120 | 1.04 | 0.13 | 132 | 1.02 | 0.07 |
| Videotaped Laxness | 170 | 1.21 | 0.45 | 163 | 1.12 | 0.31 | 120 | 1.05 | 0.18 | 132 | 1.05 | 0.27 |

Note: CD = conduct disorder.

Table 2

Intercorrelations between CD symptoms and Maternal Parenting Variables at Time 1

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---------------------------------|---|------|-----|-------|---------|--------|-------|---------|
| 1. CD symptoms | - | .15* | .07 | -.04 | -.05 | .02 | -.03 | .09 |
| 2. Self-reported Overreactivity | | - | .13 | .08 | .07 | -.01 | .14 | -.11 |
| 3. Self-reported Laxness | | | - | -.20* | .19* | -.01 | .26** | -.12 |
| 4. Videotaped Warmth | | | | - | -.37*** | -.08 | -.04 | .22** |
| 5. Videotaped Negative Affect | | | | | - | .45*** | .06 | -.23** |
| 6. Videotaped Laxness | | | | | | - | -.01 | -.04 |
| 7. Audiotaped Negative Affect | | | | | | | - | -.38*** |
| 8. Audiotaped Warmth | | | | | | | | - |

Note: CD = conduct disorder. * $p < .05$. ** $p < .01$. *** $p < .001$

Table 3

Intercorrelations between CD symptoms and Maternal Parenting Variables at Time 2

| | 1 | 2 | 3 | 4 | 5 | 6 |
|---------------------------------|---|-----|-------|--------|--------|------|
| 1. CD symptoms | - | .15 | -.01 | -.09 | -.03 | -.09 |
| 2. Self-reported Overreactivity | | - | .23** | -.06 | .07 | -.05 |
| 3. Self-reported Laxness | | | - | -.21** | .07 | .15 |
| 4. Videotaped Warmth | | | | - | -.24** | .05 |
| 5. Videotaped Negative Affect | | | | | - | .03 |
| 6. Videotaped Laxness | | | | | | - |

Note: CD = conduct disorder. * $p < .05$. ** $p < .01$. *** $p < .001$

Table 4

Intercorrelations between CD symptoms and Maternal Parenting Variables at Time 3

| | 1 | 2 | 3 | 4 | 5 | 6 |
|---------------------------------|---|--------|--------|------|-------|------|
| 1. CD symptoms | - | .33*** | .06 | -.06 | -.001 | .05 |
| 2. Self-reported Overreactivity | | - | .30*** | -.02 | .004 | .06 |
| 3. Self-reported Laxness | | | - | -.14 | -.10 | -.02 |
| 4. Videotaped Warmth | | | | - | -.16 | -.02 |
| 5. Videotaped Negative Affect | | | | | - | .04 |
| 6. Videotaped Laxness | | | | | | - |

Note: CD = conduct disorder. * $p < .05$. ** $p < .01$. *** $p < .001$

Table 5

Intercorrelations between CD symptoms and Maternal Parenting Variables at Time 4

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---------------------------------|---|-----|--------|---------|------|--------|-------|---------|
| 1. CD symptoms | - | .13 | -.04 | .03 | -.03 | .03 | .04 | -.16 |
| 2. Self-reported Overreactivity | | - | .37*** | -.09 | -.06 | -.03 | .20* | -.18* |
| 3. Self-reported Laxness | | | - | -.40*** | .10 | -.04 | .24** | -.10 |
| 4. Videotaped Warmth | | | | - | -.17 | -.22** | -.16 | .02 |
| 5. Videotaped Negative Affect | | | | | - | .04 | .17 | .04 |
| 6. Videotaped Laxness | | | | | | - | .02 | -.07 |
| 7. Audiotaped Negative Affect | | | | | | | - | -.31*** |
| 8. Audiotaped Warmth Intensity | | | | | | | | - |

Note: CD = conduct disorder. * $p < .05$. ** $p < .01$. *** $p < .001$

Table 6

Model fitting results for Audiotaped Maternal Variables and CD symptoms

| | Fit of model comparisons | | | Compared to model | Difference in fit of models | | |
|----------------------------|--------------------------|-----------|------------|-------------------|-----------------------------|-------------|----------------|
| | χ^2 | <i>df</i> | <i>p</i> | | $\Delta\chi^2$ | Δdf | <i>p</i> |
| Audiotaped Negative Affect | | | | | | | |
| Model A | .60 | 2 | .74 | -- | -- | -- | -- |
| Model B | .01 | 1 | .92 | A | .50 | 1 | .44 |
| Model C | .59 | 1 | .44 | A | .01 | 1 | .92 |
| Audiotaped Warmth | | | | | | | |
| Model A | 4.02 | 2 | .13 | -- | -- | -- | -- |
| Model B | 3.98 | 1 | .05 | A | .03 | 1 | .86 |
| Model C | .05 | 1 | .82 | A | 3.97 | 1 | >.05 |

Note: Best fitting model indicated in bold. Model A = best model without lagged effects; Model B = best model with parent-to-child pathways only; Model C = best model with child-to-parent pathways only.

Table 7

Model fitting results for Self-reported Maternal Variables and CD symptoms

| | Fit of model comparisons | | | Difference in fit of models | | | |
|------------------------------|--------------------------|-----------|------------|-----------------------------|----------------|-------------|----------|
| | χ^2 | <i>df</i> | <i>p</i> | Compared to model | $\Delta\chi^2$ | Δdf | <i>p</i> |
| Self-reported Overreactivity | | | | | | | |
| Model A | 18.68 | 16 | .29 | -- | -- | -- | -- |
| Model B | 18.08 | 15 | .26 | A | 0.60 | 1 | .44 |
| Model C | 16.67 | 15 | .34 | A | 2.01 | 1 | .16 |
| Self-reported Laxness | | | | | | | |
| Model A | 12.30 | 16 | .72 | -- | -- | -- | -- |
| Model B | 11.97 | 15 | .68 | A | 0.33 | 1 | >.57 |
| Model C | 10.90 | 15 | .76 | A | 1.40 | 1 | >.24 |

Note: Best fitting model indicated in bold. Model A = best model without lagged effects; Model B = best model with parent-to-child pathways only; Model C = best model with child-to-parent pathways only; Model D = best cross-lagged model.

Table 8

Model fitting results for Videotaped Maternal Variables and CD symptoms

| | Fit of model comparisons | | | Difference in fit of models | | | |
|----------------------------|--------------------------|-----------|------------|-----------------------------|----------------|-------------|----------|
| | χ^2 | <i>df</i> | <i>p</i> | Compared to model | $\Delta\chi^2$ | Δdf | <i>p</i> |
| Videotaped Warmth | | | | | | | |
| Model A | 15.93 | 18 | .60 | -- | -- | -- | -- |
| Model B | 15.37 | 17 | .57 | A | 0.56 | 1 | .45 |
| Model C | 15.57 | 17 | .55 | A | 0.36 | 1 | .55 |
| Videotaped Negative Affect | | | | | | | |
| Model A | 31.46 | 18 | .03 | -- | -- | -- | -- |
| Model B | 31.04 | 17 | .02 | A | 0.42 | 1 | .52 |
| Model C | 31.27 | 17 | .02 | A | 0.19 | 1 | .66 |
| Videotaped Laxness | | | | | | | |
| Model A | 22.66 | 18 | .20 | -- | -- | -- | -- |
| Model B | 22.63 | 17 | .16 | A | 0.03 | 1 | .86 |
| Model C | 15.49 | 15 | .41 | A | 7.17 | 3 | .07 |

Note: Best fitting model indicated in bold. Model A = best model without lagged effects; Model B = best model with parent-to-child pathways only; Model C = best model with child-to-parent pathways only; Model D = best cross-lagged model.

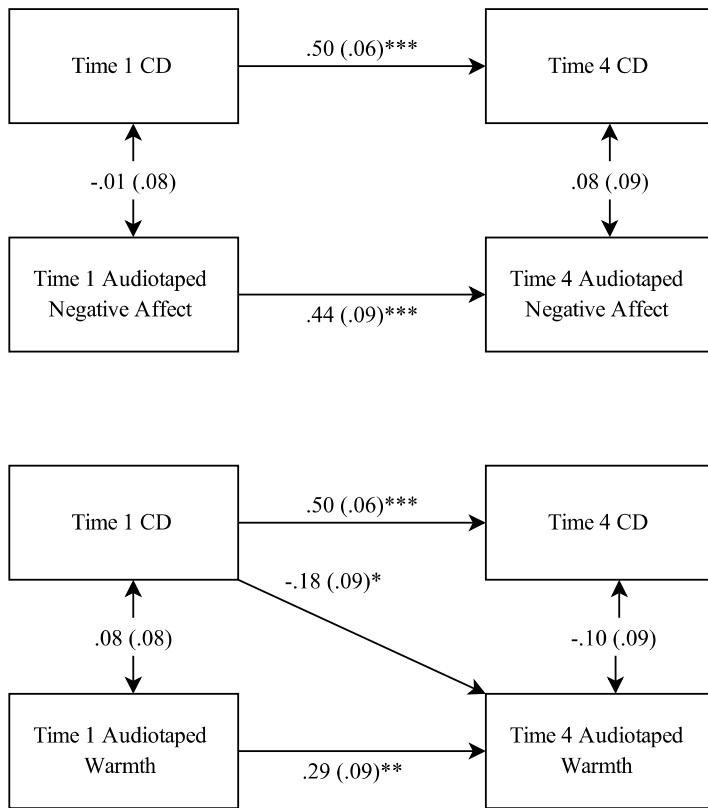


Figure 1. Models for Audiotaped Maternal Parenting Variables and CD symptoms. Standardized coefficients are presented. CD = conduct disorder symptoms. * $p < .05$. ** $p < .01$. *** $p < .001$

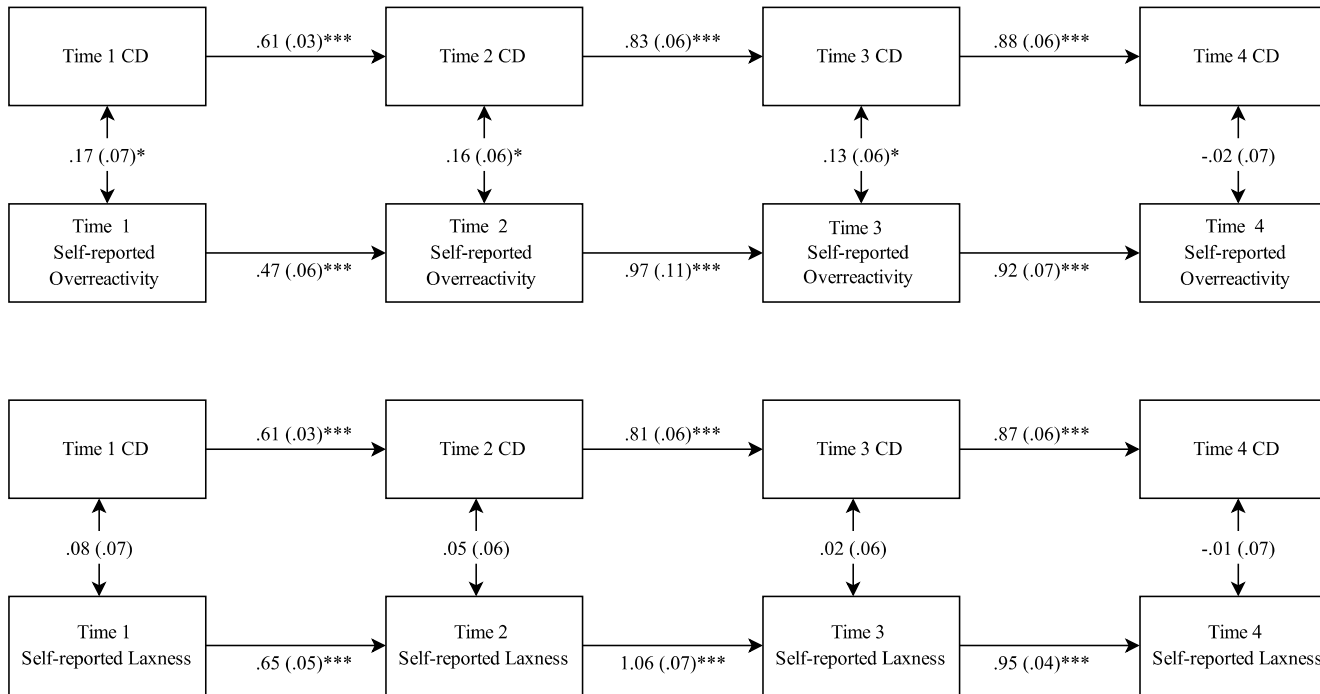


Figure 2. Models for Self-reported Maternal Parenting Variables and CD symptoms. CD = conduct disorder symptoms. Standardized coefficients are presented. * $p < .05$. *** $p < .001$

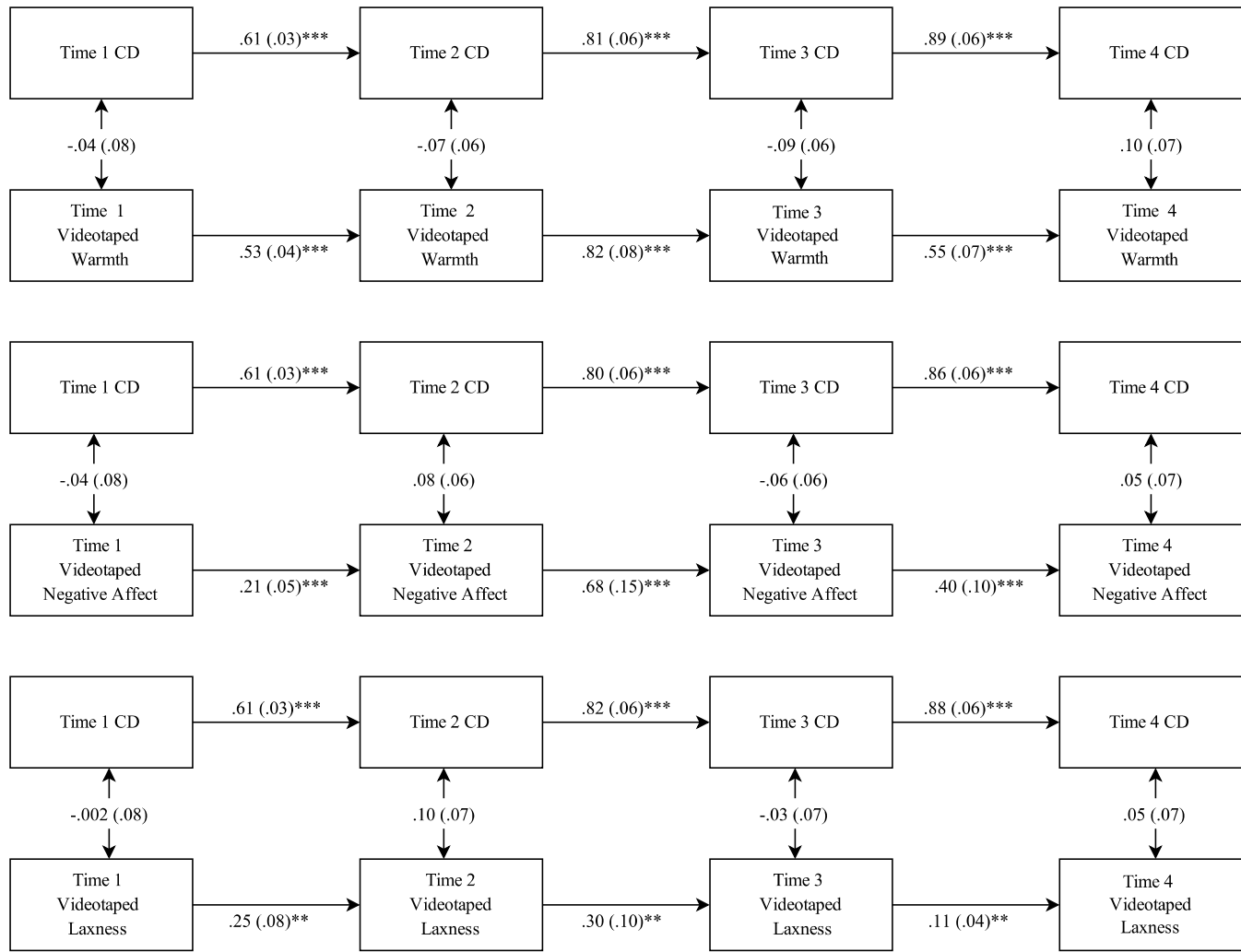
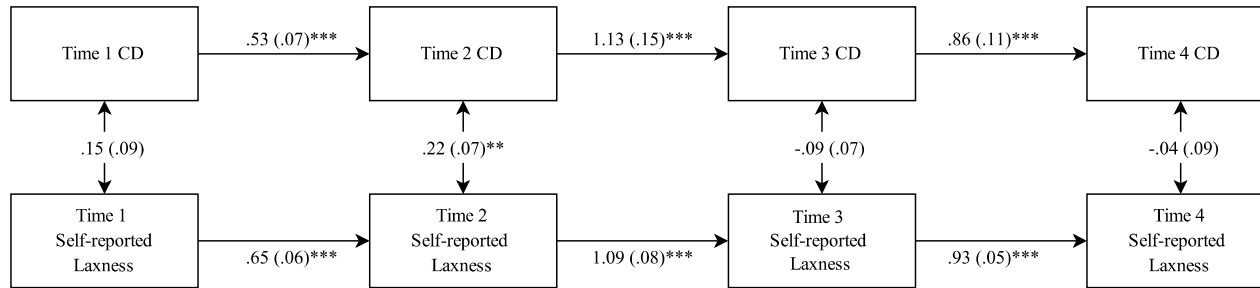
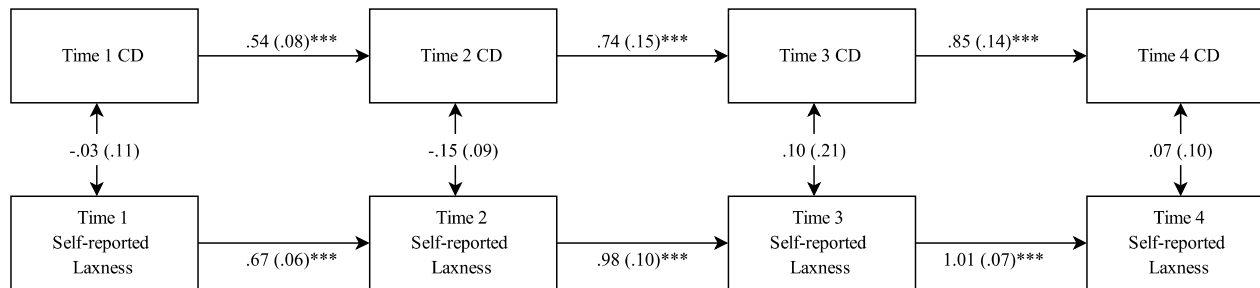


Figure 3. Models for Videotaped Maternal Parenting Variables and CD symptoms. CD = conduct disorder symptoms. Standardized coefficients are presented. $**p < .01$. $***p < .001$



a) Boys



b) Girls

Figure 4. Model for Self-reported Maternal Laxness and CD symptoms by Sex. CD = conduct disorder symptoms. Standardized coefficients are presented. **p < .01. ***p < .001

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